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As filed with the Securities and Exchange Commission on April 5, 2019

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UNITED STATES  
SECURITIES AND EXCHANGE COMMISSION  
Washington, D.C. 20549

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FORM 20-F  
ANNUAL REPORT PURSUANT TO  
SECTION 13 OR 15(d) OF  
THE SECURITIES EXCHANGE ACT OF 1934

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For the fiscal year ended December 31, 2018

Commission file number: 001-34175

ECOPETROL S.A.  
(Exact name of Registrant as specified in its charter)

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N/A  
(Translation of Registrant's name into English)

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REPUBLIC OF COLOMBIA  
(Jurisdiction of incorporation or organization)

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Carrera 13 No. 36 – 24  
BOGOTA – COLOMBIA  
(Address of principal executive offices)  
Tel. (571) 234 4000

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Investor Relations Officer  
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Bogota, Colombia

(Name, Telephone, E-Mail and/or Facsimile number and Address of Company Contact Person)

Securities registered or to be registered pursuant to Section 12(b) of the Act.

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**Title of each class**

American Depository Shares (as evidenced by American Depository Receipts),  
each representing 20 common shares par value COP\$609 per share  
Ecopetrol common shares par value COP\$609 per share

**Name of each exchange on which registered:**

New York Stock Exchange  
New York Stock Exchange (for listing purposes only)

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**Title of each class**

5.875% Notes due 2023  
 4.125% Notes due 2025  
 5.375% Notes due 2026  
 7.375% Notes due 2043  
 5.875% Notes due 2045

**Name of each exchange on which registered**

New York Stock Exchange  
 New York Stock Exchange  
 New York Stock Exchange  
 New York Stock Exchange  
 New York Stock Exchange

Securities registered or to be registered pursuant to Section 12(g) of the Act: None

Securities for which there is a reporting obligation pursuant to Section 15(d) of the Act: None

Indicate the number of outstanding shares of each of the issuer's classes of capital or common stock as of the close of the period covered by the annual report.

41,116,694,690 Ecopetrol common shares, par value COP\$609 per share

Indicate by check mark if the registrant is a well-known seasoned issuer, as defined in Rule 405 of the Securities Act.

Yes  No

If this report is an annual or transition report, indicate by check mark if the registrant is not required to file reports pursuant to Section 13 or 15(d) of the Securities Exchange Act of 1934.

Yes  No

Indicate by check mark whether the registrant (1) has filed all reports required to be filed by Section 13 or 15(d) of the Securities Exchange Act of 1934 during the preceding 12 months (or for such shorter period that the registrant was required to file such reports), and (2) has been subject to such filing requirements for the past 90 days.

Yes  No

Indicate by check mark whether the registrant has submitted electronically every Interactive Data File required to be submitted pursuant to Rule 405 of Regulation S-T (§232.405 of this chapter) during the preceding 12 months (or for such shorter period that the registrant was required to submit such files).

Yes  No

Indicate by check mark whether the registrant is a large accelerated filer, an accelerated filer, a non-accelerated filer, or an emerging growth company. See definition of "large accelerated filer," "accelerated filer," and "emerging growth company" in Rule 12b-2 of the Exchange Act.

Large accelerated filer       Accelerated filer       Non-accelerated filer       Emerging growth company

If an emerging growth company that prepares its financial statements in accordance with U.S. GAAP, indicate by check mark if the registrant has elected not to use the extended transition period for complying with any new or revised financial accounting standards<sup>†</sup> provided pursuant to Section 13(a) of the Exchange Act.

<sup>†</sup> The term "new or revised financial accounting standard" refers to any update issued by the Financial Accounting Standards Board to its Accounting Standards Codification after April 5, 2012.

Indicate by check mark which basis of accounting the registrant has used to prepare the financial statements included in this filing:

U.S. GAAP       International Financial Reporting Standards as issued by the International Accounting Standards Board       Other

If "Other" has been checked in response to the previous question, indicate by check mark which financial statement item the registrant has elected to follow:

Item 17  Item 18

If this is an annual report, indicate by check mark whether the registrant is a shell company (as defined in Rule 12b-2 of the Exchange Act).

Yes  No

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## 1. Introduction

### 1.1 About This Report

*We file our Annual Report on Form 20-F and other information with the U.S. Securities and Exchange Commission.*

We file reports, including annual reports on Form 20-F, and other information with the SEC pursuant to the rules and regulations of the SEC that apply to foreign private issuers. The materials included in this annual report on Form 20-F may be downloaded at the SEC's website: <http://www.sec.gov>. Any filings we make are also available to the public over the Internet at the SEC's website at [www.sec.gov](http://www.sec.gov) and at our website at [www.ecopetrol.com.co](http://www.ecopetrol.com.co). (This URL is intended to be an inactive textual reference only. It is not intended to be an active hyperlink to our website. The information on our website, which might be accessible through a hyperlink resulting from this URL, is not and shall not be deemed to be incorporated into this annual report.)

Unless the context otherwise requires, the terms "Ecopetrol," "we," "us," "our," or the "Company" are used in this annual report to refer to Ecopetrol S.A. and its subsidiaries on a consolidated basis.

References to the Nation in this annual report relate to the Republic of Colombia ("Colombia"), our controlling shareholder. References made to the Colombian government or the Government correspond to the executive branch including the President of Colombia, the ministries and other governmental agencies responsible for regulating our business.

### 1.2 Forward-looking Statements

This annual report on Form 20-F contains forward-looking statements within the meaning of the safe harbor provisions of the U.S. Private Securities Litigation Reform Act of 1995. These statements are not based on historical facts and reflect our expectations for future events and results. Most facts are uncertain because of their nature. Words such as "anticipate," "believe," "could," "estimate," "expect," "should," "plan," "potential," "predicts," "prognosticate," "project," "target," "achieve" and "intend," among other similar expressions, are understood as forward-looking statements. We have made forward-looking statements that address, among other things:

- our exploration and production activities, including drilling;
- import and export activities;
- our liquidity, cash flow, and sources of funding;
- our projected and targeted capital expenditures and other cost commitments and revenues; and
- dates by which certain areas will be developed or will come on-stream.

Our forward-looking statements and sensitivity analysis are not guarantees of future performance and are subject to assumptions that may prove incorrect and to risks and uncertainties that are difficult to predict. Actual results could differ materially from those expressed or forecasted in any forward-looking statements as a result of a variety of factors. These factors may include, but are not limited to, the following:

- general economic and business conditions, including crude oil and other commodity prices, refining margins and prevailing exchange rates;
- competition;
- our ability to obtain financing;
- our ability to find, acquire or gain access to additional reserves and our ability to develop existing reserves;
- uncertainties inherent in making estimates of our reserves;



- significant political, economic and social developments in Colombia and other countries where we do business;
- natural disasters, military operations, terrorist acts, wars or embargoes;
- regulatory developments, including regulations related to climate change;
- receipt of government approvals and licenses;
- technical difficulties; and
- other factors discussed in Section 5.1 of this document as “Risk Factors.”

All forward-looking statements attributed to us are qualified in their entirety by this cautionary statement. We undertake no obligation to publicly update or revise any forward-looking statements, whether as a result of new information or for any other reason. Accordingly, readers should not place undue reliance on the forward-looking statements.

### 1.3 Selected Financial and Operating Data

The following table sets forth, for the periods and at the dates indicated, our selected historical financial and certain key operating data. The selected financial data has been derived from and should be read in conjunction with, and is qualified in its entirety by reference to, our consolidated audited financial statements, presented in Colombian Pesos.

**Table 1 – Selected Operating Data**

<b>Operating Information</b>	<b>2018</b>	<b>2017</b>	<b>2016</b>	<b>2015</b>	<b>2014</b>
Oil and gas production (mboed)	720.4	715.1	717.9	760.7	755.4
Proved oil and gas reserves (Mmboe) <sup>(1)</sup>	1,727	1,659	1,598	1,849	2,084
Exploratory Wells <sup>(2)</sup>	17	20	6	5	28
Refinery Through-put (bpd) <sup>(3)</sup>	375,666	347,483	332,751	234,861	240,484
IP Reserves replacement ratio	129%	126%	(7)%	6%	146%

(1) Proved oil and gas reserves include natural gas royalties and exclude crude oil royalties.

(2) Gross exploratory wells.

(3) Refinery throughput includes the Barrancabermeja, Reficar, Apiay and Orito refineries. Reficar operations were shut down in March 2014 for the expansion and modernization plan. The new crude unit began start-up process in October 2015. During 2016, Reficar was undergoing the unit startup phase and commenced full operation in July 2016. The refinery’s global performance testing was successfully completed in the fourth quarter of 2017, resulting in the start of the refinery’s optimization and continuous operation stage. During 2018, Reficar continued its optimization phase.

### **Financial Information**

International Financial Reporting Standards (“IFRS”)

(Expressed in millions of Colombian Pesos, except for the net income per share and net operating income per share, which are expressed in Colombian Pesos)

**Table 2 – Selected Financial Data**

<b>Financial Information</b>	<b>2018</b>	<b>2017</b>	<b>2016</b>	<b>2015</b>	<b>2014</b>
Revenue	68,603,872	55,954,228	48,485,561	52,347,271	65,971,888
Operating income	22,458,414	16,171,855	8,904,548	2,131,165	14,449,027
Net income (loss) attributable to Ecopetrol’s shareholders	11,381,386	7,178,539	2,447,881	(7,193,859)	5,046,517

<b>Financial Information</b>	<b>2018</b>	<b>2017</b>	<b>2016</b>	<b>2015</b>	<b>2014</b>
Net operating income per share	546	393	217	51.8	351.4
Weighted average number of shares outstanding	41,116,694,690	41,116,694,690	41,116,694,690	41,116,694,690	41,116,698,456
Earnings (loss) per share (basic and diluted)	277	175	59.5	(175.0)	122.7
<b>Total assets</b>	<b>124,643,498</b>	<b>117,847,412</b>	<b>118,958,977</b>	<b>123,588,190</b>	<b>110,923,851</b>
<b>Total equity</b>	<b>57,107,780</b>	<b>48,215,699</b>	<b>43,560,501</b>	<b>43,100,963</b>	<b>48,534,228</b>
Subscribed and paid-in capital	25,040,067	25,040,067	25,040,067	25,040,068	10,279,175
Number of common shares	41,116,694,690	41,116,694,690	41,116,694,690	41,116,694,690	41,116,698,456
Dividends declared per share	225	89	23	-	133
<b>Total liabilities</b>	<b>67,535,718</b>	<b>69,631,713</b>	<b>75,398,476</b>	<b>80,487,227</b>	<b>62,389,623</b>

Our consolidated financial statements for the years ended December 31, 2014, 2015, 2016, 2017 and 2018 were prepared in accordance with IFRS as issued by IASB. References in this annual report to IFRS mean IFRS as issued by the IASB. Our date of transition to IFRS was January 1, 2014. Our consolidated financial statements for the year ended December 31, 2015 were our first set of consolidated financial statements prepared in accordance with IFRS.

IFRS differs in certain significant aspects from the current reporting standards as in effect in Colombia (“Colombian IFRS”), which is the accounting standard we use for local reporting purposes. As a result, our financial information presented under IFRS is not directly comparable to our financial information presented under Colombian IFRS. For a description of the differences between Colombian IFRS and IFRS, see section *Financial Review—Summary of Differences between Internal Reporting Policies and IFRS*.

Our consolidated financial statements were consolidated line by line and all transactions and balances between subsidiaries have been eliminated. These financial statements include the financial results of all subsidiary companies controlled, directly or indirectly, by Ecopetrol S.A. See Exhibit 1 – Consolidated companies, associates and joint ventures, to our consolidated financial statements included in this annual report.

As indicated IFRS 10 “Consolidated Financial Statements” we must present our financial information on a consolidated basis as if we were a single entity, combining the financial statements of Ecopetrol S.A. and its subsidiaries line by line, adding assets, liabilities, shareholder’s equity, revenues and expenses of similar nature, removing the reciprocal items among members of the Ecopetrol Group (“Ecopetrol Group” or “EG”) and recognizing non-controlling interest. We present our operating information on a consolidated basis in accordance with IFRS.

The regulations of the SEC do not require foreign private issuers that prepare their financial statements on the basis of IFRS to reconcile such financial statements to U.S. GAAP. Accordingly, while we have in the past reconciled our consolidated financial statements prepared in accordance with Colombian Government Entity GAAP to U.S. GAAP, these reconciliations have not been presented in our filings to the SEC since 2015. We do continue to provide the disclosure required under the U.S. Financial Accounting Standards Board (FASB) Accounting Standards Codification (ASC) Topic 932 “Extractive Activities—Oil and Gas” (which we refer to as ASC Topic 932), as this is required, regardless of the basis of accounting on which we prepare our financial statements.

In this annual report, references to “US\$” or “U.S. dollars” are to United States dollars and references to “COP\$” “Colombian Peso” or “Colombian Pesos” are to Colombian Pesos, the Ecopetrol Group’s functional and presentation currency under which we prepare our consolidated financial statements. This annual report translates certain Colombian Peso amounts into U.S. dollars at specified rates solely for the convenience of the reader. Unless otherwise indicated, such Colombian Peso amounts have been translated at the rate of COP\$2,956.55 per US\$1.00, which corresponds to the *Tasa Representativa Promedio del Mercado* (TRM), or Average Representative Market Exchange Rate, for 2018. Such conversion should not be construed as a representation that the Colombian Peso amounts correspond to, or have been or could be converted into, U.S. dollars at that rate or any other rate. On April 1, 2019, the Representative Market Exchange Rate was COP\$3,174.79 per US\$1.00.

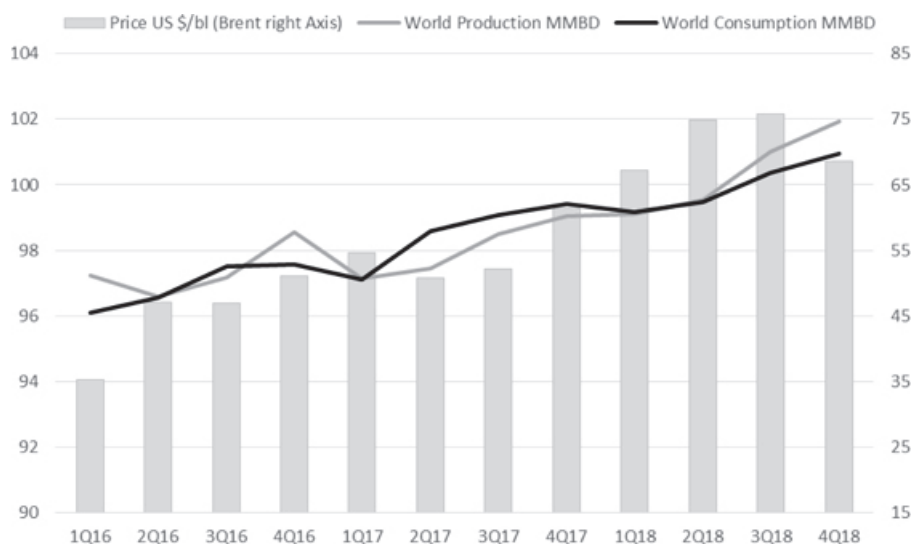
Certain figures shown in this annual report have been subject to rounding adjustments, and, accordingly, certain totals may therefore not precisely equal the sum of the numbers presented. In this annual report a billion is equal to one with nine zeros.

## 2. Strategy and Market Overview

After experiencing a gradual recovery during the first half of 2018 and reaching a peak in October, the ICE Brent price suffered a downward trend in the latter part of 2018. The expectation of weaker economic growth for 2019 and a mismatch of supply and demand of crude played a fundamental role in this trend. The US government imposed sanctions on Iran in August of 2018, announcing the goal of reducing Iranian crude and condensate exports to almost zero. This created an expectation of a tight oil market during the latter part of 2018. However, several factors did not support a strong market outlook: refining margins weakened, inventories began to pile up and production from the US, Saudi Arabia and Russia ramped up, all at the same time. Additionally, the US government provided waivers to Iranian crude importers. As a reaction to low crude prices, the OPEC+ countries agreed to cut production in order to rebalance the crude market. On the demand side, weaker economic growth in China and Europe did not favor crude oil consumption.

According to estimates of the Energy Information Administration (“EIA”), in 2018 global consumption of petroleum and other liquids fuels grew by 1.4 mmboepd while Non-OPEC petroleum and other liquid fuels supply grew by 2.5 mmboepd. On the other hand, OPEC reduced its production by 0.09 mmboepd, mainly due to unplanned crude oil disruptions which in December amounted to 2.2 mmboepd in Libya and Nigeria, Iranian sanctions and decreasing production in Venezuela.

**Graph 1 – Supply/Demand Balance vs ICE Brent Price Evolution**



Source: EIA: Short term Energy Outlook (January 15, 2019)

Although international oil prices and global demand and supply dynamics are significant factors affecting our business and financial condition, Colombia’s local economic factors have also influenced, and could continue to influence, our performance given that we conduct most of our business in Colombia.

The performance of Colombia's gross domestic product (GDP) is one of the main drivers of fuel consumption in Colombia. According to the National Administrative Department of Statistics (DANE for its acronym in Spanish), during 2018 Colombia's GDP grew 2.7% in real terms, as compared to 2017. The sectors with the greatest growth rates were retail, manufacturing and state defense spending which had the largest contribution to national GDP. On the other hand, agricultural and cattle activities had the worst performance. Local sales of liquid fuels increased by 1.3%, boosted by increased demand for diesel and jet fuel.

Natural gas demand in Colombia grew by 5.1% in 2018 due to higher demand from natural gas fired power plants and from non-thermal demand, mainly for household consumption.

## **2.1 Our Corporate Strategy**

### **2.1.1 Business Plan**

Ecopetrol's 2019 – 2021 (the "Business Plan") maintains the strategic priorities set forth in the previous 2020 plan: we continue to prioritize profitable reserves and production growth, underpinned by strict capital discipline and continued focus on cost efficiency and cash flow generation. The plan seeks to maximize value generation for our shareholders with continued focus on our incumbent position in Colombia, ensuring sustainability, competitiveness and profitability.

Among other matters, the Business Plan calls for achieving the following targets by the end of 2021: (i) organic production levels between 750-770 mboed, (ii) optimum throughput of the integrated refining system at a level between 370-400 mbpd, (iii) increasing transported volumes in line with the country's production, (iv) investing approximately US\$12-15 billion during the period and (v) maintaining a robust cash position and optimal leverage levels. The Business Plan is based on a reference price of US\$65/bl.

Growth in reserves and production will be supported by four levers: (i) continuing the growth of our recovery factors and underlying hydrocarbons in place in existing fields, (ii) the diversification of our exploration portfolio in Colombia, (iii) the internationalization of our operations through both organic and inorganic means, and (iv) the appraisal and development of identified unconventional hydrocarbon potential in Colombia.

We estimate that by 2021 hydrocarbons originally in place (HCIIP) associated to our assets in Colombia will be approximately 60 billion barrels compared to 55 billion barrels as of the end of 2018. This increase is expected to be supported by seismic reprocessing, reassessments of reservoirs and drilling of advanced wells, among others. Additionally, the enhanced program is expected to continue to leverage our reserve and production growth.

Growth in the exploratory portfolio in Colombia will prioritize the incorporation of short cycle resources through the strengthening of the near field exploration activity in Colombia, mainly in the Llanos and Middle Magdalena basins. Furthermore, we seek to expand our presence in high potential under-explored basins, such as Putumayo and Piedemonte, and developing the potential of our operations in the offshore Caribbean.

The internationalization lever seeks to develop and maximize the potential of the position we have built in Brazil, the U.S. Gulf Mexico and Mexico. In addition, we expect to continue assessing business opportunities associated with unconventional hydrocarbon basins in the United States and other mergers and acquisition opportunities in those geographies.

We have identified unconventional hydrocarbons potential in two basins in Colombia of approximately 10 tera cubic feet of gas and between 4 and 7 billion barrels of crude. In our investment plan described below, we are allocating US\$500 million for the development of pilot programs between 2019 and 2021, subject to government approval. If successful, we would then move to the commercial development of these pilots after 2021.

Our sustainability and growth are also leveraged in the concept of integration of our different segments.

We expect our midstream segment (or "transportation and logistics segment") to continue being an important cash generator. In order to do so, the Business Plan calls for, among others, the segment to focus on improving efficiencies and synergies in our transportation system and pursuing investment opportunities in product pipelines given the increase in demand for fuels in Colombia. The Business Plan is currently projecting that our transport systems will move between 1.10-1.25 million barrels of oil and products per day during the period.

In our downstream segment (or “refining, petrochemicals, and biofuels segment”), the Business Plan focuses on the use and optimization of current infrastructure in order to achieve an expected refining throughput between 370-400 mbpd and an expected refining margin between US\$12-15/bl, subject to market conditions. We expect to achieve this (i) through the incorporation of synergies between the Barrancabermeja and Cartagena refineries and (ii) by capturing market opportunities associated with the implementation of the International Convention for the Prevention of Pollution from Ships (Marpol), which favors the use of fuels with lower sulfur content in maritime transport. Additionally, as we did in 2018, we expect to continue delivering low sulfur diesel of 20 parts per million (ppm) and gasoline of 100 ppm versus the Colombian regulation of 50 ppm and 300 ppm, respectively.

Following the implementation of our transformation program in 2015, we have accumulated approximately US\$3.3 billion in efficiencies to date. Our Business Plan is focused on continuing this trend. We expect to capture savings of approximately US\$1.45-2.0 billion between 2019 and 2021, particularly: (i) capital expenditure efficiencies, (ii) revenue and margin optimization and (iii) operating expenditure efficiencies.

In terms of sustainability, the Business Plan calls for integral water management, the protection of biodiversity and a continued focus on climate change, among others, all within the framework of the United Nations Sustainable Development Goals 2030. We expect to invest approximately COP\$2 trillion in socio-environmental projects between 2019 and 2021. We are also seeking to reduce our energy costs by US \$100 million by 2021 and increase our investments in renewable energy sources through the incorporation of 60 MW of renewable photovoltaic energy to our energy matrix, which already has 43 MW of biomass generation.

We currently expect the Business Plan to require investments of between US\$12-15 billion during the 2019-2021 period, of which approximately 82% would be allocated to the upstream segment, 8% to the midstream segment, 7% to the downstream segment and 3% to other. These investments exclude inorganic growth opportunities, which if materialized, could be financed through cash from operations.

The Business Plan seeks to maintain leverage metrics to help us preserve our investment grade rating while allowing flexibility for specific optimizations of our capital structure during the period.

### 2.1.2 2019 Investment Plan

In November 2018, the Board of Directors approved between US\$3.5 and US\$4.0 billion for the 2019 investment plan. The Ecopetrol Group plans to produce between 720 and 730 thousand barrels of oil equivalent per day during 2019. The table below sets forth the details of the investment plan per business segment.

**Table 3 – 2019 Investment Plan**

<b>Business Segment</b>	<b>Millions of US\$<sup>(1)</sup></b>	<b>% Percentage<sup>(2)</sup></b>
Exploration	430-490	12%
Production	2,385-2,725	68%
Midstream	240-275	7%
Downstream	365-420	11%
Others	80-90	2%
<b>TOTAL</b>	<b>3,500-4,000</b>	<b>100%</b>

(1) Rounded figures.

(2) Percentage over the upper range

#### *Exploration*

In the exploration segment, US\$430-US\$490 million has been allocated mainly to the evaluation and appraisal of discoveries and ongoing exploration activity of Ecopetrol S.A. (approximately 44%), Hocol S.A. (“Hocol”) (approximately 12%), Ecopetrol America Inc. (approximately 1%), ECP Hidrocarburos Mexico (approximately 7%), Ecopetrol Costa Afuera (approximately 3%) and Ecopetrol Brazil (approximately 33%).

### *Production*

In the production segment, US\$2,385-US\$2,725 million has been allocated mainly to the execution of development and incremental production projects of Ecopetrol S.A. (approximately 91%) primarily at Castilla, Rubiales, Chichimene, Apiay-Suria, Yarigui-Cantagallo, La Cira-Infantas, Casabe, Piedemonte and Quifa. We have also allocated funds for our affiliates and subsidiaries as follows: approximately 3% for the development, operation and maintenance of fields of Ecopetrol America Inc. in the U.S. Gulf of Mexico, approximately 5% to Hocol, approximately 1% to Equion and Savia.

### *Midstream*

In the midstream segment, US\$240-US\$275 million has been allocated to investments focused on system and operational integrity. The segment is seeking a higher efficiency in operations and maintenance practices.

### *Downstream*

In the downstream segment, US\$365-US\$420 million has been principally allocated to Barrancabermeja refinery and Reficar through initiatives aimed at increasing revenues, enhancing integrity management, improving efficiency and reducing operational costs. The segment is seeking a higher efficiency in operations and maintenance practices in order to maximize the value of the existing assets.

## **3. Business Overview**

### **3.1 Our History**

We were formed in 1951 by the Colombian government as *Empresa Colombiana de Petr leos* and began operating the crude oil fields at La Cira-Infantas, the oldest Colombian oil field, where production started in 1918, and the pipeline that connected that field with the Barrancabermeja refinery and the port of Cartagena. In 1961, we assumed the direct operation of the Barrancabermeja refinery and continued its transformation into an industrial complex. In 1974, we acquired the Cartagena Refinery (as defined below), which had been in operation since 1957. Pursuant to Decree 0062 of 1970, we were transformed into a governmental, industrial and commercial company.

In 2003 pursuant to Decree Law 1760, the *Agencia Nacional de Hidrocarburos* - National Hydrocarbons Agency (the "ANH") was created and Ecopetrol's public role as administrator and regulator of the national hydrocarbons resources was transferred to the ANH. Ecopetrol modified its organic structure and became Ecopetrol S.A., a public stock-holding corporation, one hundred percent state-owned, and continued the development of exploration and production activities in a competitive basis with autonomy over our business decisions. Since 2006, according to Law 1118, we have been evolving from a wholly state-owned entity to a mixed-economy company with private capital. This process has resulted in a substantial change in the legal framework to which we are subject and in the nature of our relationship with the Nation, as our controlling shareholder. As of March 23, 2018, pursuant to our amended bylaws, the duration of the Company is 100 years.

We carried out our initial public offering in November 2007, when our common shares were listed on the Colombian Stock Exchange. Our American Depository Shares ("ADSs") were listed on the New York Stock Exchange in 2008. Starting in August 2010, our ADSs began trading on the Toronto Stock Exchange ("TSX") under the symbol "ECP." On February 17, 2016, we announced our application for voluntary delisting from the TSX. On March 25, 2016, our ADR's were officially delisted from the TSX. On December 7, 2017, we applied to the Alberta Securities Commission and the Ontario Securities Commission to cease our reporting requirements, due to our delisting process. On September 4, 2018, we announced that effective August 29, 2018, we had ceased to be a reporting issuer in each of the provinces of Alberta and Ontario and hence were no longer a reporting issuer in any jurisdiction in Canada. Accordingly, Ecopetrol no longer has any continuous disclosure obligations in Canada.

### 3.2 Our Corporate Structure

We operate in the following business segments: i) Exploration and Production; ii) Transportation and Logistics; and iii) Refining, Petrochemicals, and Biofuels.

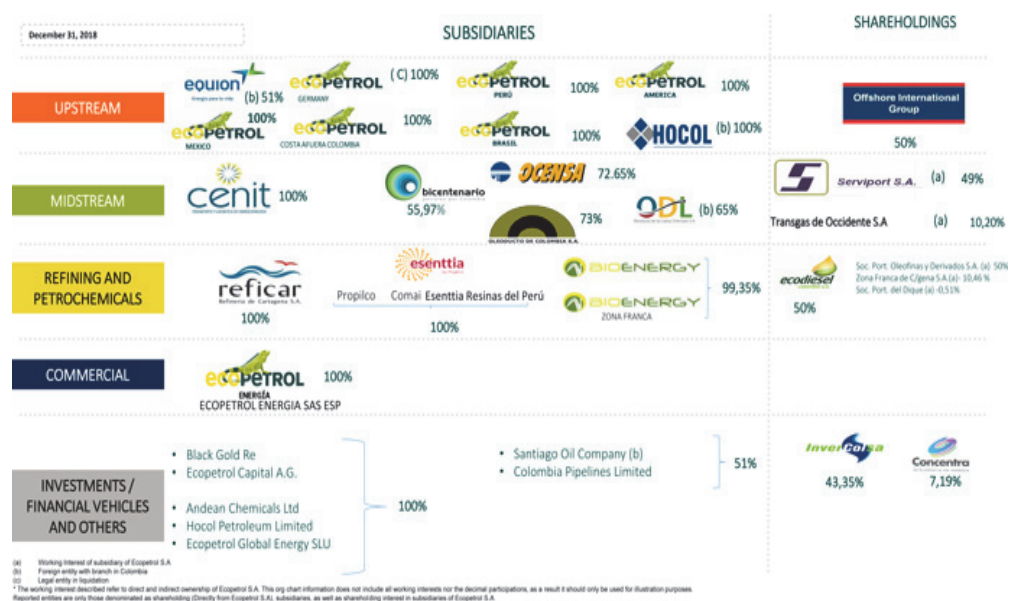
Our subsidiaries, Refinería de Cartagena S.A. (“Reficar” or “Cartagena Refinery”), Cenit Transporte y Logística de Hidrocarburos S.A.S. (Cenit) and Oleoducto Central S.A. (Ocesa) are significant subsidiaries, as such term is defined under SEC Regulation S-X.

We have a number of directly and indirectly held subsidiaries both in Colombia and abroad. Our subsidiaries are either directly owned by us or indirectly owned by us through one or more of our other subsidiaries. As of December 31, 2018, we have seven directly owned and 29 indirectly owned subsidiaries.

During 2018, the following changes were made to the Ecopetrol Group’s structure:

- i. In March 2018, Ecopetrol S.A. incorporated a new subsidiary, Ecopetrol Energía SAS E.S.P., domiciled in Colombia, which will be responsible for commercialization of electricity for the Business Group. It began operations in December 2018.
- ii. On April 4, 2018, Ecopetrol Global Capital S.L.U. was liquidated.

**Graph 2 – Ecopetrol Corporate Structure**



The stock ownership percentage listed refers to Ecopetrol S.A.’s direct and indirect participation. The data in this structure shows neither the whole ownership nor its decimal figures, so they will be used only for information purposes.

The so-called shareholding (Ecopetrol S.A.’s direct participation), affiliated, subsidiary companies are listed, as well as the stock interest of Ecopetrol S.A.’s subordinate companies.

In 2017, Ecopetrol completed the divestment of its stake in Empresa de Energía de Bogotá S.A. E.S.P. EEB for a total of COP\$1,124 billion. The operation was carried out in accordance with the procedures defined by the Law 226 of 1995, the Decree 2305 of November 13, 2014, and the Decree 2110 of December 22, 2016.





During 2018, the exploration strategy was directed at leveraging our goal on three working fronts: onshore Colombia, offshore Caribbean, and strengthening and diversifying our exploration overseas.

### 3.4.1.1 *Exploration Activities in Colombia*

During 2018, Ecopetrol and its subsidiaries conducted drilling operations in twelve exploration wells (A3/A2) and in five appraisal wells (A1) in Colombia. Of these seventeen wells, six were successful, seven were plugged and abandoned, and four were under evaluation as of December 31, 2018. This activity was concentrated mainly in the following basins: Eastern Plains (Llanos Orientales), Lower Magdalena Valley, Middle Magdalena Valley and foothills.

In terms of onshore Colombia, our exploration efforts were focused on searching for hydrocarbons in mature basins, near-field exploration and areas close to existing production infrastructure.

In offshore activities, we increased our participation from 50% to 100% in the *Fuerte Sur* and Purple Angel blocks (Sinu offshore basin), which were relinquished by Anadarko Petroleum Corporation. In the case of the block Col-5 (Sinu offshore basin), the ANH approved the conversion of a Technical Evaluation Agreement (as defined below) to an Exploration and Production Contract (as defined below), where we have a 100% participation.

The following table sets forth, for the periods indicated, the number of gross and net productive and dry exploratory wells drilled by us and our joint venture partners, and the exploratory wells drilled by third parties pursuant to sole risk contracts with us.

**Table 4 – Exploratory Drilling in Colombia**

	For the year ended December 31,		
	2018	2017	2016
	(number of wells)		
<b>COLOMBIA</b>			
<b>Ecopetrol S.A.</b>			
<b>Gross Exploratory Wells</b>			
<b>Owned and operated by Ecopetrol</b>			
Productive	–	–	–
Dry <sup>(1)</sup>	–	1.0	1.0
<b>Total</b>	<u>–</u>	<u>1.0</u>	<u>1.0</u>
<b>Operated by Partner in Joint Venture</b>			
Productive	5.0	3.0	–
Dry	1.0	2.0	–
<b>Total</b>	<u>6.0</u>	<u>5.0</u>	<u>–</u>
<b>Operated by Ecopetrol in Joint Venture</b>			
Productive	–	–	–
Dry	–	1.0	–
<b>Total</b>	<u>–</u>	<u>1.0</u>	<u>–</u>
<b>Net Exploratory Wells<sup>(2)</sup></b>			
Productive	1.9	1.5	–
Dry	0.3	2.3	1.0
<b>Total</b>	<u>2.2</u>	<u>3.8</u>	<u>1.0</u>
<b>Sole Risk</b>			
Productive	–	–	–
Dry	2.0	–	–
<b>Total</b>	<u>2.0</u>	<u>–</u>	<u>–</u>
<b>ECAS</b>			
<b>Gross Exploratory Wells</b>			

	For the year ended December 31,		
	2018	2017 (number of wells)	2016
Productive	–	–	–
Dry	–	1.0	–
<b>Total</b>	<b>–</b>	<b>1.0</b>	<b>–</b>
<b>Net Exploratory Wells<sup>(2)</sup></b>			
Productive	–	–	–
Dry	–	0.5	–
<b>Total</b>	<b>–</b>	<b>0.5</b>	<b>–</b>
<b>Equion</b>			
<b>Gross Exploratory Wells</b>			
Productive	–	–	–
Dry	–	–	–
<b>Total</b>	<b>–</b>	<b>–</b>	<b>–</b>
<b>Hocol</b>			
<b>Gross Exploratory Wells</b>			
Productive	1.0	–	1.0
Dry	4.0	1.0	–
<b>Total</b>	<b>5.0</b>	<b>1.0</b>	<b>1.0</b>
<b>Net Exploratory Wells<sup>(2)</sup></b>			
Productive	1.0	–	0.5
Dry	3.2	1.0	–
<b>Total</b>	<b>4.2</b>	<b>1.0</b>	<b>0.5</b>

(1) A dry well or hole is an exploratory well found to be incapable of producing either crude oil or natural gas in sufficient quantities to justify completion as a crude oil or natural gas well.

(2) Net exploratory wells were calculated according to our percentage of ownership in these wells.

Ecopetrol drilled six successful wells in Colombia in 2018: (i) Jaspe 6D, where Ecopetrol holds a 30% working interest, and Frontera as the operator holds the remaining 70% at the Quifa block, (ii) Andina-1, where Ecopetrol holds a 50% working interest, and Parex Resources as the operator holds the remaining 50% at the Capachos block, (iii) Rex NE-02 ST-1, where Ecopetrol holds a 30% working interest, and Occidental Petroleum Corporation as the operator holds the remaining 70% at the Cosecha block, (iv) Andina-2, where Ecopetrol holds a 50% working interest, and Parex Resources as the operator holds the remaining 50% at the Capachos block, (v) Cosecha C-01, where Ecopetrol holds a 30% working interest, and Occidental Petroleum Corporation as the operator holds the remaining 70% at the Cosecha block and (vi) Arrecife-1, where our subsidiary Hocol owns a 100% working interest in the VIM-8 block.

Seven wells located in the Eastern plains (*Llanos Orientales*) and foothills were plugged and abandoned as follows: (i) Payero E-1 ST-1, where Ecopetrol holds a 20% working interest through our subsidiary Hocol, Repsol a 30% working interest and Total a 50% working interest, with Equion as operator in the Niscota block, (ii) Ocelote 500, operated by our subsidiary Hocol who holds a 100% working interest in the Guarrojo block, (iii) Ocelote 510, operated by our subsidiary Hocol who holds a 100% working interest in the Guarrojo block, (iv) Jaspe-7D, where Ecopetrol holds a 30% working interest and Frontera Energy Group as the operator holds a 70% working interest in the Quifa block, (v) the Chipiron Far North-01 sole risk contract from Occidental Petroleum Corporation in the Chipiron block, (vi) the Pulpo-1 sole risk contract from Occidental Petroleum Corporation in the Rondon block.

In addition, four appraisal wells were drilled as of December 31, 2018, and are currently under evaluation: (i) Cira-7000 located at La Cira Infantas block, operated by Occidental Petroleum Corporation, which holds a 52% working interest in partnership with Ecopetrol, holding the remaining 48% working interest, (ii) Capachos Sur-2 located at the Capachos Block, operated by Parex Resources, which holds a 50% working interest in partnership with Ecopetrol, holding the remaining 50%, (iii) Coyote-2 located at the Mares Block, operated by Parex Resources, which holds a 50% working interest in partnership with Ecopetrol, holding the remaining 50% and (iv) Bufalo-1 located at VMM-32 block, operated by us, where we hold a 51% working interest in partnership with CPVEN, which holds the remaining 49%.

## Seismic

In Colombia our subsidiary Hocol S.A. acquired a total of 337 km of 2D in the SN 15 block and through our joint venture partner, Ismocol-Joshi-Parko, 60 km<sup>2</sup> of 3D were acquired over the Palagua-Caipal field.

Furthermore, Ecopetrol purchased three additional 3D seismic surveys for a total of 292.5 km<sup>2</sup> in the Putumayo basin to improve the subsurface coverage and imaging of the basin.

### **3.4.1.2 Exploration Activities Outside Colombia**

Our international exploration strategy aims to expand and renew our exploration portfolio in basins with remaining long term potential, diversify our risks and improve the possibilities of increasing our crude oil and natural gas reserves. Key aspects of this strategy might include participating in bidding rounds to secure blocks available for exploration and entering into joint ventures with international and regional oil companies that bring operational experience and technology into the consortium.

In partnership with BP and CNOOC, Ecopetrol was awarded the block Pau-Brazil in the Santos Basin in Brazil during the Pre-Salt 5th bidding round, organized by the National Agency of Petroleum, Natural Gas and Biofuels (ANP). Moreover, Ecopetrol is awaiting approval from the ANP to access a 10% working interest in offshore block Saturno, also located in the Santos basin, which is operated by Shell (who holds a 45% working interest) in partnership with Chevron (who holds the remaining 45% working interest). With the participation in these two deep water blocks, Ecopetrol has managed to obtain a position in the pre-salt play in Brazil. In order to advance our previous commitments in Brazil, we will continue with regional studies in the Ceará, Potiguar and Sergipe Blocks.

As part of the committed exploration plan in our current assets of the Equatorial Margin (CE-M-715 in the Ceará Basin, POT-M-567 in Potiguar and FZA-M-320 in Foz do Amazonas), both geology and geophysics work and technical maturation activities were carried out to help obtain a deeper understanding of the prospective potential in these provinces.

Additionally our subsidiary, Ecopetrol America Inc., was awarded the Green Canyon 404, 405, 448 and 492 blocks in the Gulf of Mexico during Lease Sale 251.

We secured the approval of the National Hydrocarbons Commission (CNH) for the exploration plan through our partnership with PEMEX in respect of block 8 (October) and Petronas-block 6 (November). The exploration plan for block 6 considers purchasing seismic, geological and geophysical analysis, seismic interpretation and drilling of the first exploration well in Mexico in 2020 and the exploration plan for block 8 considers seismic licensing, processing and the interpretation required to identify the potential prospects in the block.

During the course of 2018, Ecopetrol and its partners did not carry out any exploratory drilling outside Colombia.

The following table sets forth information on our exploratory drilling for the periods indicated.

**Table 5 – Exploratory Drilling Outside Colombia**

	For the year ended December 31,		
	2018	2017	2016
	(number of wells)		
<b>INTERNATIONAL</b>			
<b>Ecopetrol America Inc.</b>			
<b>Gross Exploratory Wells</b>			
Productive	–	–	1.0
Dry <sup>(1)</sup>	–	2.0	–
<b>Total</b>	–	<b>2.0</b>	<b>1.0</b>
<b>Net Exploratory Wells<sup>(2)(3)</sup></b>			
Productive	–	–	0.2
Dry	–	0.6	–
<b>Total</b>	–	<b>0.6</b>	<b>0.2</b>
<b>Ecopetrol Óleo e Gás do Brasil Ltda.</b>			
<b>Gross Exploratory Wells</b>			
Productive	–	–	–
Dry	–	–	–
<b>Total</b>	–	–	–
<b>Net Exploratory Wells</b>			
Productive	–	–	–
Dry	–	–	–
<b>Total</b>	–	–	–
<b>Ecopetrol Germany</b>			
<b>Gross Exploratory Wells</b>			
Productive	–	–	–
Dry	–	–	–
<b>Total</b>	–	–	–
<b>Net Exploratory Wells</b>			
Productive	–	–	–
Dry	–	–	–
<b>Total</b>	–	–	–
<b>Savia Perú</b>			
<b>Gross Exploratory Wells</b>			
Productive	–	–	–
Dry	–	–	–
<b>Total</b>	–	–	–
<b>Net Exploratory Wells</b>			
Productive	–	–	–
Dry	–	–	–
<b>Total</b>	–	–	–

(1) A dry well or hole is an exploratory well found to be incapable of producing either crude oil or natural gas in sufficient quantities to justify completion as a crude oil or natural gas well.

(2) Net exploratory wells are calculated according to our percentage of ownership in these wells.

(3) None of our international wells were drilled pursuant to a sole risk contract.

### Seismic

Our subsidiary, Ecopetrol Brazil, purchased 874 km of 2D (spectrum survey) and 5,441 km<sup>2</sup> 3D (CGG and PGS) to evaluate the structures of Saturno, Titan and Ferradura (Round 15), as well as the blocks Uirapuru (Round 4) and Pau Brazil (Round 5), all of them located in the pre-salt play over the Santos and Campos basins.

Ecopetrol Hidrocarburos Mexico Inc. procured a large 60,076 km 2D seismic survey and 11,009 km<sup>2</sup> of 3D seismic data (surveys: Campeche Sur, Campeche Somero and Tabasco), to evaluate the Salina basin in the Gulf of Mexico.

### 3.4.2 Production Activities

Our consolidated average production was 720.4 thousand boepd in 2018, an increase of approximately 5 thousand boepd as compared to 2017. This increase is mainly the result of an increase in upstream investments during 2018.

The following table summarizes the results of our oil and gas production activities for the periods indicated:

**Table 6 – Ecopetrol Group’s Oil and Gas Production**

	For the year ended December 31,								
	2018			2017			2016		
	Oil	Gas <sup>(1)</sup>	Total	Oil	Gas <sup>(1)</sup>	Total	Oil	Gas <sup>(1)</sup>	Total
	(thousand boepd)								
Total production in Colombia <sup>(2)</sup>	578.4	125	703.4	577.3	121.6	698.9	582.5	123.3	705.8
Total International production <sup>(3)</sup>	14.1	2.9	17.0	13.6	2.6	16.2	9.6	2.5	12.1
Total production of Ecopetrol Group	592.5	127.9	720.4	590.9	124.2	715.1	592.1	125.8	717.9

(1) Conversion between mcfpd and boepd is performed at 5,700 mcfpd to 1 boepd.

(2) Total production in Colombia corresponds to Ecopetrol S.A., Hocol and Equion.

(3) Total International production corresponds to Savia Perú and Ecopetrol America Inc.

#### 3.4.2.1 Production Activities in Colombia

##### 3.4.2.1.1 Ecopetrol S.A.’s Production Activities in Colombia

For the year ended December 31, 2018, Ecopetrol S.A. was the largest participant in the Colombian hydrocarbons industry, accounting for approximately 63% of crude oil production (according to calculations made by Ecopetrol based on information from the Ministry of Mines and Energy) and approximately 66% of natural gas production (according to calculations made by Ecopetrol based on information from the Ministry of Mines and Energy). Also during 2018, Ecopetrol S.A. carried out development drilling mainly in the Eastern and Orinoquia regions, drilling 528 development wells (226 of those through direct operations and 302 through joint ventures).

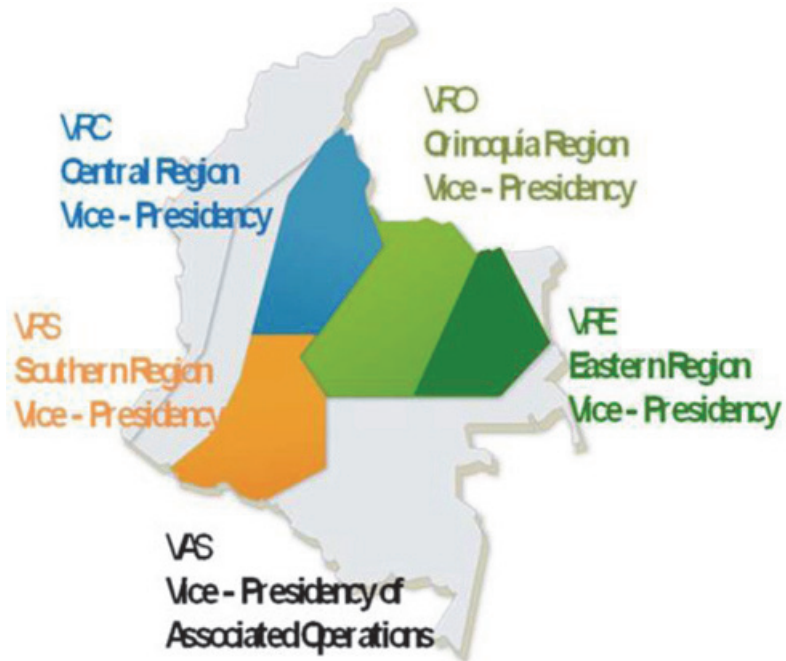
In terms of operational structure, Ecopetrol S.A. manages its production operations through a regional organization. Our operating assets are distributed in the following regions:

- Central Region: comprising 23 fields with active production in 2018.
- Orinoquia Region: comprising 22 fields with active production in 2018.
- Southern Region: comprising 33 fields with active production in 2018.
- Eastern Region: comprising 2 fields with active production in 2018.

A fifth Vice-Presidency, the Vice-Presidency of Associated Operations, is responsible for all of the production activities in which a partner is involved, regardless of the location of such activities in Colombia. This Vice- Presidency is comprised of 126 fields with active production in 2018.

The map below shows the locations of Ecopetrol S.A.’s operations with production information for each of our administrative regions described in the following paragraphs.

Graph 4 – Ecopetrol S.A. Operations in Colombia



Note: VAS is a countrywide Vice-presidency.

*Crude Oil Production*

The average daily production of crude oil in Colombia by Ecopetrol S.A. (excluding its subsidiaries), was 548.7 mbod in 2018, 3.7 mbod higher than in 2017, which represents a year-to-year increase of 0.7%.

The following chart summarizes Ecopetrol S.A.'s average daily crude oil production in Colombia by Region, prior to deducting royalties, for the periods indicated.

**Table 7 – Ecopetrol S.A.’s Average Daily Crude Oil Production in Colombia by Region Vice-Presidency**

	For the year ended December 31,		
	2018	2017	2016
	(thousand bpd)		
<b>Central Region</b>			
1) La Cira – Infantas	28.1	22.6	19.1
2) Casabe	13.9	15.9	17.8
3) Yarigui	14.4	14.5	16.6
4) Other	17.3	18.5	21.3
<b>Total Central Region</b>	<b>73.7</b>	<b>71.5</b>	<b>74.8</b>
<b>Orinoquía Region</b>			
1) Castilla	113.9	114.1	121.3
2) Chichimene	67.7	70.5	74.0
3) Cupiagua	8.3	9.6	11.3
4) Other	25.5	24.3	18.3
<b>Total Orinoquía Region</b>	<b>215.4</b>	<b>218.5</b>	<b>224.9</b>
<b>Eastern Region</b>			
1) Rubiales <sup>(1)</sup>	119.5	118.7	61.5
2) Caño Sur <sup>(2)</sup>	3.2	1.4	0.4
<b>Total Eastern Region</b>	<b>122.7</b>	<b>120.1</b>	<b>61.9</b>
<b>Southern Region</b>			
1) San Francisco	6.0	6.2	6.5
2) Huila Area <sup>(3)</sup>	3.5	3.1	7.4
3) Tello	3.6	3.9	4.4
4) Other	11.7	12.2	9.4
<b>Total Southern Region</b>	<b>24.8</b>	<b>25.4</b>	<b>27.7</b>
<b>Associated Operations</b>			
1) Rubiales <sup>(1)</sup>	–	–	41.4
2) Quifa	21.2	18.8	19.6
3) Caño Limon	25.3	22.2	23.3
4) Cusiana <sup>(4)</sup>	–	–	2.6
5) Other	65.6	68.5	75.9
<b>Total Associated Operations</b>	<b>112.1</b>	<b>109.5</b>	<b>162.8</b>
<b>Total average daily crude oil production Ecopetrol S.A. (Colombia)</b>	<b>548.7</b>	<b>545.0</b>	<b>552.1</b>

(1) In the first half of 2016, the Rubiales field was part of the Vice-Presidency of Associated Operations. Since July 1, 2016, it has been a part of the Eastern Region.

(2) In the first half of 2016, the Caño Sur field was part of the Orinoquia Region. Since July 1, 2016, it has been a part of the Eastern Region.

(3) Huila Area: some assets were reclassified and are reported under Other in the Southern Region.

(4) In the first half of 2016, the Cusiana field was part of the Vice-Presidency of Associated Operations. Since July 3, 2016, it has been a part of the Orinoquia Region.

**Table 8 – Ecopetrol S.A. Production per Type of Crude**

	2018 (mbod)	Year-on-Year Δ(%)	2017 (mbod)	Year-on-Year Δ(%)	2016 (mbod)
Light	40.7	(4.0)%	42.4	(4.9)%	44.6
Medium	154.4	1.8%	151.6	(6.1)%	161.5
Heavy	353.6	0.7%	351.0	1.4%	346.0
<b>Total</b>	<b>548.7</b>		<b>545.0</b>		<b>552.1</b>

Ecopetrol S.A.’s crude oil production during 2018 consisted of approximately 36% light and medium crudes and 64% heavy crudes. In 2017, approximately 36% of the crude oil production consisted of light and medium crudes and 64% consisted of heavy crudes. In 2016, approximately 37% of the crude oil production corresponded to light and medium crudes and 63% to heavy crudes.

#### Natural Gas Production

In 2018, the average daily production of natural gas by Ecopetrol S.A. reached 112.5 mboed, including natural gas liquids (“NGLs”), corresponding to a 1.4% increase in comparison to 2017 production.

We have three main natural gas production fields, Guajira, Cusiana and Cupiagua. In the Guajira field, we have partnered with Chevron who operates the field. The development of Cusiana field had a change in participation, because Tauramena joint venture expired on July 3, 2016. The Tauramena block is part of the Cusiana unified exploitation plan. As a consequence of the termination of the Tauramena joint venture, Ecopetrol’s participation increased from 63.4% to 97.8%, and Ecopetrol assumed the operation of the Cusiana unified exploitation plan. Ecopetrol S.A. is the operator of the Cupiagua field and other wells previously under the Recetor contract that were transferred from Equion to Ecopetrol as a result of the full return of the Recetor Field to Ecopetrol on May 29, 2017.

Of our total natural gas production during the year ended December 31, 2018, approximately 20% was supplied from the Guajira field, 31% from the Cusiana field, 24% from the Cupiagua field and the remaining 25% from other fields.

The following table sets forth Ecopetrol S.A.'s average daily natural gas production in Colombia, including NGLs, prior to deducting royalties, for the years ended on December 31, 2018, 2017 and 2016.

**Table 9 – Ecopetrol S.A.'s Average Daily Natural Gas Production in Colombia**

	For the year ended December 31,		
	2018	2017	2016
	(thousand boepd)		
<b>COLOMBIA</b>			
<b>Central Region</b>			
1) La Cira – Infantas	0.16	0.15	0.17
2) Provincia	1.96	2.41	3.09
3) Yarigui	0.42	0.48	0.56
4) Gibraltar	6.87	7.16	6.32
4) Other	1.86	2.02	1.60
<b>Total Central Region</b>	<b>11.27</b>	<b>12.22</b>	<b>11.74</b>
<b>Orinoquía Region</b>			
1) Cupiagua	26.97	25.29	28.72
2) Cusiana <sup>(1)</sup>	34.73	31.97	15.98
3) Other	2.80	2.44	1.44
<b>Total Orinoquía Region</b>	<b>64.5</b>	<b>59.70</b>	<b>46.14</b>
<b>Southern Region</b>			
1) Huila Area <sup>(2)</sup>	0.13	0.10	0.64
2) Tello	0.11	0.22	0.35
3) Other	0.25	0.40	0.03
<b>Total Southern Region</b>	<b>0.49</b>	<b>0.72</b>	<b>1.02</b>
<b>Associated Operations</b>			
1) Guajira	23.02	27.09	33.34
2) Cusiana <sup>(1)</sup>	0.00	0.00	12.65
3) Other	13.21	11.29	11.10
<b>Total Associated Operations</b>	<b>36.23</b>	<b>38.38</b>	<b>57.09</b>
<b>Total Natural Gas Production (Colombia)</b>	<b>112.49</b>	<b>111.02</b>	<b>115.99</b>

Note: Conversion between mcfpd and boepd is performed at 5,700 mcfpd to 1 boepd.

(1) In the first half of 2016, the Cusiana field was part of the Vice-Presidency of Associated Operations. Since July 3, 2016, it has been a part of the Orinoquía Region.

(2) In the Southern Region, some assets that were previously part of the Huila area were reclassified as Other.

#### *Projects to Increase Recovery Factor*

Ecopetrol continues to invest in its recovery factor program in order to increase reserves and production. In 2018, the recovery factor program increased proven reserves by 129 million boe. US\$94 million was invested for the execution of 60 studies and 19 pilots to reduce uncertainties and mature these opportunities into projects in the medium or long term. These pilots under assessment had a daily production of approximately 17 mboed.

Secondary and tertiary recovery technologies contributed 167 mboed or 23% of the Ecopetrol Group's total daily production, primarily from the Castilla, Chichimene, Teca, La Cira Infantas, Casabe, Yarigui, Tibú, Asociacion Nare, Cusiana, Cupiagua and Piedemonte fields.



In 2018, the following projects exhibited positive results in both efficiency of injection and response in production: (i) the water injection pilots at Castilla, Chichimene, Apiay, Suria and La Cira sands A and B, (ii) the improved water injection pilots at Chichimene, La Cira Infantas, Casabe and Yarigui fields, and (iii) the steam injection pilots at the Teca and Nare fields.

In 2018, a final investment decision was taken in respect of the commencement of eight recovery projects based on the results of their correspondent pilots: (i) six water injection projects (Chichimene, Castilla, Suria, La Cira sands A and B, Llanito-Gala and Galan), (ii) one enhanced water injection project (Dina K) and (iii) one continuous steam injection project (Teca). Additionally, nine recovery technology expansion projects are currently being structured.

#### Development Wells

The following table sets forth the number of gross and net development wells drilled in Colombia, both solely by Ecopetrol S.A. and with its joint ventures that reached total depth for the years ended December 31, 2018, 2017 and 2016.

**Table 10 – Ecopetrol S.A.’s Gross and Net Development Wells in Colombia**

	For the year ended December 31,		
	2018	2017	2016
	(number of wells)		
<b>COLOMBIA</b>			
<b>Central Region</b>			
Gross wells owned and operated by Ecopetrol	12	–	–
<b>Orinoquía Region</b>			
Gross wells owned and operated by Ecopetrol	77	56	47
<b>Southern Region</b>			
Gross wells owned and operated by Ecopetrol	19	–	–
<b>Eastern Region</b>			
Gross wells owned and operated by Ecopetrol	118	143	36
<b>Total gross wells owned and operated by Ecopetrol S.A. in Colombia</b>	<b>226</b>	<b>199</b>	<b>83</b>
<b>Associated Operations</b>			
Gross wells in joint ventures	302	276	50
Net wells <sup>(1)</sup>	144.2	97	19
<b>Total gross wells in joint ventures Ecopetrol S.A. in Colombia</b>	<b>302</b>	<b>276</b>	<b>50</b>
<b>Total net wells in joint ventures Ecopetrol S.A. in Colombia<sup>(1)</sup></b>	<b>144.2</b>	<b>97</b>	<b>19</b>
<b>Total gross wells Ecopetrol S.A. in Colombia</b>	<b>528</b>	<b>475</b>	<b>133</b>
<b>Total net wells Ecopetrol S.A. in Colombia<sup>(1)</sup></b>	<b>370.2</b>	<b>296</b>	<b>102</b>

(1) Net wells correspond to the sum of wells owned and operated by Ecopetrol plus the net wells in our associated operations. Net wells in the associated operations are the result of our working interest in wells owned in joint ventures with our partners, as defined in the contract obligations.

#### Production Acreage

The following table sets forth Ecopetrol S.A.’s developed and undeveloped gross and net acreage of crude oil and natural gas production in Colombia for the year ended December 31, 2018.

**Table 11 – Ecopetrol S.A.’s Developed and Undeveloped Gross and Net Acreage of Crude Oil and Natural Gas Production in Colombia**

	Production Acreage as of December 31, 2018 ( acres)			
	Developed		Undeveloped	
	Gross	Net	Gross	Net
Ecopetrol S.A.	452,121	349,954	4,653,531	3,426,785

Gross and Net Productive Wells

The following table sets forth Ecopetrol S.A.'s total gross and net productive wells by region as of December 31, 2018.

**Table 12 – Ecopetrol S.A.'s Gross and Net Productive Wells by Region**

	As of December 31, 2018 (number of wells)			
	Crude Oil <sup>(1)</sup>		Natural Gas <sup>(2)</sup>	
	Gross	Net <sup>(3)</sup>	Gross	Net <sup>(3)</sup>
<b>COLOMBIA</b>				
<b>Ecopetrol S.A.</b>				
Central region	2,244	1,767	9	9
Orinoquía region	1,086	1,077	22	18
Southern region	589	534	13	13
Eastern Region	693	693	-	-
Region of Associated Operations	2,602	1,260	16	7
<b>Total (Ecopetrol S.A.)<sup>(4)</sup></b>	<b>7,214</b>	<b>5,331</b>	<b>60</b>	<b>47</b>

Note: The above table reflects the productive wells that directly contribute to hydrocarbon production and therefore excludes wells used for injection, disposal, water abstraction, or other similar activities.

- (1) We consider crude oil wells to be those in which the main operation is oil production, although many of these wells produce gas associated with oil production that, in some cases, have a commercial purpose.
- (2) Natural gas wells are those in which operations are directed only toward the production of commercial gas.
- (3) Calculation of net productive wells is calculated by multiplying gross productive wells by our ownership percentage.
- (4) Wells from oil fields transferred to Hocol are not included.

**3.4.2.1.2 Ecopetrol S.A.'s Affiliates and Subsidiaries' Production Activities in Colombia**

*Crude Oil Production*

The following table sets forth our average daily crude oil production from Hocol and Equion, prior to deducting royalties, for the periods indicated.

**Table 13 – Ecopetrol S.A.'s Subsidiaries in Colombia Average Daily Crude Oil Production**

	For the year ended December 31,		
	2018	2017	2016
	(thousand bpd)		
<b>Hocol</b>			
Joint venture operation	2.3	2.3	2.6
Direct operation	18.4	19.4	15.4
<b>Total Hocol</b>	<b>20.7</b>	<b>21.7</b>	<b>18.0</b>
<b>Equion</b>			
Joint venture operation	-	0.1	0.1
Direct operation	9.0	10.5	12.3
<b>Total Equion</b>	<b>9.0</b>	<b>10.6</b>	<b>12.4</b>
<b>Production Tests</b>	-	-	-
<b>Total Average Daily Crude Oil Production (Subsidiaries in Colombia)</b>	<b>29.7</b>	<b>32.3</b>	<b>30.4</b>

The 4.6% decrease in Hocol's production in 2018, as compared to 2017, was mainly due to result of the natural production decline of our fields.

The 15.1% decrease in Equion's production in 2018, as compared to 2017, was mainly due to result of the natural production decline of our fields, and the transfer of a part of its participation in the Recetor contract to Ecopetrol.

#### Natural Gas Production

The following table sets forth our subsidiaries' average daily natural gas production, prior to deducting royalties, for the periods indicated.

**Table 14 – Ecopetrol S.A.'s Subsidiaries in Colombia Average Daily Natural Gas Production**

	For the year ended December 31,		
	2018	2017	2016
	(thousand boepd) <sup>(1)</sup>		
<b>Hocol</b>			
Joint venture operation	1.6	0.6	0.2
Direct operation	5.9	5.2	0.6
<b>Total Hocol</b>	<b>7.5</b>	<b>5.8</b>	<b>0.8</b>
<b>Equion</b>			
Joint venture operation	0.2	0.2	0.1
Direct operation	4.8	4.6	6.4
<b>Total Equion</b>	<b>5.0</b>	<b>4.8</b>	<b>6.5</b>
<b>Production Tests</b>	<b>–</b>	<b>–</b>	<b>–</b>
<b>Total Natural Gas Production (Subsidiaries in Colombia)</b>	<b>12.5</b>	<b>10.6</b>	<b>7.3</b>

(1) Conversion between mcfpd and boepd is performed at 5,700 mcfpd to 1 boepd.

#### Development Wells

The following table sets forth the number of gross and net development wells drilled exclusively by our subsidiaries and in their joint ventures in Colombia for the periods indicated.

**Table 15 – Ecopetrol S.A.'s Subsidiaries in Colombia Gross and Net Development Wells**

	For the year ended December 31,		
	2018	2017	2016
	(number of wells)		
<b>Hocol</b>			
Gross wells owned and operated by Hocol	12	17	9
Gross wells in joint ventures	2	–	–
Net wells <sup>(1)</sup>	13	17	9
<b>Equion</b>			
Gross wells owned and operated by Equion <sup>(2)</sup>	–	–	–
Gross wells in joint ventures	–	1	1
Net wells <sup>(1)</sup>	–	–	–
<b>Total gross wells owned and operated in Colombia</b>	<b>12</b>	<b>17</b>	<b>9</b>
<b>Total gross wells in joint ventures in Colombia</b>	<b>2</b>	<b>1</b>	<b>1</b>
<b>Total net wells (Subsidiaries in Colombia)</b>	<b>13</b>	<b>17</b>	<b>9</b>

(1) Net wells correspond to the sum of wells owned and operated by our subsidiaries and their ownership percentage of wells owned in joint ventures with their partners.

(2) Even though for the last three years Equion has operated every well, Equion has not owned any well 100%; rather Equion has drilled wells in joint venture with Ecopetrol. Therefore, after a careful review of the categories, all Equion data was moved from gross wells owned and operated by Equion to gross wells in joint ventures. However, the number of wells remains the same.

### Production Acreage

The following table sets forth our subsidiaries' developed and undeveloped gross and net acreage of crude oil and natural gas production in Colombia for the year ended December 31, 2018.

**Table 16 – Ecopetrol S.A.'s Subsidiaries in Colombia Developed and Undeveloped Gross and Net Acreage of Crude Oil and Natural Gas Production**

	Production acreage as of December 31, 2018			
	Developed		Undeveloped	
	Gross	Net	Gross	Net
	(in acres)			
Hocol	17,845	15,930	675	666
Equion	16,300	4,104	54,666	12,162
<b>Total (Subsidiaries in Colombia)</b>	<b>34,145</b>	<b>20,034</b>	<b>55,341</b>	<b>12,828</b>

### Gross and Net Productive Wells

The following table sets forth our subsidiaries' total gross and net productive wells in Colombia for the year ended December 31, 2018.

**Table 17 – Ecopetrol S.A.'s Subsidiaries in Colombia Gross and Net Productive Wells<sup>(1)</sup>**

	For the year ended December 31, 2018			
	Crude Oil		Natural Gas	
	Gross	Net	Gross	Net
	(number of wells)			
Hocol	281	241.9	20	18.5
Equion	15	8	15	8
<b>Total (Subsidiaries in Colombia)</b>	<b>296</b>	<b>249.9</b>	<b>35</b>	<b>26.5</b>

(1) Information in the table above reflects productive wells that directly contribute to hydrocarbons production and therefore excludes wells used for injection, disposal, water abstraction or other similar activities. We consider crude oil wells to be those in which the main operation is oil production, although many of these wells produce gas associated with oil production that, in some cases, have a commercial purpose. Natural gas wells are those in which operations are directed only towards production of commercial gas.

### 3.4.2.2 Production Activities Outside Colombia

The Ecopetrol Group's production outside of Colombia comes from 100% of the production of Ecopetrol America Inc. and 50% of our share of Savia in Peru. In 2018, the production obtained from these two companies was 17 boepd, which represents 2.4% of the total production of the Ecopetrol Group.

### Crude Oil Production

The following table sets forth our average daily crude oil production outside Colombia, prior to deducting royalties, for the periods indicated.

**Table 18 – Ecopetrol S.A.'s Subsidiaries Outside Colombia Average Daily Crude Oil Production**

	For the year ended December 31,		
	2018	2017	2016
	(thousand bpd)		
Savia Perú	3.9	3.9 <sup>(1)</sup>	4.1
Ecopetrol America Inc.	10.2	9.2	5.5
<b>Total average daily crude oil production (International)</b>	<b>14.1</b>	<b>13.1</b>	<b>9.6</b>

(1) In 2017, Savia's crude oil production included NGLs. In preparing our 2018 operational information, those NGLs were reclassified into our 2017 natural gas production.

### Natural Gas Production

The following table sets forth our average daily natural gas production outside Colombia, prior to deducting royalties, for the periods indicated.

**Table 19 – Ecopetrol S.A.’s Subsidiaries Outside Colombia Average Daily Natural Gas Production**

	For the year ended December 31,		
	2018	2017	2016
		(thousand boepd)	
Savia Perú	1.1	1.1 <sup>(1)</sup>	1.3
Ecopetrol America Inc.	1.8	2.0	1.2
<b>Total average daily natural gas production (International)</b>	<b>2.9</b>	<b>3.1</b>	<b>2.5</b>

(1) In 2017, Savia’s crude oil production included NGLs. In preparing our 2018 operational information, those NGLs were reclassified into our 2017 natural gas production.

### Development Wells

The following table sets forth the number of gross and net development wells outside Colombia, drilled exclusively by us and in joint ventures for the periods indicated.

**Table 20 – Ecopetrol S.A.’s Subsidiaries Outside Colombia Gross and Net Development Wells <sup>(1)</sup>**

	For the year ended December 31,		
	2018	2017	2016
		(number of wells)	
<b>Savia Perú</b>			
Gross wells	-	-	-
Net wells <sup>(2)</sup>	-	-	-
<b>Ecopetrol America Inc.</b>			
Gross wells	1	2	3
Net wells <sup>(2)</sup>	0.3	0.4	0.7
<b>Total gross wells (International)</b>	<b>1</b>	<b>2</b>	<b>3</b>
<b>Total net wells (International)</b>	<b>0.3</b>	<b>0.4</b>	<b>0.7</b>

(1) Information in the table above reflects productive wells that directly contribute to hydrocarbons production and therefore excludes wells used for injection, disposal, water abstraction or other similar activities.

(2) Net wells correspond to the sum of wells entirely owned by us or our subsidiaries and our ownership percentage of wells owned in joint ventures with our partners.

### Production Acreage

The following table sets forth our developed and undeveloped gross and net acreage of crude oil and natural gas production outside Colombia for the year ended December 31, 2018.

**Table 21 – Ecopetrol S.A.’s Subsidiaries Outside Colombia Developed and Undeveloped Gross and Net Acreage of Crude Oil and Natural Gas Production**

	Production acreage as of December 31, 2018			
	Developed		Undeveloped	
	Gross	Net	Gross	Net
	(in acres)			
Savia Perú	79,575	39,788	57,671	28,836
Ecopetrol America Inc. <sup>(1)</sup>	55,440	15,059	23,040	6,566
<b>Total (International)</b>	<b>135,015</b>	<b>54,847</b>	<b>80,711</b>	<b>35,402</b>

(1) Production and acreage from Ecopetrol America Inc. is related to the K2, Dalmatian and Gunflint field blocks in the Gulf of Mexico. For K2, there are four blocks in the production stage. For Dalmatian, there are two blocks in the production stage. For Gunflint, there are five blocks in the production stage, of which one is producing.

#### *Gross and Net Productive Wells*

The following table sets forth our total gross and net productive wells outside Colombia for the year ended December 31, 2018.

**Table 22 – Ecopetrol S.A.’s Subsidiaries Outside Colombia Gross and Net Productive Wells**

	As of December 31, 2018	
	Crude Oil	
	Gross	Net
	(number of wells)	
<b>INTERNATIONAL</b>		
Savia Perú	606	303
Ecopetrol America Inc.	15	3.6
<b>Total (International)</b>	<b>621</b>	<b>306.6</b>

#### **3.4.2.3 *Marketing of Crude Oil and Natural Gas***

In 2018, Ecopetrol sold 899.5 mboed, out of which 400.4 mboed represented sales of crude oil (44%), 78.5 mboed natural gas (9%) and 420.6 mboed of fuels and petrochemicals (47%).

#### *Crude Oil Export Sales*

Crude oil export sales in 2018 decreased by 24 mbopd compared to 2017 mainly due to the substitution of imports at Reficar for domestic crudes. Ecopetrol’s crude oil export sales are traded both in the spot and contract markets, primarily to refiners in the United States, Asia and Europe.

The Castilla blend is the main type of crude oil for export sales, with 334 mbopd sold during 2018 (a 84% share of our crude oil basket) followed by the Vasconia with 19 mbopd (a 5% share in our crude oil basket), South blend with 11 mbopd (a 3% share of our crude oil basket), and Vasconia Norte with 9.4 mbopd (a 2% share of our crude oil basket).

Ecopetrol placed its exports in markets that represent the best value for its crudes. In 2018, Asia was the main destination, representing 41% of crude oil exports, closely followed by the United States with 40% of crude oil exports. The expansion of refining capacity both in the private and state owned companies in countries like China has supported the increase in crude oil flows from Colombia to Asia, volatility in the production of regional producers has given US refiners an incentive to diversify their supply sources which has opened opportunities for Colombian producers. Ecopetrol’s crude basket was discounted by US\$ 8.5/bl below the ICE Brent price. Our crude basket increased by US\$15.4/bl year over year due to the strength of the ICE Brent price and our persistent commercial strategy towards markets with higher value.

### Crude Oil Purchase Contracts

Ecopetrol has signed several crude oil purchase contracts with third parties and business partners. Ecopetrol also purchases crude oil from the ANH from royalties. This oil is processed in Ecopetrol's refineries or exported. The purchase price is referenced to export parity based on international market prices plus a commercial fee.

The table below sets forth the volumes of crude oil purchased from our business partners and third parties and volumes of crude oil purchased from the ANH from royalties for the years ended on December 31, 2018, 2017 and 2016.

**Table 23 – Ecopetrol Consolidated Crude Oil Purchases**

	For the year ended December 31,		
	2018	2017	2016
	(million barrels)		
<b>Ecopetrol Corporate Group</b>			
Crude oil purchased from ANH royalties	37.6	40.3	42.9
Crude oil purchased from third parties	20.7	16.7	15.5
Crude oil imported from third parties	14.0	24.8	22.0

During 2018, part of Ecopetrol's crude strategy was centered on increasing the purchase of crude oil from third parties, which enables further optimization of the supply chain.

### Import of Diluents

In 2018, Ecopetrol decreased the imports of diluent by 1.7% (0.9 mbpd) compared to 2017. Diluent is used to transport our heavy crudes through the pipeline system, and the reduction is due to optimizations in dilution processes within the transformation plan last year.

### Natural Gas Sales

Ecopetrol sells natural gas to distribution companies through firm, interruptible and conditional contracts. These distributors supply natural gas to the residential market, as compressed natural gas for vehicles market and to large industrials in Colombia. We also market and sell natural gas directly to the industrial sector and to gas-fired power plants.

Ecopetrol's natural gas sales and self-consumption increased by 1.0% (0.93 mboepd) compared to 2017, due to an increase in short term sales to industrial consumers.

### Natural Gas Delivery Commitments

The table below sets forth the commitments we have in Colombia under firm contracts with local natural gas distribution companies, local industries, gas-fired power generators and internal agreements with our refineries and fields.

**Table 24 – Ecopetrol Consolidated Natural Gas Delivery Commitments**

	For the year ended December 31,			
	2019	2020	2021	2022
	(gbtud)			
Volume for sales third parties	526.8	549.2	499.9	323.0
Volume for self-consumption	140.4	175.2	185.3	194.8
<b>Total Commitments</b>	<b>667.2</b>	<b>724.4</b>	<b>685.2</b>	<b>517.8</b>

Neither Equion nor Savia Peru are included in the table above since they do not consolidate within Ecopetrol Group. Data was updated based on current contracts and the official report made to the Ministry of Mines and Energy in 2018. During 2017 the Energy and Gas Regulatory Commission published a new resolution modifying the existing trading rules in the Colombian natural gas market. See the section Business Overview—Applicable Laws and Regulations—Regulation of the Natural Gas Market.

### 3.4.3 Reserves

The reserves reporting process was conducted in accordance with SEC definitions and rules set forth in Rule 4-10(a) of Regulation S-X and the disclosure guidelines contained in the SEC's Modernization of Oil and Gas Reporting final rule dated December 31, 2008 and effective as of January 1, 2010.

The estimated reserve amounts presented in this report, as of December 31, 2018, are based on the average prices during the 12-month period prior to the ending date of the period covered in this report, determined as the unweighted arithmetic averages of the prices in effect on the first day of the month for each month within such period, unless prices were defined by contractual arrangements, as required by the SEC regulations.

Our crude oil and natural gas net proved reserves include reserves from our subsidiaries located in the United States (Gulf of Mexico) and Peru, and Equion and Hocol's assets in Colombia.

#### Estimated Net Proved Reserves

The following table sets forth our estimated net proved developed reserves of crude oil and gas by region for the years ended December 31, 2018, 2017 and 2016.

**Table 25 – Net Proved Developed Reserves**

<b>Net Proved Developed Reserves</b>	<b>Colombia</b>	<b>North America</b>	<b>South America excluding Colombia</b>	<b>Total</b>
<b>Net Proved Developed oil reserves in million barrels oil equivalent</b>				
At December 31, 2016	710	6	7	723
At December 31, 2017	747	10	6	763
At December 31, 2018	<b>814</b>	<b>13</b>	<b>5</b>	<b>832</b>
<b>Net Proved Developed NGL reserves in million barrels oil equivalent</b>				
At December 31, 2016	55	-	1	56
At December 31, 2017	54.6	-	0.8	55.4
At December 31, 2018	50.5	-	0.6	51.1
<b>Net Proved Developed gas reserves in billion standard cubic feet</b>				
At December 31, 2016	3,114	9	8	3,131
At December 31, 2017	3,143	10	5	3,158
At December 31, 2018	2,865.5	10	7	2,882
<b>Net Proved Developed oil, NGL and gas reserves in million barrels oil equivalent</b>				
At December 31, 2016	1,311	8	10	1,329
At December 31, 2017	1,353	11	8	1,372
At December 31, 2018	1,368	14	7	1,389

The conversion rate used is 5,700 standard cubic feet = 1 barrel of oil equivalent.



We are required, as are all oil companies undertaking exploratory and production activities in Colombia, to pay a percentage of our production to the Government as royalties. However, the ANH's Resolution 877 of 2013, Resolution 351 of 2014 and Resolution 640 of 2014 require natural gas royalties to be paid in cash, which means that the determination of the property rights to the quantities of natural gas we produce is based on the total volume produced without deductions on account of royalties. The main producing gas fields are Guajira, Cusiana, Cupiagua, Pauto, Chuchupa, Gibraltar, Ballena and Mamey.

Ecopetrol S.A. owns 100% of Cenit, a subsidiary that operates in Colombia and is dedicated to the storage and transportation of hydrocarbons through pipelines. Cenit provides transportation services for the entire Ecopetrol Group and we fully consolidate Cenit into our consolidated results of operations. Therefore, the difference between the tariffs set by the Ministry of Mines and Energy and the real transportation costs (fixed and variable operating expenses) does not affect our consolidated income statement. Thus, in presenting our reserves information in the 2016, 2017 and 2018 annual reports, we have used our real transportation costs, rather than the regular tariffs set by the Ministry of Mines and Energy.

The following table summarizes our proved oil, NGL and natural gas reserves, which includes 16 million barrels of fuel oil, 327 billion standard cubic feet of fuel gas within our natural gas results and 534 billion cubic feet of royalties, as of December 31, 2018.

**Table 26 – Proved Oil, NGL and Natural Gas Reserves**

<b>Reserves Category</b>	<b>Oil (million barrels)</b>	<b>NGL (million barrels)</b>	<b>Natural Gas (bcf)</b>	<b>Total Oil and Gas (Mmboe)</b>
<b>PROVED DEVELOPED RESERVES</b>				
<b>Total (Colombia)</b>	814	50.5	2,866	1,368
International:				
North America	13	-	10	14
South America	5	0.5	7	7
<b>TOTAL PROVED DEVELOPED RESERVES</b>	<b>832</b>	<b>51</b>	<b>2,883</b>	<b>1,389</b>
<b>PROVED UNDEVELOPED RESERVES</b>				
<b>Total (Colombia)</b>	285	22	113	327
International:				
North America	10	-	6	11
South America	-	-	-	-
<b>TOTAL PROVED UNDEVELOPED RESERVES</b>	<b>295</b>	<b>22</b>	<b>119</b>	<b>338</b>
<b>TOTAL PROVED RESERVES</b>	<b>1,127</b>	<b>73</b>	<b>3,002</b>	<b>1,727</b>

The conversion rate used is 5,700 standard cubic feet = 1 barrel of oil equivalent.

#### *Reserves Replacement*

The reserves replacement ratio is defined as the sum of additions and revisions of proved reserves divided by produced volumes in any given period. The following table presents the changes in reserves in each category relating to the reserve replacement ratio for the years 2018, 2017 and 2016.

#### *Changes in Proved Reserves*

**Table 27 – Changes in Proved Reserves**

	<b>As of December 31,</b>		
	<b>2018</b>	<b>2017</b>	<b>2016</b>
<i>Consolidated Company (million barrels oil equivalent)</i>			
Revisions of previous estimates	120.5	174	(54)
Improved Recovery	129.1	73	11
Extensions and discoveries	57.4	44	27
Purchases	-	4	-
<b>Total reserves additions</b>	<b>307</b>	<b>295</b>	<b>(16)</b>
Production	(239)	(234)	(235)
<b>Net change in proved reserves</b>	<b>68</b>	<b>61</b>	<b>(251)</b>

The reserves replacement ratio for 2018 was 1.29 barrels compared to 1.26 barrels in 2017. The average replacement ratio for the last three years was 0.83 barrels.

**Table 28 – Reserves Replacement Ratio (including purchase and sales)**

	As of December 31,		
	2018	2017	2016
Annual	1.29	1.26	(0.07)
Three year average	0.83	0.42	0.48

*Revisions of Previous Estimates*

In 2018, revisions increased reserves by 120 million boe, mainly as a result of:

- (i) An increase of 87 million boe due to the continuous development of the Rubiales, Chichimene and Quifa fields, of which a 68 million boe increase in reserves is due to improved reservoir performance in the Rubiales field.
- (ii) An increase 14 million boe increase in reserves due to development activities in the Bonanza and Ocelote fields.
- (iii) The remaining 16%, or 19.8 million boe, increase in reserves was due to varying increases and decreases from other fields.

*Improved Recovery*

In 2018, improved recovery increased reserves by 129 million boe. The additions were associated with new proved areas under water flooding in the Chichimene, Castilla, La Cira-Infantas, Apiay, Suria, Yarigui, Casabe and Dina Cretaceo fields 86 million boe increase. In addition, the new steam injection project at the Teca-Cocorná field accounted for a 19 million boe increase in reserves.

The remaining 19%, or 24 million boe, increase was due primarily to water injection reservoir responses at various fields.

*Extensions and Discoveries*

Extensions and discoveries during 2018 amounted to 57 million boe primarily due to extensions of proved acreage mainly from activities in new proved areas in the Rubiales, Castilla, Cupiagua, Pauto and Caño Sur fields, which accounted for 45 million boe and newly discovered fields and reservoirs accounted for 12 million boe. The remaining 9 million boe corresponds to smaller changes in several other fields.

*Purchases*

There were no purchases or acquisitions in 2018.

### Development of reserves

As of December 31, 2018, our total proved undeveloped oil and gas reserves amounted to 338 million boe, 21% of which is related to new drilling activities in the Rubiales field, 41% is related to development activities in the Castilla, Caño Sur, Chichimene, Quifa, Cupiagua and Yarigui fields and 22% of which is related to the new development activities in the Teca, Pauto, Bonanza and Ryberg fields. The remaining 16% comes from activities at several other fields.

Our proved undeveloped reserves represent 20% of our total proved reserves.

The Ecopetrol's year-end development plans are consistent with SEC guidelines for the development of proved undeveloped reserves within five years.

The following table reflects the developed and undeveloped proved reserves estimates through the past three fiscal years.

**Table 29 – Developed and Undeveloped Proved Reserves**

<b>Proved Reserves as of December 31,</b>	<b>Oil</b>	<b>NGL</b>	<b>Gas</b>	<b>Total</b>
	<b>Mmbls</b>	<b>Mmbls</b>	<b>Bcf</b>	<b>Mmboe</b>
<b>2018 proved reserves</b>				
Developed	832	51	2,882	1,389
Undeveloped	295	23	119	338
<b>2017 proved reserves</b>				
Developed	763	55	3,158	1,372
Undeveloped	251	19	96	287
<b>2016 proved reserves</b>				
Developed	723	56	3,131	1,329
Undeveloped	241	13	87	269

Of the total amount of proved undeveloped reserves that Ecopetrol had at the end of 2017 (287 million boe), we converted approximately 84 million boe, or 29%, to proven developed reserves during 2018.

Approximately 69% of the total conversion is primarily associated with the development of crude oil and gas projects in the Castilla, Rubiales and Chichimene fields (58 million boe), while the remaining 31% is associated with development execution in other fields such as the Ocelote, La Cira Infantas, Caño Sur and K2 fields, among others. The amount of investments made during 2018 to convert proved undeveloped reserves to proved developed reserves was US\$841 million.

### Changes in Undeveloped Proved Reserves

The following table reflects the main changes in undeveloped proved reserves during 2018.

**Table 30 – Changes in Undeveloped Proved Reserves in 2018**

<b>Consolidated Companies (million barrels oil equivalent)</b>	
Revisions of previous estimates	28.4
Improved recovery	67.1
Extensions and discoveries	39.9
Proved Undeveloped converted to Proved Developed	(83.7)
Net change in unproved reserves	51.7

The conversion rate used is 5,700 standard cubic feet = 1 barrel of oil equivalent.

### Reserve Process

Ecopetrol's reserves process is coordinated by the Corporate Reserves Manager, a highly experienced engineer, who reports to the Upstream Chief Financial Officer. The Ecopetrol reserves group is comprised of reserves coordinators who are geologist and petroleum engineers, each with more than ten years of experience in reservoir characterization, field development, estimation and reporting of reserves and who support and interact with the specialists involved in the estimation and reporting process, following an established procedure with its corresponding internal controls. As in previous years, the reserves are estimated and certified by recognized external independent engineers (this year consisting of Ryder Scott Company, Gaffney, Cline & Associates, Sproule International Limited and DeGolyer and MacNaughton) in compliance with the definitions of the Society of Petroleum Engineers and the applicable SEC rules. According to our corporate policy, we report the reserves values obtained from the external engineers, even if they are lower than our expected reserves.

The reserves estimation process ends when the Corporate Reserves Manager consolidates the results and together, with the Development Vice-President and the Upstream Chief Financial Officer, presents the outcome to the Reserves Committee, which comprises the CEO, the Ecopetrol's Group's CFO and the Vice-President of Development and Production. Results are later presented to the Audit and Risk Committee of the Board of Directors and finally approved by the Board of Directors.

Petroleum engineering consultants Ryder Scott Company, Gaffney, Cline & Associates, Sproule International Limited and DeGolyer and MacNaughton have estimated and certified Ecopetrol's proved reserves as of December 31, 2018. These external engineers estimated 99% of our estimated net proved reserves. The reserves reports of the external engineers are included as exhibits to this annual report.

Ecopetrol's reserves process uses deterministic methods which are commonly used internationally to estimate reserves. These methods have some uncertainty with respect to degradation, and thus, the estimates should not be interpreted as being exact amounts. However, the technology used to estimate reserves is considered reliable. The majority of the producing proved reserves were estimated by applying appropriate decline curves or other performance relationships. In analyzing decline curves, reserves were estimated by calculating economic limits that are based on current economic conditions. In certain cases, where the methods previously employed could not be used, reserves were estimated by analogy with similar reserves for which more complete data was available.

Estimates of reserves were prepared by geological and engineering standard methods commonly used in the oil and gas industry. The method or combination of methods used in the analysis of each reserve was adopted from experience analogy reserves, including information on the stage of development, quality and completeness of basic data and production history.

The following table reflects the estimated proved reserves of oil and gas as of December 31, 2016 through 2018, and the changes therein.

**Table 31 – Estimated Proved Reserves of Oil and Gas**

Consolidated companies	Colombia	North	South	Total
		America	America excluding Colombia	
Net proved oil, NGL and gas reserves in Mmboe				
At December 31, 2016	1,577	11	10	1,598
Revisions	170	4.6	(0.3)	174.3
Improved Recovery	73	-	-	73
Extensions and discoveries	44	-	-	44
Purchases	-	4	-	4
Production	(229)	(3.6)	(1.5)	(234.1)
At December 31, 2017	1,635	16	8.2	1,659.2
Revisions	114	5.8	1	120.8
Improved Recovery	129	-	-	129
Extensions and discoveries	50	7	-	57
Production	(233)	(3.8)	(2)	(238.8)
At December 31, 2018	1,695	25	7.2	1,727.2

For more information regarding the potential impacts of oil prices on our reserve estimates, see the sections *Financial Review—Trend Analysis and Sensitivity Analysis* and *Risk Review—Risk Factors*.

#### 3.4.4 Joint Venture and Other Contractual Arrangements

We conduct our exploration and production business through a variety of types of contractual arrangements with the Colombian government or with third parties. Below is a general description of each type of contractual arrangement to which we were a party as of December 31, 2018:

##### Association Contract

The purpose of this type of contract, created by Decree 2310 of 1974, is the exploration of the areas covered by the contract, and the exploitation of hydrocarbons found in that area. This type of contract, together with E&P contracts and Special Contracts (Casabe, La Cira and Teca-Cocorná fields) which are described below, are the most significant in terms of our production and proved reserves.

Under association contracts, the exploratory risk is assumed entirely by Ecopetrol S.A.'s contractual partner, the associate. If there is a discovery and Ecopetrol S.A. agrees that the relevant field is commercially viable, Ecopetrol S.A. will participate in the field's development. A joint account will be created, and Ecopetrol S.A. and the partner will participate in the expenses and investments in the proportions established in the corresponding contract. Ecopetrol S.A. will reimburse the direct exploratory expenses incurred by the contractual partner in the proportions established by the contract.

If Ecopetrol S.A. does not believe that the relevant field is commercially viable, the partner has the right to execute on its own all activities considered necessary for the field's exploitation as a "sole risk operation," and to be reimbursed for a defined percentage of all investments for such sole risk operation in accordance with the corresponding contract.

Every association contract provides for an executive committee that makes all technical, financial and operational decisions if Ecopetrol S.A. has agreed that a field is economically viable. All major decisions of this committee must be made unanimously by the parties.

The maximum term of an association contract is 28 years. The first six years of the contract are for the exploratory phase, and are extendible for 1 or 2 more years at the partner's request. The remaining time is for the exploitation phase.

##### Incremental Production Contract

We enter into incremental production contracts to obtain additional hydrocarbon production beyond a base production curve that is established based on the proven reserves of a specific field or well. Under this type of arrangement, Ecopetrol S.A. owns 100% of the hydrocarbons defined by the base production curve. The incremental production (*i.e.*, the hydrocarbon volume obtained beyond the basic production as a result of investment activities), will be owned by the parties to such incremental production contract in the proportions established by such contract.

The initial phase of an incremental production contract has a term of up to 3 years, in which the contractual partner executes an initial work program approved by Ecopetrol S.A. in order to gain the right (but not the obligation) to continue with the second phase. If Ecopetrol's partner decides to continue with the project for the second phase (the complementary phase), it must inform Ecopetrol S.A. in writing no later than 90 days prior to the termination date of the initial phase and deliver a proposed development plan for each covered field. The second phase is the production phase and has a maximum term of 22 years minus the length of the initial phase.

Incremental production contracts provide for an executive committee that is responsible for taking all decisions in order to approve, control and supervise all operations that take place during the duration of the contract. These contracts also provide for a steering committee, which is responsible for the supervision of the execution of the work programs, the annual budget and other items.

### **Risk Production Contract for Discovered Undeveloped and Inactive Fields (First Round 2003)**

We have entered into risk production contracts for discovered undeveloped fields to promote exploration by private companies of both undeveloped and inactive fields. Under these contracts, the contracting party assumes all costs and expenses for the development and operation of a field in exchange for a percentage interest in the field's production as specified in the contract. This type of contract has a ten-year term calculated from its date of execution: one year for the evaluation period and a maximum of nine years for the development period. Some of these contracts have subsequently been extended beyond their original term.

### **Special Contracts**

We are party to a Joint Venture Contract for Exploration and Exploitation of "La Cira-Infantas" Area, "Teca Cocorná" Area; and a Services and Technical Collaboration Contract for the "Casabe" field.

### **Joint Venture Contracts for Exploration and Exploitation of "La Cira-Infantas" Area and of "Teca-Cocorná" Area**

These contracts between Ecopetrol S.A. and Occidental Andina LLC, executed on September 6, 2005 and June 24, 2014, respectively, have as their purpose, a joint collaboration between the parties with the goal of increasing the economic value of the La Cira-Infantas field and the Teca-Cocorná field by means of hydrocarbon exploration and production activities, including, among others, an incremental production project to improve the recovery factor, process optimization and exploratory activities.

Ecopetrol S.A. partially assigned its exploratory and production rights in the Contracted Areas to Occidental Andina LLC. Ecopetrol S.A. provides financial resources and the preferential rights of use for the existing infrastructure in that zone and Occidental Andina LLC provides financial resources and the technical and operative experience in mature fields redevelopment projects and enhanced recovery technologies.

Ecopetrol S.A. is the operator under both Joint Venture Contracts, and on behalf of the parties is responsible for the conduction, execution and control, directly or via contractors, of the operational activities.

The La Cira-Infantas contract's term is divided in three phases. The first phase lasts 180 days, the second 730 days and the third up to the economical limit.

The incremental production, after deduction of the royalties, is owned 52% by Ecopetrol S.A. and 48% by Occidental Andina LLC. These same percentages apply to the participation in the operational and direct expenses. Adjustments to the participations for the benefit of Ecopetrol S.A. will occur if there are high production levels or high prices.

The Teca-Cocorná contract's term is divided in two phases. The first phase lasts three years, extendable for up to an additional year, the second 20 years counted as from the initiation for the second phase and will be reduced by the term of any extensions of the first phase.

The basic production is 100% owned by Ecopetrol S.A. The incremental production, after deduction of the royalties, is owned 60% by Ecopetrol S.A. and 40% by Occidental Andina LLC. These same percentages apply to the participation in the operational and direct expenses. Adjustments to the participations for the benefit of Ecopetrol S.A. will occur if there are high production levels and high prices.

### **Services and Technical Collaboration Contract "Casabe"**

The purpose of the contract executed between Ecopetrol S.A. and Schlumberger Surencó S.A. on April 26, 2004, is the evaluation, design and execution of work programs specifically with the purpose of increasing the value in the Casabe field by means of hydrocarbon exploration and production activities to obtain incremental production, application of new technologies, application of techniques for deposits management and operational costs reduction. Ecopetrol S.A. is the operator and Schlumberger Surencó S.A. keeps the right of first option regarding the activities to be executed in the area of interest.

Both parties can invest in all the activities seeking to evaluate, obtain and incorporate incremental value in the area of interest. Such activities are developed directly by the parties or via contractors (Ecopetrol) or subcontractors (Schlumberger). Amounts expended pursuant to the contract are reimbursed depending on the incremental value (monthly valuation in US\$ of the results obtained from the execution of the work programs) created through the contract and the activities executed thereunder.

Both Ecopetrol S.A. and Schlumberger Sureco S.A. commit to assume full responsibility for damages and/or losses suffered by their respective personnel and goods in development of the contract, regardless of the cause. The maximum authority is the Management Committee.

The contract had an initial term of 10 years, and was amended several times to include an additional term of six years for which a new business was structured.

### **The National Hydrocarbons Agency (ANH) and its Contracts**

The National Hydrocarbon Agency (“ANH”) was created by Decree Law 1760 of 2003 and was given the authority to administer all national hydrocarbon reserves under contracts executed beginning on January 1, 2004. Decree Law 1760 of 2003 states, “The Empresa Colombiana de Petróleos, Ecopetrol, is split, its organic structure is modified, and the Agencia Nacional de Hidrocarburos and the Sociedad Promotora de Energía de Colombia S.A. are created.” Prior to January 1, 2004, Ecopetrol S.A. had the authority to contract with third parties for the exploration and production of new areas.

The creation of the ANH did not modify the rights or obligations of Ecopetrol or other parties with respect to contracts in existence before January 1, 2004 when the ANH was created and therefore Ecopetrol retains the authority to execute agreements with respect to all areas that it held prior to that date.

Below, we include a brief description of each type of contract that we have entered into with the ANH:

#### ***Technical Evaluation Agreement***

This type of contract grants the contractor the right to develop technical evaluation operations with operational autonomy at its own cost and risk, seeking to appraise the hydrocarbon potential, with the purpose of identifying the zones of prospective interest in the area by means of the execution of an exploratory program. The contractor has the option to request the conversion of a technical evaluation agreement (“Technical Evaluation Agreement” or “TEA”) into one or more E&P Contracts that cover the area of the TEA (or a portion thereof).

The contractor can conduct evaluation activities for terms that vary between 18, 24 and 36 months, depending on the terms of reference of the ANH’s bidding round.

#### ***E&P Contract***

The ANH enters into concession contracts pursuant to which the Nation grants exploration and production rights, and receives royalties and taxes. In turn, the contractor provides 100% of the investment and expenses resources, and receives 100% of the production after royalties and taxes. The ANH has named this contract an “Exploration and Production Contract” (E&P Contract).

Pursuant to the first stage of this contractual model, the ANH only receives a percentage of oil revenues in two cases:

- (i) when the international oil prices rise beyond a specified price, above which the ANH has a right to participate in a share of the increased revenues generated, or
- (ii) in the case of recognition of production rights in an extended contractual phase.

Under all E&P contracts executed since ANH’s 2008 bidding round, the ANH receives a percentage of the production from the beginning of the contract, upon the commencement of the production phase, and not only in the extension phase of the contract as mentioned in the previous paragraph. In addition, ANH has economic rights when the price of oil exceeds a reference price set in the contract (high price fee) and the superficiary canon.

E&P contracts have two phases: (i) an exploration period, which term is 6 years counted from the effective date, renewable for two additional years, and (ii) a production period, which is, with respect to each production field, 24 years plus any extensions, which are counted from the date of declaration of commerciality of the corresponding field. The abovementioned terms have been modified during ANH’s 2014 bidding round for unconventional and offshore reservoirs to an exploration period of nine years and a 30-year production period.

### ***ANH and Ecopetrol Agreements (Convenios)***

At the time of termination or extension of any association contract executed by Ecopetrol S.A. before December 31, 2003, the rights over the production area and over the movable and immovable assets therein will continue to belong to Ecopetrol S.A.

Pursuant to article 2 of Decree 2288 of 2004, which regulates Decree Law 1760 of 2003, Ecopetrol S.A. must execute an agreement with the ANH to regulate the exploration and exploitation terms and conditions of the relevant area, which was previously subject to an association contract.

Decree 2288 of 2004 also established that Ecopetrol S.A. would have to execute agreements with ANH covering fields directly operated by Ecopetrol S.A. Under these agreements ANH recognizes the exclusive right of Ecopetrol S.A. to explore and exploit the hydrocarbons property of the Nation that are obtained in the areas they cover, until resource depletion or until Ecopetrol S.A. returns the area to the Nation through the ANH.

These agreements also provide the conditions under which Ecopetrol S.A. is able to assign, partially or completely, its rights and duties thereunder to third parties.

#### **3.5 Transportation and Logistics**

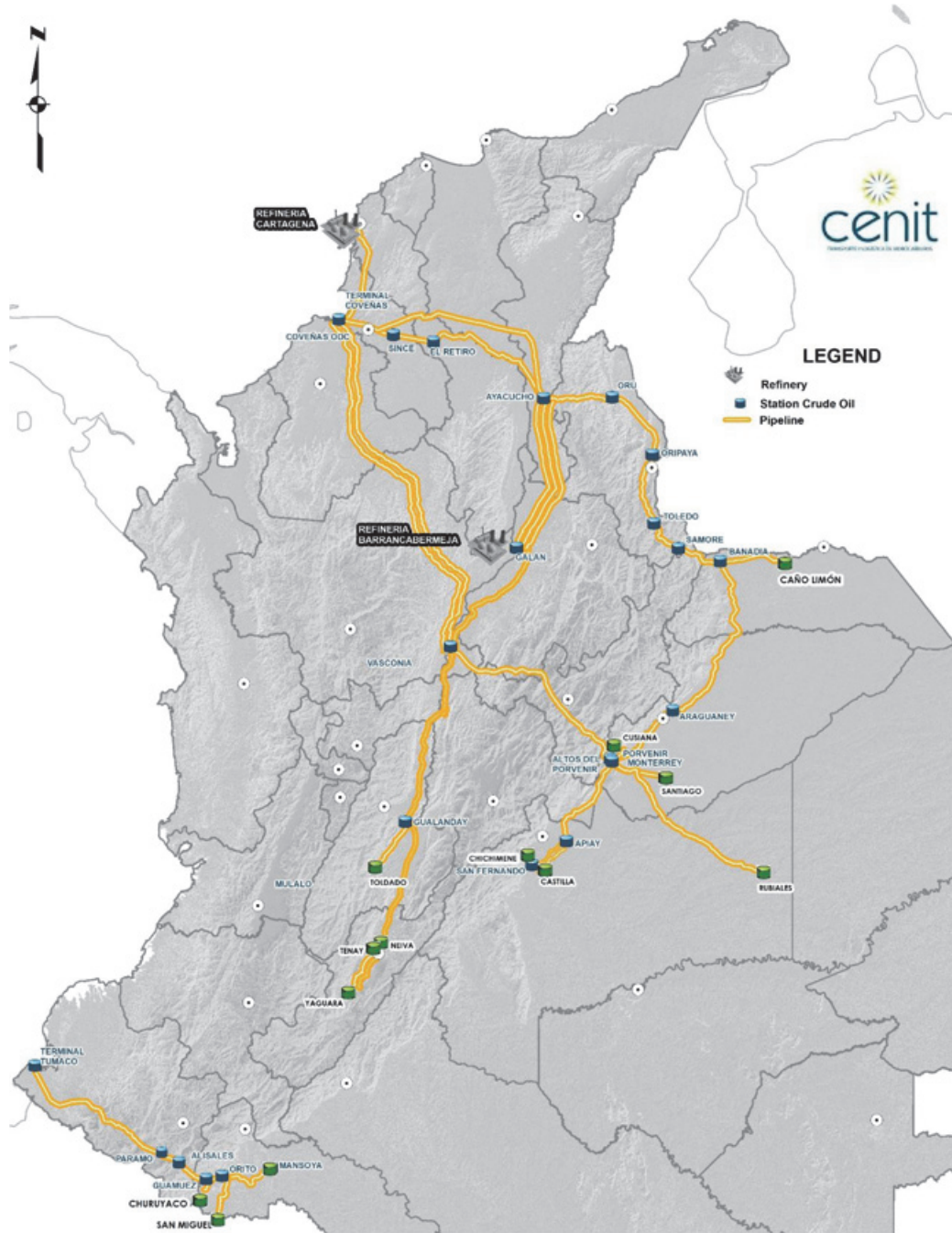
##### **3.5.1 Transportation Activities**

The transportation and logistics segment includes the transportation of crude oil, motor fuels, fuel oil and other refined products including diesel, jet and biofuels. We conduct most of these activities through our wholly owned subsidiary Cenit and its subsidiaries.

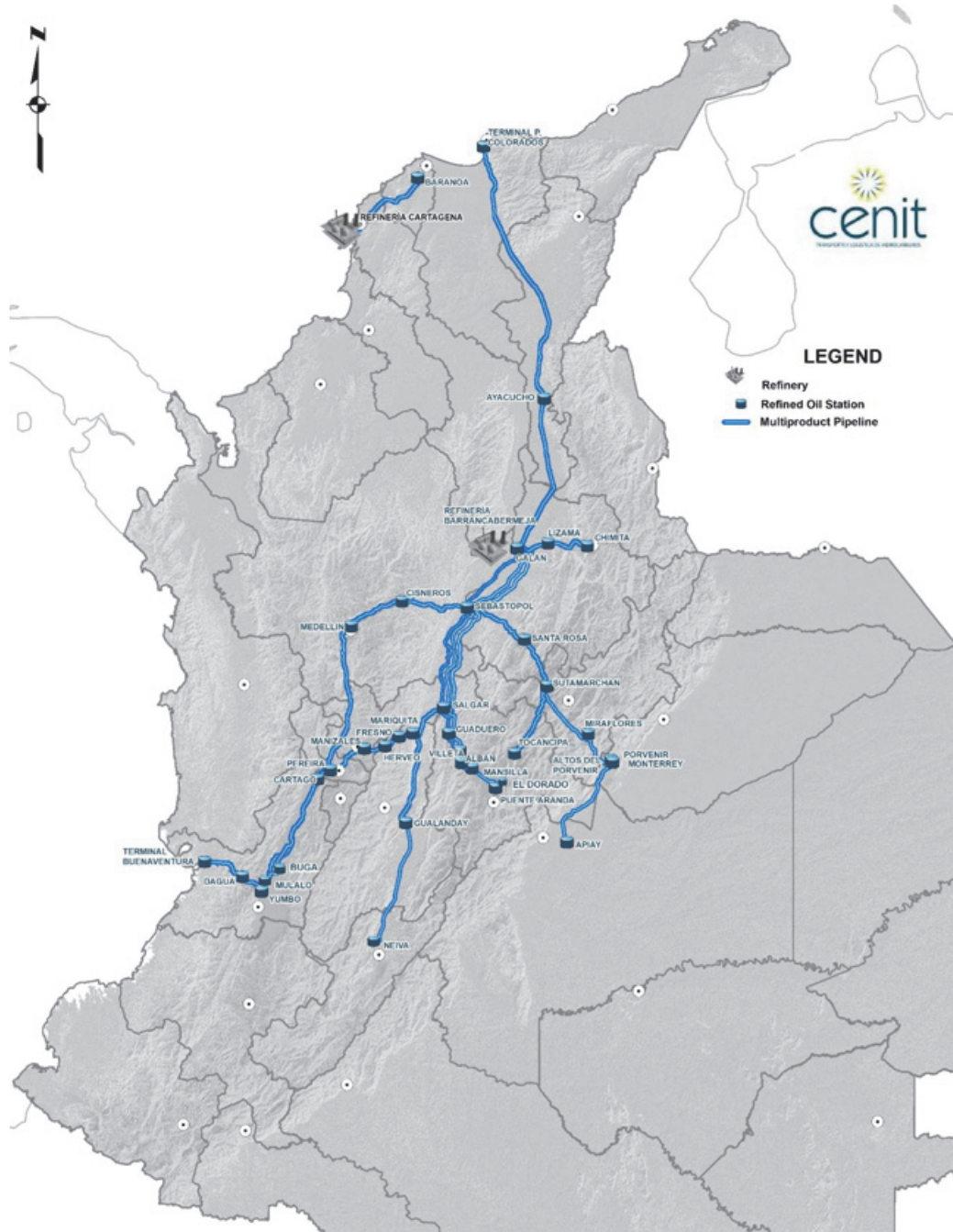
The map below shows the locations of the main transportation networks owned by our business partners and us.



Graph 5 – Map of Oil Pipelines



Graph 6 – Map of Multipurpose Pipeline



The table below sets forth the volumes of crude oil and refined products transported through the crude oil pipelines and multipurpose pipelines owned by us.

**Table 32 – Volumes of Crude Oil and Refined Products Transported**

	For the year ended December 31,		
	2018	2017	2016
	(thousand bpd)		
Crude oil transport <sup>(1)</sup>	836.2	823.3	864.7
Refined products transport <sup>(2)</sup>	273.4	268.2	262.4
<b>Total</b>	<b>1,109.6</b>	<b>1,091.5</b>	<b>1,127.1</b>

(1) The crude oil transported volumes correspond to the following systems: Ocesa Segment 3, ODC, Vasconia-Galan, Ayacucho-Galan, Ayacucho-Coveñas and Trasandino Pipeline.

(2) The pipelines transporting refined products include the following: Galan-Sebastopol, Galan-Salgar, Galan-Bucaramanga, Buenaventura-Yumbo and Cartagena-Baranoa.

The volume of crude oil transported by Cenit's main systems and those of affiliates increased in 2018 by 1.6% compared to the previous year. This increase was mainly the result of a higher volume of Castilla Norte crude oil coming from the Barrancabermeja refinery through the Ayacucho-Coveñas 16"/24" systems. Additionally, we experienced an increase in the volume of Castilla crude oil transported through the Llanos node, which increased the proportion of that crude oil in the systems that reach Coveñas. Of the total volume of crude transported by oil pipeline, approximately 75.7% belonged to Ecopetrol's corporate group.

The volume of refined products transported by Cenit increased by 1.9% in 2018 mainly due to growth of local fuel demand. Of the total volume of refined products transported in multi-purpose pipelines during the year, 33% belonged to Ecopetrol's corporate group.

#### *Transportation Capacity*

During 2018, due to the calculation of our service factor (which determines the transportation capacity that can be offered), we decreased the capacity of our primary and secondary oil and product pipelines and loading facilities. Our service factor is calculated on a monthly basis and may vary from time to time, as it considers operative and technical effects (whether scheduled or unscheduled) within a certain period of time. Our main crude oil pipeline systems' operating capacity decreased from 1,500,000 bpd in 2017 to 1,497,000 bpd in 2018. Our main refined products pipeline transportation capacity decreased from 518.6 thousand bpd in 2017 to 510 thousand bpd in 2018.

References to our crude oil transportation capacity in this annual report refer to the capacity of the pipelines that belong to Cenit and its subsidiaries to transport crude oil volumes either to the refineries or to our export facilities. In addition, we have other feeder systems that transport oil volumes from producing facilities or other pumping stations to these main pipelines. References to our refined products transportation capacity refer to the capacity of pipelines that begin in the Galan station (Barrancabermeja refinery) and Cartagena station (Cartagena Refinery).

#### **3.5.1.1** *Pipelines*

As of December 31, 2018, we, directly or indirectly with private partners, own, operate and maintain an extensive network of crude oil and refined products pipelines. These pipelines connect our own and third-party production centers, import facilities and terminals to refineries, major distribution points and export facilities in Colombia. Cenit directly owns 45% of the total crude oil pipeline shipping capacity in Colombia. When aggregated with the crude oil pipelines in which Cenit owns an interest, Cenit owns 82% of the oil pipeline shipping capacity in Colombia. By December 31, 2018, our network of crude oil and multipurpose pipelines was approximately 9,071 kilometers in length. The transportation network consists of approximately 5,362 kilometers of main crude terminals and oil pipeline networks connecting various fields to the Barrancabermeja refinery and Reficar, as well as to our export facilities. We also own 3,709 kilometers of multipurpose pipelines for transportation of refined products from the Barrancabermeja refinery and from Reficar to major distribution points. Out of the 5,362 kilometers of crude oil pipelines, owned by us, 3,150 kilometers of crude oil pipeline are wholly owned, and 2,212 kilometers of crude oil pipeline are owned through non-wholly owned subsidiaries.

The following table sets forth our main pipelines in which we own an indirect interest as of December 31, 2018.

**Table 33 – Our Main Pipelines**

<b>Pipeline</b>	<b>Kilometers</b>	<b>Capacity (mbd)</b>	<b>Product Transported</b>	<b>Origin</b>	<b>Destination</b>	<b>Indirect Ownership Percentage</b>
Caño Limón-Coveñas	771	250	Crude Oil	Caño Limón	Coveñas	100.00%
Oleoducto de Alto Magdalena (OAM)	391	110	Crude Oil	Tenay	Vasconia	95.8%
Oleoducto de Colombia (ODC)	483	236	Crude Oil	Vasconia	Coveñas	73.00%
Oleoducto Central –Ocensa <sup>(1)</sup>	848	745	Crude Oil	Cupiagua	Coveñas	72.65%
Oleoducto de los Llanos (ODL)	260	314 <sup>(2)</sup>	Crude Oil	East fields	Monterrey Cusiana	65.00%
Oleoducto Bicentenario de Colombia	230	110 <sup>(3)</sup>	Crude Oil	Araguaney	Banadia	55.97%

(1) Ocensa has four segments with different capacities. 745 mbd refers to the capacity of segment two (El Porvenir-Vasconia). The capacity of the other segments are as follows:

- a. Cupiagua-Cusiana (segment zero): 198 mbd
- b. Cusiana-El Porvenir (segment one): 745 mbd
- c. Vasconia-Coveñas (segment three): 550 mbd

(2) Transportation capacity for this pipeline is measured by using crude oil viscosity of 690 cStk (30° C).

(3) Represents the contractual crude oil transportation capacity for the pipeline currently in operation.

As of December 31, 2018 we owned 73 stations, 39 located in crude oil pipelines, 30 in refined products pipelines, 2 in crude oil ports and 2 in refined product ports.

As of December 31, 2018, we had a nominal storage capacity associated with the transportation network of 17.7 million barrels of crude oil and 4.9 million barrels of refined products. We do not own any tankers.

The Transportation and Logistics segment has a maintenance operating model with the aim of unifying criteria for planning and execution among the companies of the segment.

#### *Pipeline Projects*

##### **San Fernando – Monterrey**

The San Fernando – the Monterrey project’s initial objectives included ensuring the ability to transport 300,000 bpd at 300 cSt of diluted crude oil from the Chichimene and Castilla fields to the Monterrey pumping station and the transportation of 45,000 bpd of diluent (naphtha) between the Apiay station and the Castilla and Chichimene fields.

The scope of the project includes the construction of a new 30” 119-km crude oil pipeline, a new pumping station to include reception, storage and dilution facilities, the conversion of the existing pipeline of 10” between the Castilla II plant and the Apiay station, and the construction of a new 10” pipeline between Chichimene and San Fernando fields in order to transport diluent (naphtha) from the Apiay station to the San Fernando plant.

In 2018, the project completed the maximum pumping test, in accordance with the operational system parameter and owner’s requirements; as a result, the main functional services of the project were validated. The construction, startup phase and commissioning of all systems were completed in January 2018. The system is able to transport crude oil at 750 cSt between the San Fernando and Apiay stations.

##### **Oleoducto al Pacifico SAS**

Given the uncertainties around the future results of the exploration and production activities in Colombia and the current expected return of the investment, in December 2017 the parties engaged in the Oleoducto al Pacifico suspended the project. Based on our current view, this decision has had no impact on the oil industry in Colombia and can be reconsidered in the event the transportation system may be necessary.

##### **Replacement of El Porvenir Station Pumping Units**

During 2018, Ocensa began to replace five pumping units with internal combustion engines with electrical energy engines. The goal of this project is to reduce the level of greenhouse gas emissions and noise pollution, thereby having a positive effect on the environment and potentially reduce operation and maintenance costs.

## Adaptation of Cusiana Truck Unloading Facility

The Cusiana truck unloading facilities enables exploration and production companies in blocks or areas not connected to the network to access Ocesa pipeline.

During 2018 Ocesa adapted its facilities to Colombia's new crude oil quality basket and increased capacity up to 81 thousand bpd by means of the implementation of in-line dilution facilities. As a result, shippers can now unload heavy crudes and blend them with light crudes or refined diluents in order to maximize the value of the crude oil.

### **3.5.1.2 Export and Import Facilities**

We currently have concessions granted by the Colombian Government for four export/import docks for crude oil and refined products: Coveñas, Tumaco, Pozos Colorados and Cartagena. Our export capacity reached 1.24 million bpd for crude oil. Our import capacity of refined products and crude oil reached 0.19 million bpd and 0.25 million bpd, respectively.

Our crude oil loading facilities can load tankers of up to 350 thousand deadweight tonnage (DWT). Adjacent to these loading facilities we also have storage facilities that are capable of storing 11.6 million barrels. Our docks used for import and export of refined products can load tankers of 70 thousand DWT. Additionally, these facilities have storage capacity of up to 5.6 million barrels.

### **3.5.2 Other Transportation Facilities**

We have entered into transportation agreements with tanker truck and barge companies in order to transport crude oil from locations that do not have pipeline connections to refineries and export facilities. The volume of refined products that cannot be transported by pipelines or tanker trucks because of capacity limitation is transported by barges. During 2018, 27.9 million barrels of crude oil and refined products were transported by tanker trucks, and 7.2 million barrels of crude oil and refined products were transported by barges, particularly using the Magdalena River, connecting Barrancabermeja with Barranquilla and Cartagena.

### **3.5.3 Marketing of Transportation Services**

Cenit and its subsidiaries' main line of business is the crude oil pipeline transport (75% of revenues), followed by the refined products pipeline transport (16% of revenues) and ports and related services (6% of revenues).

Transportation contracts of crude oil may take several forms: ship or pay (payment for the availability of a fixed capacity in the system), ship and pay (payment for volumes actually transported) or spot. The main users for the crude oil transportation business are Ecopetrol S.A., Frontera, Trafigura, Mansarovar, Metapetroleum and Gran Tierra, who collectively represented 93% of this business segment's revenues in 2018. Transportation services for crude oil provided to Ecopetrol S.A. represented 57% of this business segment's crude oil transport revenues.

Cenit also transports refined products. Its main client for this service is Ecopetrol S.A., which accounted for 40% of refined products pipeline transport revenues in 2018, principally due to the transport of naphtha, diesel and gasoline. Cenit also has 14 other fuel wholesalers' customers for whom it transports refined products. The most significant among them are Organizacion Terpel, ExxonMobil, Chevron Petroleum Company, Biocombustibles S.A.S. and Distribuidora Andina.

Deregulated businesses, such as ports and crude-loading facilities, represent a smaller portion of Cenit's revenue (6% in 2018). Clients for these businesses include some of the same parties for which Cenit provides crude oil and refined products transportation services.

#### *Developments with certain clients of Bicentenario and Cenit*

#### **Oleoducto Bicentenario de Colombia S.A.S.**

During July 2018, the carriers Frontera Energy Colombia Corp. ("Frontera"), Canacol Energy Colombia S.A.S. ("Canacol") and Vetra Exploración y Producción Colombia S.A.S. ("Vetra" and, together with Frontera and Canacol, the "Carriers") sent letters to Oleoducto Bicentenario de Colombia S.A.S. ("Bicentenario") alleging they were early termination rights under the Ship-or-Pay Transport Agreements entered by each of them and Bicentenario in 2012 (the "Transport Agreements"). Bicentenario has rejected the terms of the letters, noting that there is no option for early termination and reiterating to the Carriers that the Transport Agreements are current and therefore the Carriers must fulfill their obligations under the Transport Agreements in a timely fashion.

Under Bicentenario's understanding that the Transport Agreements remain current and that the Carriers are in violation of their obligations under such agreements, Bicentenario declared the Carriers delinquent because of their failure to pay for transport service under the aforementioned agreements.

Consequently, Bicentenario executed the standby letters of credit posted as guarantee for the Transport Agreements. On October 19, 2018, Bicentenario notified Frontera of the existence of a "Dispute" pursuant to Clause 20 of the respective Transport Agreement and moved to the party dispute settlement stage as provided for in such clause. Such discussions ended without an agreement on December 19, 2018. On January 28, 2019, Bicentenario filed an Arbitration Claim against Frontera in accordance with the arbitration clause of the Transportation Agreement to claim any compensation, indemnification or other restitution deriving from the alleged early termination of said agreements.

Similarly, on November 1, 2018, Bicentenario notified Vetra and Canacol of the existence of a "Dispute" pursuant to Clause 20 of the respective Transport Agreement and moved to the party dispute settlement stage as provided for in each such respective clause. Such discussions ended without agreement on March, 2019.

As of the date of these financial statements, Bicentenario continues evaluating its options under the Transport Agreements and the Shareholders Agreement (*Acuerdo Marco de Inversión*) in order to guarantee compliance and claim any compensation, indemnification or other restitution deriving from the alleged early termination of said agreements and any other contractual breaches by the Carriers.

#### **Cenit Transporte y Logística de Hidrocarburos S.A.S.**

During July 2018, the carriers Frontera, Vetra and Canacol ("carriers") sent notifications to Cenit Transporte y Logística de Hidrocarburos SAS ("Cenit") alleging they were exercising their early termination right under the Ship-or-Pay Crude Oil Transport Agreements (SoP agreements) entered among each of them and Cenit for the transportation of crude oil through the Caño Limón – Coveñas pipeline (owned by Cenit).

In response to the alleged termination of SoP Agreements, CENIT issued letters stating that the alleged event which would have given the carriers early termination rights had not occurred as provided for in Clause 13.3 and other clauses of the aforementioned SoP agreements. In the same letters, CENIT stated that it would continue

invoicing and charging for the transport services as stipulated in the SoP agreements, since they remain in force, and therefore, Carriers must fulfill their contractual obligations.

In November, 2018, CENIT filed an arbitration demand against Frontera Energy Group pleading that SoP Agreements are in full force and effect, that Frontera is obliged to comply its terms and conditions and, therefore, is obliged to pay transportation tariffs as agreed in the SoP agreements. In similar terms an arbitration demand was also filed against Vetra and the same will occur against Canacol.

### 3.6 Refining and Petrochemicals

#### 3.6.1 Refining

Our main refineries are the Barrancabermeja refinery, which Ecopetrol S.A. directly owns and operates, and a refinery in the Free Trade Zone in Cartagena owned by Reficar, a wholly owned subsidiary of Ecopetrol S.A. Ecopetrol S.A. also owns and operates two other minor refineries – Orito and Apiay, but these are considered part of the upstream segment since the majority of production is for self-consumption.

Our refineries produce a full range of refined products, including gasoline, diesel, jet fuel, LPG and heavy fuel oils, among others.

The following table sets forth our average daily installed and actual refinery capacity for each of the last three years:

**Table 34 – Average Daily Installed and Actual Refinery Capacity**

	For the year ended December 31,								
	2018			2017			2016		
	Capacity (bpd)	Through- put (bpd)	% Use (bpd)	Capacity (bpd)	Through- put (bpd)	% Use (bpd)	Capacity (bpd)	Through- put (bpd)	% Use (bpd)
Barrancabermeja	250,000	221,946	89%	250,000	209,838	84%	250,000	213,091	85%
Reficar <sup>(1)</sup>	150,000	151,331	101%	150,000	135,700	90%	150,000	117,188	78%
Apiay <sup>(2)</sup>	2,500	939	38%	2,500	997	40%	2,500	1,382	55%
Orito <sup>(2)</sup>	2,300 <sup>(3)</sup>	1,228	53%	2,500	948	38%	2,500	1,090	44%
<b>Total</b>	<b>404,800</b>	<b>375,444</b>	<b>93%</b>	<b>405,000</b>	<b>347,483</b>	<b>86%</b>	<b>405,000</b>	<b>332,751</b>	<b>82%</b>

(1) Reficar's operations were fully stabilized during the second half of 2017.

(2) Apiay and Orito are part of the upstream segment, since the majority of their production is for on-site consumption.

(3) Capacity has been updated to take into account major maintenance performed in 2018.

#### 3.6.1.1 Barrancabermeja Refinery

We estimate that the Barrancabermeja refinery supplies 48% of the fuels consumed in Colombia according to internal calculations made by us and Colombia's fuels consumption reported by the Ministry of Finance.

The following table sets forth the production of refined products of the Barrancabermeja refinery for the periods indicated.

**Table 35 – Production of Refined Products from the Barrancabermeja Refinery**

	For the year ended December 31,		
	2018	2017 (bpd)	2016
LPG, Propylene and Butane	11,813	10,712	11,956
Gasoline Fuels and Naphtha	58,623	56,047	59,305
Diesel	58,305	56,090	48,233
Jet Fuel and Kerosene	23,604	20,421	20,435
Fuel Oil	36,636	38,217	55,730
Lube Base Oils and Waxes	729	609	668
Aromatics and Solvents	3,106	2,847	2,879
Asphalts and Aromatic Tar	31,104	26,468	14,092
Polyethylene, Sulfur and Sulfuric Acid	1,479	1,509	1,541
<b>Total</b>	<b>225,399</b>	<b>212,920</b>	<b>214,839</b>
Difference between Inventory of Intermediate Products	(1,018)	(405)	(661)
<b>Total Production</b>	<b>224,381</b>	<b>212,515</b>	<b>214,178</b>

In 2018, total production from the Barrancabermeja refinery increased by 5.6% from 212,515 bpd in 2017 to 224,381 bpd in 2018 primarily as a result of stable operation and improved throughput due to the implementation of initiatives to segregate and purchase light and intermediate crudes.

We own and operate four petrochemical plants and one paraffin and lube plant located within the Barrancabermeja refinery. In 2018, we produced 48,468 tons of low-density polyethylene, a decrease of 9.3% compared to the production of 53,417 tons in 2017. This decrease was due primarily to a reduction of ethylene availability due to a turnaround of one of the fluid catalytic cracking (FCC) units. We produced 894 mboe of aromatics (benzene, toluene, xylene, orthoxylene, heavy aromatics and cyclohexane), a 4.3% increase as compared with the production of 857 mboe of aromatics in 2017. The increase was mainly the result of an increase in local demand for benzene, toluene, xylene, orthoxylene (BTXO).

The gross refining margin decreased from US\$13.5 per barrel in 2017 to US\$11.8 per barrel in 2018, primarily due to the decrease in the price of refined products, mainly gasoline and fuel oil, as compared to the ICE Brent. The average conversion index for the Barrancabermeja refinery was 84.6% in 2018 and 82.7% in 2017. This increase was primarily due to the operation at higher capacity of the units that convert bottom streams into diesel.

### 3.6.1.2 Cartagena Refinery

The following table sets forth the production of refined products from the Cartagena Refinery for the periods indicated.

**Table 36 – Production of Refined Products from the Cartagena Refinery**

	For the year ended December 31,		
	2018	2017	2016
		(bpd)	
LPG, Propylene and Butane	4,227	6,791	6,080
Gasoline Fuels and Naphta	51,703	43,728	35,012
Diesel	76,833	60,467	40,950
Jet Fuel and Kerosene	8,057	6,700	5,768
Fuel Oil	4,671	10,150	24,602
Sulfur	581	446	241
<b>Total</b>	<b>146,072</b>	<b>128,282</b>	<b>112,653</b>
Difference between Inventory of Intermediate Products	39	3,916	911
<b>Total Production<sup>(1)</sup></b>	<b>146,111</b>	<b>132,198</b>	<b>113,564</b>
<b>Petcoke (Metric tons)</b>	<b>984,558</b>	<b>704,073</b>	<b>601,163</b>

(1) Does not include petcoke.

The following tables set forth the imports and sales of refined products from the Cartagena Refinery for the periods indicated.

**Table 37 – Imports and Sales of Refined Products from the Cartagena Refinery**

	For the year ended December 31,		
	2018	2017	2016
		(bpd)	
<b>Imports</b>			
Motor Fuels	-	212	3,641
Diesel	-	-	6,155
Jet Fuel and Kerosene	466	847	2,211
Alkylate	-	-	83
LPG and Butane	739	618	355
<b>Total Imports</b>	<b>1,205</b>	<b>1,677</b>	<b>12,445</b>



During 2018, the Cartagena Refinery imported products to cover the North Coast sales demand primarily due to operational turnarounds during the last quarter of 2018.

	<b>For the year ended December 31,</b>		
	<b>2018</b>	<b>2017</b>	<b>2016</b>
	<b>(bpd)</b>		
<b>Sales</b>			
Motor Fuels	52,126	44,051	38,534
Diesel	78,007	60,289	46,060
Jet Fuel and Kerosene	8,082	7,489	7,479
Fuel Oil	4,704	7,528	16,593
Other Products	19,942	27,099	22,990
<b>Total Sales</b>	<b>162,861</b>	<b>146,456</b>	<b>131,656</b>

During its stabilization period in the second half of 2017, the Cartagena Refinery reached the goal of completing individual unit performance tests (for 100% of units), and the Global Performance Test on December 5, 2017.

As part of the initial phase of the refinery optimization process, during the first half of 2018 the maximum load capacity of certain of the Cartagena Refinery's plants were tested and provided the following results: (i) the coke unit, with maximum load of 46,088 bpd versus a nominal capacity of 45,000 bpd, (ii) the crude unit, with 166,607 bpd versus a nominal capacity of 150,000 bpd and (iii) the hydrocracking unit with, 38,204 bpd versus a nominal capacity of 35,000 bpd.

In August 2018 a test was run using 100% domestic crude during nine days, achieving an average throughput of 164 mbd. In September 2018, the highest average throughput per month under regular operation was achieved since the refinery's commissioning, at 161 mbd.

Finally, the fluid catalytic cracking unit ran at 43,515 bpd versus a nominal capacity of 40,000 bpd after coupling and putting into operation the turbo expander.

In terms of gross refining margin, the refinery progressed from US\$9.5 per barrel in 2017 to US\$11.0 per barrel in 2018. Throughput also improved during 2018, increasing from an average of 136 mbd in 2017 to 151 mbd in 2018. This result primarily reflects the good performance of the refinery after its stabilization period and commencing its optimization process in 2018.

The Cartagena Refinery's 2018 figures already reflect the operation of all units, thus total sales have increased as compared to 2017, from US\$3,085 million in 2017 to US\$4,129 million in 2018. A total of 55.3 million barrels of crude were processed in 2018 compared to 49.5 million barrels processed in 2017. Exports to international markets represented 42% of total sales (US\$1,749 million).

### **Financing**

On December 30, 2011, with the approval from the Colombian Ministry of Finance and Public Credit, Reficar executed a US\$3.5 billion project finance to partially fund the expansion and modernization of the Cartagena Refinery, loans with tenors of 14 and 16 years from Commercial Banks and Export Credit Agency Facilities, respectively. The aggregate amount drawn under these finance agreements totaled US\$3,496.6 million. These credit agreements included a mechanism by which Reficar can exit the facility by transferring the debt to the Ecopetrol parent level by either (i) the occurrence of a mandatory debt assumption event or (ii) a voluntary debt assumption.

During 2017, Reficar received capital injections of US\$269 million to cover project capital expenditures, start-up costs, one-off stabilization costs of the new refinery and the debt service payments due on June 20, 2017. The amount requested by Reficar under the Construction Support Agreement was US\$97 million. The amount requested by Reficar under the Debt Service Guarantee Agreement was US\$172 million. There was no need to request additional contributions under the Debt Service Guarantee to cover the debt service payment due on December 2017.

The principal amount repaid by Reficar during 2016 was US\$269 million and during 2017 was US\$130 million. Interest payments during 2016 and 2017 were US\$87 million and US\$42 million, respectively.

As part of Ecopetrol Group's strategy to optimize its capital structure, on December 13, 2017, with the approval of the senior lenders and the Colombian Ministry of Finance and Public Credit, Ecopetrol S.A. voluntarily assumed Reficar's senior debt. As of the date of the voluntary assumption, Reficar owed the senior lenders a principal amount of US\$2,666 million (in nominal terms).

In order to finalize the implementation of Ecopetrol Group's strategy to optimize its capital structure, the following capital injections were undertaken by Ecopetrol on December 13, 2017, increasing its shareholding participation in Reficar from 75.96% to 99.34%:

- i. As a result of the voluntary debt assumption, Reficar assumed an account payable in the amount of US\$2,596 million (book value for Reficar's senior debt under IFRS) in favor of Ecopetrol. As a shareholder, Ecopetrol requested that such account be repaid with Reficar shares.
- ii. Ecopetrol requested that the existing subordinated COP-denominated loan it granted in Reficar in the amount of \$1,522,760 million (book value as of December 13, 2017) be repaid with new Reficar shares.
- iii. Additionally, on December 7, 2018, the direct shareholding participation of Ecopetrol S.A. in Reficar increased from 75.96% to 99.34%, after additional contributions of paid-in capital.

### 3.6.1.3 Esentia S.A.

During 2018, Esentia production totaled 447 thousand tons of petrochemical products, a 2% increase compared to the 441 thousand tons produced in 2017 primarily due to delays in the supply of raw materials as a result of Hurricane Harvey. The total contribution margin in 2018 (including the contribution of polypropylene, polyethylene and masterbatches) was 11.2% lower than in 2017, a decrease from US\$215 per ton in 2017 to US\$191 per ton in 2018. The decrease in contribution margin was primarily due to higher volatility in the propylene market, Esentia's main feedstock.

**Table 38 – Operating Capacity of Esentia**

	For the year ended December 31,		
	2018	2017	2016
	(Metric Tons)		
Average capacity	470,000	470,000	470,000
Throughput	447,290	440,632	444,812
% Use	95%	94%	95%

### 3.6.1.4 Biofuels

We have investments in two biofuel companies: (i) Bioenergy S.A.S., in which we own indirectly 99.35% of the shares, that in 2017 began the operation of an ethanol plant with nominal capacity of 480,000 liters/day, and (ii) Ecodiesel Colombia S.A., in which we own 50% of the shares, currently in operation with a theoretical capacity of 100,000 tons per year of biodiesel.

### **3.6.2 Marketing and Supply of Refined Products**

We are the main producer and supplier of refined products in Colombia. We market a full range of refined and feedstock products, including regular and high-octane gasoline, diesel fuel, jet fuel, LPG, natural gas and petrochemical products, among others.

Domestic sales of products increased by 4.7 mboepd, an increase of 1.6% compared to 2017. This increase is primarily the result of: (i) a 2.5%, or 3.7 mboepd, increase in middle distillates sales mainly due to higher economic growth in general and higher airplane transportation demand by passengers, (ii) a 5.3%, or 0.9 mboepd, decrease in LPG sales, primarily as a result of lower production at Reficar and Barrancabermeja, (iii) a 12%, or a 2.2 mboepd, increase in petrochemical sales, due to an increase in asphalt sales by Ecopetrol, as a consequence of the reactivation of domestic demand and local sales to clients who then export the product.

During 2018, 8.8 million barrels of diesel and 3.4 million barrels of gasoline produced by Reficar were allocated to the local market in order to complement the supply from the Barrancabermeja refinery and fulfill Colombia's demand, avoiding larger imports and allowing Ecopetrol to maintain the share of the national market. In addition, Ecopetrol imported petrochemicals in order to complement the national supply, generating additional sales of lubricating bases, polyethylene, hexanes and others.

Exports of products increased by 8.3% compared to 2017, 12 mbd from Reficar and 3.0 mbd from Ecopetrol, primarily due to (i) a 97%, or 16 mbd increase in exports of high sulfur diesel, partially offset by (ii) a 21%, or 8.4 mbd decrease in fuel oil exports.

### **3.7 Research and Development; Intellectual Property**

Our innovation and technology center is the Colombian Petroleum Institute, established in 1985 and located in Bucaramanga, Santander. In 2018, research and development expenses were US\$40.67 million, compared to US\$25.7 million in 2017. Technology and innovation are essential to our efforts to add value to our business segments through the development of proprietary technologies and competitive advantages and the adaptation of third-party technologies to our processes.

The focus of technology development is on designing high added-value products and solutions for Ecopetrol and the Colombian oil industry. The scope of the Colombian Petroleum Institute activities covers all of our value chain segments: exploration, production, refining, transportation and commercialization, as well as environmental sustainability and asset integrity.

Each year Ecopetrol presents to the Colombian Institute for the Development of Science and Technology (*Instituto Colombiano para el Desarrollo de la Ciencia y la Tecnología*, or COLCIENCIAS) its research, technology development projects and innovation initiatives, in order to obtain certifications for its science and technology investments. COLCIENCIAS certifies science and technology investments, which are deductible from income tax upon execution; and Ecopetrol applies the tax benefit. In 2018, we obtained US\$1.66 million in science-and-technology-related tax benefits certified by COLCIENCIAS.

Our intangible assets are preserved through a technological value-generation process and an intellectual property protection process, which include the consolidation of trade secrets, patents, copyrights, trademarks, industrial designs, and publications in specialized journals. Ecopetrol has filed 224 patent applications in the last 11 years, 17 of them in 2018. Our most recent patent applications include innovative technologies, such as (i) a method that uses nanofluids to improve the oil relative permeability in heavy and extra-heavy oil fields, (ii) a device for controlling production fluctuations at the well head, and the subsequent separation of heavy oil and water, (iii) a process to enhance the flow capacity of oil-water-diluent mixtures and the dilution capacity of diluents used in heavy and extra-heavy oil production and transportation, (iv) a method and device to determine the volumetric contraction of mixtures of heavy oil and light hydrocarbons, and (v) a visbreaking process for refining heavy petroleum components in the presence of a catalyst and hydrogen at low pressure.

In 2018, Ecopetrol declared two industrial secrets that strengthen its competitive advantages in the exploration and transportation of hydrocarbons. The Colombian and international authorities granted us 15 new patents, including one in Mexico and another in Ecuador. We currently hold 87 patents in Colombia, the United States, Mexico, Russia, Peru, Venezuela, Ecuador, Brazil, Nigeria, Indonesia and Malaysia.

In 2018, Ecopetrol S.A. licensed 7 of its technologies to private companies for manufacturing, marketing commercialization and after-sales support. To date, we have licensed 49 technologies to Colombian and multi-national companies.

### 3.8 Applicable Laws and Regulations

#### 3.8.1 Regulation of Exploration and Production Activities

##### 3.8.1.1 Business Regulation

Pursuant to the Colombian Constitution, the Nation is the exclusive owner of all hydrocarbon resources located in Colombia and has full authority to determine the rights to be held and royalties or compensation to be paid by investors for the exploration or production of any hydrocarbon reserves. The Ministry of Mines and Energy and the ANH are the authorities responsible for regulating all activities related to the exploration and production of hydrocarbons in Colombia.

Decree Law 1056 of 1953 (the Petroleum Code, or *Código de Petróleos*) declares that the hydrocarbon industry and its activities of exploration, exploitation, refinement, transportation and distribution are of public interest, which means that, in the interest of the hydrocarbon industry, the Colombian government may order necessary expropriations in order to develop such industry. The hydrocarbon industry is under governmental supervision and control, regulated mainly by the Ministry of Mines and Energy and the ANH.

Ministry of Mines and Energy Resolution 181495 of 2009, as amended by Resolution 40048 of 2015, establishes a series of regulations regarding hydrocarbon exploration and production.

Ministry of Mines and Energy Resolution 180742 of 2012, partially repealed by Resolution 90341 of 2014, includes a series of technical regulations for unconventional hydrocarbon resources, including the procedures for advancing the exploration and exploitation of unconventional reserves. It also establishes the types of wells and their classification, as well as the fulfillment of those minimum (drilling and abandoning) conditions necessary to initiate or perform E&P activities. Furthermore, it contemplates the applicable procedure to resolve disputes between the mining sector and the oil and gas sector, regarding the coexistence of their rights in some specific projects.

On May 26, 2015, Decree 1073 compiled the majority of Colombian decrees in force regarding the administrative sector of mines and energy.

Agreement (*Acuerdo*, a type of regulation) 004 of 2012, as issued by the ANH, amends Agreement 008 of 2004 and sets forth the rules governing the award of exploration and production areas and the execution of contracts. As set forth below, Agreement 002 of 2017 replaces this *Acuerdo*.

Agreement 003 of 2014, as issued by the ANH, complements Agreement 004 of 2012 by setting forth the contractual framework for the carrying out of activities in unconventional reservoirs, the procurement regulations for the exploration and exploitation of unconventional fields and the procurement process for the awarding of hydrocarbon exploration and exploitation areas.

Agreement 002 of 2015, as issued by the ANH, partially amends Agreement 004 of 2012 and sets forth the initial rules and measures the Government can take to mitigate the adverse effects of the decline of international oil prices. The main measures established by this agreement are the following:

- (i) The extension of terms and deadlines for the execution of activities related to investments in exploration and evaluation phases and for the declaration of commercial discoveries;
- (ii) The establishment of procedures to transfer investments in exploration programs between allocated areas; and

- (iii) The leveling of the contractual terms of offshore contracts entered before 2014 to the ones included in the contracts executed as a result of the 2014 Colombian Round.

Agreement 003 of 2015, as issued by the ANH, modifies and also partially amends Agreement 004 of 2012, and provides certain rules and measures the Government can take to mitigate the adverse effects of the decline of international oil prices. This agreement permits performance guarantees required under E&P contracts to be reduced in the same amount as the works actually performed during the term of the respective phase.

Agreement 004 of 2015, as issued by the ANH, also partially amends Agreement 004 of 2012, and provides certain rules and measures for the Government to mitigate the adverse effects of the decline of international oil prices. This agreement allows contractors to attribute additional activities carried out under a TEA to commitments under the first phase of an E&P contract.

Agreement 002 of 2017, as issued by the ANH on May 18, 2017, replaces Agreement 004 of 2012, Agreement 003 of 2014, and Agreements 002, 003, 004 and 005 of 2015. It establishes the general structure of the New Regulation for Administration and Assignment of Areas and the general guidelines regarding future hydrocarbon contracts in Colombia. Seeking the interests of the Nation, the market conditions, the national hydrocarbon sector strategy, the competitive context of producer countries and the Nation's social and environmental evolution.

Agreement 002 of 2017 adapts the existing regulations for the selection of contractors, and the applicable rules for the award, execution, termination, liquidation, monitoring, control and surveillance of the contracts signed with the ANH.

On February 4, 2019, the ANH published the new model contract for offshore exploration and production. The purpose of this new model contract is to foster and stimulate investments in exploration and the exploitation of offshore hydrocarbons, enhancing Colombia's competitiveness to attract and retain investments from large and experienced O&G operators.

Resolution 078 of 2019, as issued by the ANH, approved the terms of reference and the model of the contract for the "permanent bidding procedure." Pursuant to this procedure, the ANH will select areas over which proposals may be received at any time, without the need of launching specific bidding procedures for their allocation.

#### **3.8.1.1.1 Environmental Licensing and Prior Consultation**

Law 99 of 1993 and other environmental regulations, such as Decree 1076 of 2015 in particular (compilation decree regarding the administrative sector of environment and sustainable development), impose on companies, including oil and gas companies, the obligation to obtain an environmental license prior to undertaking any activity that may result in the serious deterioration of renewable natural resources, or that may have the capacity of materially modifying the physical environment.

The National Authority on Environmental Licensing (ANLA), created by means of Decree 3573 of 2011, is the entity responsible for evaluating the applications and issuing the environmental licenses for oil & gas-related activities, as well as surveilling and overseeing all hydrocarbon projects and monitoring the environmental compliance of such activities.

If the projects or activities could have a direct impact over the territories or the interests of indigenous, Afro-Colombian or Raizal communities, the Colombian Constitution provides that the companies developing such projects or activities must undertake a public consultation process with those communities before initiating such projects or activities. This consultation process is a prerequisite for obtaining the required environmental licenses.

In addition, the Colombian Constitution and laws establish that, as part of the public participation mechanisms, Colombian individuals may request information regarding the activities of the project and their potential impacts. They may also request to undertake an environmental hearing so as to obtain information of the project subject to environmental licensing.

On May 26, 2015, the Ministry of Environment and Sustainable Development ("MESD") issued Decree 1076, which compiles the majority of Colombian regulations in force regarding environment and sustainable development.

The environmental license encompasses all of the necessary permits, authorizations, concessions and other control instruments necessary under Colombian environmental law to undertake a project or activity that may result in the serious deterioration of renewable natural resources, or that have the capacity of materially modifying the physical environment. The license shall define specific conditions under which the beneficiary of the license may undertake such project or activity. The procedure to obtain an environmental license begins when the company files an Environmental Impact Study (EIA) related to the project before the ANLA. The licensing process includes an application for the use of natural renewable resources (water, soil and air), the filing of an EIA and a plan to prevent, mitigate, correct and compensate for any activity that may harm the environment, known as the Environmental Management Plan (PMA).

The environmental licensing procedure in Colombia is set forth in Decree 1076 of 2015. According to the regulation currently in effect, the procedure to obtain an environmental license shall not take more than 90 business days. But, depending on the complexity of the information requested by the ANLA and administrative delays, including an oral hearing to determine the viability of the project, the procedure may take between 165 and 265 business days, depending on whether the applicant is required to file additional information. The actual procedure incorporates an oral hearing between the ANLA and the applicant in order to evaluate the information provided in the license application and whether it is necessary or not to request additional information about the proposed project. The ANLA will have no other opportunities to request additional information after this hearing.

MESD is also responsible for establishing guidelines regarding climate change policies for the hydrocarbon sector in Colombia. We comply with those guidelines. At present, MESD has not proposed any specific steps for the implementation of the Kyoto Protocol or the Paris Agreement, as they relate to our operations. We are continuously monitoring climate change requirements that could be applicable to us. A company that does not comply with the applicable environmental laws and regulations, does not execute the Environmental Management Plan (PMA) approved by the environmental authority or ignores the requirements imposed by an environmental license may be subject to an administrative proceeding initiated by the ANLA or the regional environmental authorities established by Law 1333 of 2009. The proceeding may result in oral or written warnings, monetary penalties, fines, license revocation or the temporary or permanent suspension of the activity being undertaken. Apart from administrative sanctions, the Colombian judiciary or other law enforcement authorities may also impose civil and even criminal sanctions if environmental damages are verified as a consequence of having breached the environmental laws and regulations applicable to the project.

#### 3.8.1.1.2 Royalties

In Colombia, the Nation is the owner of minerals and non-renewable resources located in the subsoil, including hydrocarbons. Thus, companies engaged in exploration and production of hydrocarbons, such as Ecopetrol, must pay to the National Hydrocarbons Agency (ANH), as representative of the National Government of Colombia, a royalty on the production volume of each production field, as determined by the ANH.

Royalties may be paid in kind or in cash. Each production contract has its applicable royalty arrangement in accordance with applicable law. In 1999, a modification to the royalty regime established a sliding scale for royalty payments for crude oil and natural gas production fields discovered after July 29, 1999 and depending on the quality of the crude oil produced. Since 2002, as a result of the enactment of Law 756 of 2002, the royalty rate was fixed as a sliding scale depending on the produced volume from 8% for fields producing up to 5 mbd to 25% for fields producing in excess of 600 mbd. Notwithstanding the royalties for Incremental Production Contracts, Contracts for Undeveloped and Inactive Fields, and Incremental Production Projects defined in paragraph 3 article 16 Law 756 of 2002, and article 29 of the Law 1753 of 2015, the changes in the royalty regime only apply to new discoveries and do not apply to fields already in the production stage as of July 29, 1999. Producing fields pay royalties in accordance with the royalty law in force at the time of the discovery.

Regarding natural gas, in accordance with Resolution 877 of 2013, as amended by Resolution 640 of 2014, starting on January 1, 2014, the ANH has received royalties in cash rather than in kind. Thus, the producer may dispose of its gas production volumes corresponding to royalties paid in cash.

### 3.8.2 Regulation of Transportation Activities

Hydrocarbon transportation activity is a public interest activity in Colombia and a public service. As such, it is under governmental supervision and control, regulated mainly by the Ministry of Mines and Energy and the *Comisión de Regulación de Energía y Gas* (“CREG” as per its Spanish acronym).

Transportation and distribution of crude oil, liquefied petroleum gas and refined products must comply with the Petroleum Code, the Code of Commerce and all governmental decrees and resolutions. However, liquefied petroleum gas-related activities are regulated by CREG. According to Law 681 of 2001, multipurpose pipelines owned by Cenit (a company wholly owned by Ecopetrol) must be open to third-party use on the basis of equal access to all.

Notwithstanding the general rules for hydrocarbon transportation in Colombia, Law 142 of 1994 defines the regulatory framework for the provision of public utility services, including the provision of natural gas. Moreover, natural gas transportation is subject to regulations specific to the natural gas industry as issued by CREG, due to the categorization of natural gas distribution as a public interest activity under Colombian laws.

Transportation systems, classified as crude oil pipelines and refined product pipelines, may be owned by private parties. Pipeline construction, operation and maintenance must comply with environmental, social, technical and economic requirements under national guidelines and international standards for the oil and gas industry.

Construction of transportation systems requires licenses and local permits awarded by the Ministry of Mines and Energy, the Ministry of Environment and Sustainable Development and regional environmental authorities, respectively.

#### *Crude oil transport*

The regulatory framework relating to crude oil transportation accounts for both private use and public use pipelines. Private use pipelines are those built by the operating or refining entity for its own exclusive right and that of its affiliates. Public access pipelines are defined as pipelines built and operated by a public or private legal entity, for the purpose of publicly providing crude oil transportation services. The Colombian government, through the ANH, has a preferential right to use up to 20% of the total capacity of any public or private access pipeline to transport its crude oil royalties. However, for both private and public access pipelines, the ANH must pay the tariff for the pipeline use to transport its percentage of production.

The Ministry of Mines and Energy is responsible for reviewing and approving the design of and tracks for crude oil pipelines, by establishing transport rates based on information provided by the service providers. It also oversees the calculation and payment of hydrocarbon transport-related taxes and manages the information system for the oil product distribution chain.

In 2014, the Ministry updated the transport regulation and the rate calculation method for this line of business. It introduced a framework for the secondary market and incentives for new pipeline construction and current pipeline capacity expansions. According to the Petroleum Code, rates must be revised every four years.

During the scheduled revision of 2015 and due to the dramatic changes in international crude oil prices, the Ministry of Mines and Energy allowed, by means of Resolution 31325 and Resolution 31489 of 2015, transportation companies and oil production companies to engage in direct negotiations in order to agree on a tariff suitable for both parties. The negotiation period was extended until June 2016. Notwithstanding the fact that tariff agreements were reached with certain companies, the results of the negotiations were not positive. Thus, tariffs were set by the Ministry of Mines and Energy in accordance with the criteria previously established by Resolution 72146 of 2014, as further amended by Resolution 31325 of 2015 and Resolution 31285 of 2016.

The Port Superintendence is the authority that oversees the port business for crude oil and refined products. Although this business is not highly regulated, market participants are required to report certain information to the Port Superintendence.

As a result of the enactment of Decree 119 of 2015, operators of private use hydrocarbon ports are currently able to provide hydrocarbon transport services to third parties pursuant to a mechanism established under that decree.

Decree 119 of 2015 was incorporated into Decree 1079 of 2015 issued by the Ministry of Transport, which compiles the majority of Colombian decrees and regulations in force regarding the administrative sector of transportation.

#### *Refined products and liquefied petroleum gas transport*

In 2014 CREG assumed responsibility for regulating product pipeline transportation from the Ministry of Mines and Energy, in addition to its pre-existing regulatory responsibility for liquefied petroleum gas, natural gas and electric energy transportation.

In August 2017 CREG issued a draft resolution 113 of 2017, which introduced a new framework for the transportation regulation of liquefied petroleum gas and refined products. The draft resolution was open for observations from the general public and the oil and gas industry until January 12, 2018, but the final resolution has not been issued yet. CREG is also in the process of defining the transportation regulation and the rate calculation method for refined products. The primary goals and components of the proposed regulation are: (i) to ensure access to the transport systems for liquid fuels and the LPG pipeline systems without discrimination; (ii) to promote the timely expansion of the transport system in line with the needs of the market; (iii) to promote competition and prevent restrictive practices; (iv) to separate the operations of refining and transport; and (v) to ensure the efficient and continuous operation of transport systems. As of the date of this annual report, the above mentioned resolution has not been issued.

### **3.8.3 Regulation of Refining and Petrochemical Activities**

Article 58 of the Petroleum Code establishes that oil refining activities can be developed throughout the Colombian territory and are not reserved to the State. However, Article 4 establishes that such activities are considered of public interest subject to governmental regulation, and the development of those activities must comply with technical requirements established by regulation.

In 2008, Law 1205, further developed by Resolution 180689 of 2010, issued by the Ministry of Mines and Energy, was issued with the main purpose of contributing to a cleaner environment. It established the minimum quality specifications for fuels in Colombia. Since August 2010, Ecopetrol has been producing and selling diesel and gasoline that complies with the requirements of the aforementioned law and, for some cities, we sell with better standards.

Since 1995, under Resolution number 898 of August 23, 1995 the Ministries of Environment and Sustainable Development and of Mines and Energy, have regulated the environmental criteria for liquid and solid fuels used in commercial and industrial furnaces and boilers, as well as automobile internal combustion engines. Resolution 898 has been subject to numerous modifications through the years, the most recent by Resolution 40619 of June 30, 2017. Ecopetrol has been complying with this regulation and working with governmental entities in order to improve air quality in the most critical areas in Colombia.

#### **3.8.3.1 Regulation of Liquefied Petroleum Gas (LPG) and Liquid Fuels**

Wholesale marketing, transport, distribution and retail marketing of LPG are mainly regulated by CREG Resolution 74 of 1996, and subsequent resolutions. LPG in Colombia is primarily obtained through Ecopetrol's refineries, field production and imports. The LPG must meet minimum quality standards to be marketed. Our marketing activities are regulated by CREG Resolution 53 of 2011 (as amended by CREG Resolutions 108 of 2011, 154 of 2014, 019 of 2015, and 034, 063 and 064 of 2016). The LPG price is regulated by CREG Resolutions 66 of 2007 (as amended by CREG Resolutions 59 of 2008, 002 of 2009, 123 of 2010, 095 of 2011, and 65 and 129 of 2016).

According to Article 4 and 212 of the Petroleum Code and Law 39 of 1987 (added by Law 26 of 1989), the distribution of crude oil and its derivatives has a public purpose (*utilidad pública*), and the distribution of fuel oil and crude oil by-products is considered a public utility activity. Consequently, individuals or entities engaged in these activities are subject to regulations issued by the Colombian government. The Government has the power to determine quality standards, measurement and control of liquid fuels, and establish penalties that may apply to dealers who do not operate in compliance therewith.



The Ministry of Mines and Energy is the entity that controls and exercises technical supervision over the distribution of liquid fuels derived from petroleum, including the refining, import, storage, transportation and distribution in the country. Law 812 of 2003 identified the agents of the supply chain of petroleum-based liquid fuels. In this context, the Ministry of Mines and Energy through Resolution 40344 of 2017, published the required actions to ensure the LPG supply for the priority sectors in the country.

The distribution of liquid fuels, except LPG, is governed by Decree 1073 of 2015, which establishes the requirements, obligations and penalties applicable to supply agents in the distribution, refining, import, storage, wholesale, transportation, retail sale and consumption of liquid fuels.

Decree 1073 of 2015 establishes the minimum technical requirements for the construction of storage plants and service stations. This Decree also regulates the distribution of liquid fuels, except LPG establishing the minimum requirements for distributors and the activities and types of agreements permitted for these agents. The Ministry of Mines and Energy also regulates the types of liquid fuels that can be sold and purchased and the penalties for noncompliance with governmental regulations.

Pursuant to Law 1430 of 2010, the distribution of fuels in areas near Colombian borders is the responsibility of the Ministry of Mines and Energy and is subject to specific regulations that impose strong control procedures and requirements. The Ministry of Mines and Energy establishes the safety standards for LPG, storage equipment, maintenance and distribution of LPG.

The Superintendence of Public Domestic Utilities also oversees the liquefied petroleum gas transportation business.

### **3.8.3.2 Regulation Concerning Production and Prices**

According to the Decree - Law 4130 of 2011 and Decree 1260 of 2013, CREG is in charge of setting the prices of petroleum by-products throughout the entire chain of production and distribution, except for current gasoline engine, diesel and biofuels. On the other hand, by Decree 381 of 2012, as amended by Decree 1617 of 2013, the Ministry of Mines and Energy is in charge of setting the methodology to determine the reference price of gasoline, diesel, biofuels and mixtures thereof.

Then, since May 2012, CREG fixes the prices for most crude oil by-products, but for gasoline, diesel and biofuels. CREG determines the methodology to calculate their price while the Ministry of Mines and Energy fixes the relevant prices in accordance with said methodology. The ANH does not intervene in the definition of prices of gasoline and diesel fuel. In addition, under Resolution 007 of 2017, CREG determined the basis for the methodology of compensation of terrestrial transportation of liquid fuel-oil, including current gasoline, diesel and biofuels between the storage plant and the fuel service station.

The methodology for calculating jet fuel prices is set out in Law 1450 of 2011, and jet fuel prices themselves are set by the Ministry of Mines and Energy.

The ANH determines the formula that is used to calculate royalty payments corresponding to the production of crude oil.

Decree 381 of 2012 and 1617 of 2013, as amended by Decree 2881 of 2013, as compiled in Decree 1073 of 2015, restructured the Ministry of Mines and Energy and gave it the responsibility to study industry problems and implement short- and long-term refining planning policies. The Ministry is also responsible for establishing the governmental policies and goals to ensure the reliability, stability and continuity for the production of liquid fuels, biofuels and others.

Pursuant to Article 58 of the Petroleum Code, if there is a fuel shortage, any refining company operating in Colombia must offer to sell a portion or, if needed, the total of its production to supply local demand prior to exporting any production.

## **Fuel Price Stabilization Fund (FEPC)**

The Fuel Price Stabilization Fund was created by Law 1151 of 2007. It is a fund assigned and administered by the Ministry of Finance and Public Credit. Its function is to attenuate, in the domestic market, the impact of fluctuations on fuel prices in international markets.

According to article 2.3.4.1.3 of Decree 1068 of 2015, amended by Decree 1451 of 2018, the resources for the functioning of the FEPC come from the following sources: (a) financial returns of resources of the Fund; (b) extraordinary credit resources received from the National Treasury; (c) funds allocated to the FEPC in the national general budget; (d) fuel taxes and; (e) bonds or other public debt securities issued by the Nation in favor of the FEPC, in order to cover the obligations of the Fund.

The operation of the FEPC is governed by Decree 1068 of 2015, amended by Decree 1451 of 2018, Chapter 1, Title 4 (compilation decree regarding treasury public sector). First, refiners and/or importers of regular gasoline and diesel must report to the Ministry of Mines and Energy the volume of regular gasoline and diesel sold in the previous month and such reports must be made within the next 35 calendar days of each month.

The report must also contain, among other matters: information corresponding to each fuel disaggregated daily; the discrimination of the volumes sold, and the origin national or imported of the gasoline and diesel sold. If the regular gasoline or the diesel is of national origin, the refiner/importer must inform from which refinery they come. Secondly, the Ministry of Mines and Energy calculates and liquidates, by resolution, the Net Position of each refiner/importer and each fuel to be stabilized by the FEPC.

Decree 1068 of 2015, amended by Decree 1451 of 2018, provides that the FEPC will pay in Colombian pesos the value corresponding to the calculation and settlement of the Net Position of each refiner and/or importer within the term defined by the Ministry of Mines and Energy and based on availability of FEPC resources.

Law 1819 of 2016 created a tax, related contribution to finance the FEPC. This contribution is caused when the sum of the Differentials of Participation (difference between the Producer Income and the International Parity Price, when the first is greater than the second on the date of issuance of the sales invoice, multiplied by the volume of fuel sold) is greater than the sum of the Differentials of Compensation (the difference presented between the Producer Income and the International Parity Price, when the second is greater than the first on the date of issuance of the sales invoice, multiplied by the volume of fuel sold).

The event that generates the contribution is the sale in Colombia of gasoline or diesel by the refiners and/or importers to the wholesale distributor of fuels, according to the price set by the Ministry of Mines and Energy, however, if the importer is at the same time a wholesale distributor, the triggering event shall be the withdraw of the product to be sold. The taxpayer responsible for the contribution is the refiner and/or importer and the active subject is the Nation. The tax base corresponds to the positive difference between the sum of the Differentials of Participation and the sum of the Differentials of Compensation.

The Ministry of Mines and Energy calculates the contribution through the liquidation of the Net Position of each refiner or importer with respect to the FEPC based on the report that the refiners and/or importers submit. If the sum of the Differentials of Participation is greater than the sum of the Differentials of Compensation and the contribution is caused, the Ministry of Mines and Energy will order the refiner or the importer to pay the contribution to the National Treasury within the 30 days following the execution of the liquidation resolution.

Subsequently, Law 1837 of 2017 (article 16) provided that the remaining resources that were in the Ecopetrol's accounts as of December 2014, as a result of the collection of the Differential Contribution from the FEPC, would be transferred to the General Direction of Public Credit and Treasury of the Ministry of Finance and Public Credit (DGCPTN).

The Ministry of Mines and Energy issued Resolutions 31536 and 31538 of 2018 which contain the settlement of our Net Positions corresponding to: (i) the period between December 29 and 31, 2016 and the first and second quarters of 2017, and (ii) the third and fourth quarters of 2017. In those resolutions the FEPC was ordered to transfer COP \$729,729,493,450.88 and COP \$1,183,672,269,819.52 to Ecopetrol, respectively.

As of the date of this report, the Ministry of Mines and Energy has not calculated the Net Positions corresponding to the year 2018.

### **3.8.3.3 Regulation of Biofuel and Related Activities**

The sale and distribution of biofuels is regulated by the Ministry of Mines and Energy. Regulations establish the quality and pricing standards for biofuels and impose minimum requirements for mixing ethanol with gasoline and biodiesel with diesel.

The sale and distribution of biofuels is provided under CREG Resolution 240 of 2016, which particularly regulates: a) the sorts of market that will be served with biogas and biomethane; b) the quality and safety conditions; and c) the tariff regime. Pursuant to article 4 of the foregoing Resolution, biogas supply through isolated networks to serve non-regulated users and natural gas vehicles (“GNV” as per its Spanish acronym), shall be incorporated as a public utility company. Furthermore, article 5 provides that biomethane supply through isolated networks or interconnected networks to the National Transportation System shall also be incorporated as a public utility company. Finally, article 12 states that biogas suppliers may develop the production, transportation, distribution and commercialization activities through integrated structures, provided that they keep separate accounts for each activity and grant free access to the networks to both regulated and non-regulated users. To the same extent, production, distribution and commercialization of biomethane through interconnected networks to the National Transportation System may be developed through integrated structures, as long as the supplier keeps separate accounts for each activity and grants free access to the networks to both regulated and non-regulated users.

### **3.8.4 Regulation of the Natural Gas Market**

Decree 1073 of 2015, Part 2, Title 2, Chapter 2, established that all producers have to issue a production statement that includes the volumes of natural gas available for sale for a period of ten years. This decree established the regime for the selling and marketing of natural gas in Colombia, including specific procedures that regulate the Colombian market in order to manage the remaining natural gas reserves owned by the Nation, and to protect domestic consumers, especially residential consumers, by prioritizing delivery of gas to residential consumers, regulating the export of natural gas and setting forth the export restrictions applicable during an internal shortage of natural gas.

Currently in Colombia the price of natural gas is determined by the market, but some agreements still have to conform to the regulated formula. CREG issued Resolution 114 of 2017 which adjusted commercial aspects of the wholesale natural gas market in Colombia and compiled CREG Resolution 089 of 2013 and its amendments. However, pursuant to Decree 1073 of 2015, such procedures do not apply to the following activities: a) natural gas exports; b) natural gas as raw material in petrochemical production; c) natural gas commercialization from minor fields (production capacity under 30 million SCFD); d) natural gas commercialization from hydrocarbon fields under testing phase or which have not yet been declared commercially viable; e) natural gas commercialization from unconventional reservoirs; and f) internal consumption from natural gas producers.

CREG determines which agents can participate in the primary and secondary markets. Ecopetrol is authorized to participate as a seller in the primary market as a natural gas producer and as a buyer in the secondary market when Ecopetrol requires natural gas from other producers for its own needs. CREG regulations provide that a natural gas producer cannot participate as a merchant of natural gas in the secondary market, except that it may purchase gas to meet its existing contractual obligations. Ecopetrol is also able to resell available natural gas transportation capacity into the secondary market.

#### *Priority for the Supply of Natural Gas*

The export of natural gas, in contrast, is not considered a public utility activity under Colombian law and therefore is not subject to Law 142 of 1994. Nevertheless, the internal supply of natural gas is a priority for the Colombian government and is considered to be a public utility complementary activity, and therefore public utility regulations apply to the internal supply of natural gas.

Decree 1073 of 2015 (amended by Decree 2345 of 2015) provides that in the event the supply of natural gas is reduced or halted as a result of a shortage, the Colombian government has the right to suspend the supply of natural gas for export. If such export contracts are suspended by the Colombian government, the export agents are entitled to receive compensation in accordance to article 2.2.2.2.15 and 2.2.2.2.38 of Decree 1073, 2015. Notwithstanding the foregoing, Decree 1073 of 2015 establishes freedom to export natural gas under normal gas-reserve conditions. Producers of natural gas may enter into natural gas export contracts if the ratio of proved reserves to consumption exceeds seven years, as determined by the Colombian Energy Planning Authority (or UPME for its Colombian acronym).

Decree 1073 of 2015 (amended by Decree 2345 of 2015) establishes an order of supply when restrictions are placed on the supply of natural gas or serious emergency situations arise that preclude the continued provision of certain services, as follows: (i) essential demand, as established in Decree 1073 of 2015, (ii) non-essential demand under an existing agreement with a warranty of uninterrupted provision and (iii) firm exports delivery.

The order of priority for the supply of natural gas is as follows: (i) the operation of the compressor stations of the National Transportation System, (ii) residential users and small business users engaged in the distribution network, (iii) vehicular compressed natural gas and (iv) gas refineries, excluding those destined for self-generation of electricity that can be replaced with energy from National Transportation System, which has first priority. The Ministry of Mines and Energy also establishes distribution priorities in the event of a natural gas shortfall derived from supply or infrastructure issues. This order of priority is based on the type of contract, with firm supply contracts having priority over interruptible supply contracts.

Decree 1073 of 2015 and CREG Resolution 114 of 2017: (i) provide specific procedures and forms of supply agreements determined by CREG pursuant to which an agent may sell and buy natural gas in the Colombian primary and secondary market produced from large fields (capacity of more than 30 million CFPD); and (ii) permit the sale of natural gas from small fields (capacity under 30 million CFPD) pursuant to contracts that fulfill certain regulatory requirements but whose form is not prescribed by law.

### 3.9 Sustainability Initiatives

#### 3.9.1 HSE

This section describes the health, safety and environmental (HSE) practices of Ecopetrol S.A. Currently, subsidiaries of Ecopetrol S.A. establish their own HSE models, provided that these models must be consistent with guidelines established by Ecopetrol S.A.

##### 3.9.1.1 Ecopetrol S.A.

One of the principles that guides Ecopetrol is our commitment to our employees and the development of those communities in which we operate. For that reason, Ecopetrol S.A. is devoted to improving our health, safety and environmental (HSE) practices.

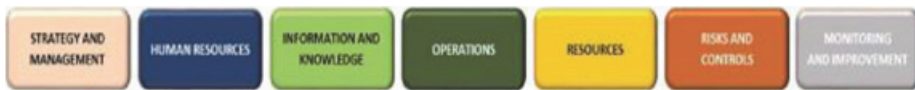
The results of the HSE performance in 2018, compared with the prior year, were:

- A reduction in the Total Recordable Incidents Frequency Index (TRIF), which represents the number of employee or contractor injuries that require medical treatment or time off for every million hours worked, including fatalities, from 0.64 incidents per million hours worked in 2017 to 0.63 in 2018; an improvement compared with the 2.96 recorded in 2012;
- A 51% decrease in road accidents, due to improvements in real-time monitoring of drivers' safety habits, an increase in control check points for tracking tankers and awareness campaigns for drivers;
- Improvement in reporting of minor oil spills and identification of their causes; and
- We maintained the same process safety performance compared to 2017, 0.05, an improvement compared with the 0.11 recorded in 2012

We did observe an increase in some other indicators as set forth below:

- A 12% increase in the number of incidents involving employee or contractor injuries that require medical treatment, restricted work or lost days;
- An increase greater than 100% in the severity of occupational incidents due to a fatality that must add to the severity index 6,000 lost days, according to Colombian legal requirements; and
- An increase greater than 100% in the amount of oil spilled, primarily due to the Lisama 158/La Fortuna Incident. See “—Lisama 158/ La Fortuna Incident” below.

We have several programs in place aimed at increasing the safety of our industrial processes and minimizing the number of occupational accidents and other major incidents. Our HSE management model is based on key focus areas that are aligned with our integrated management system.

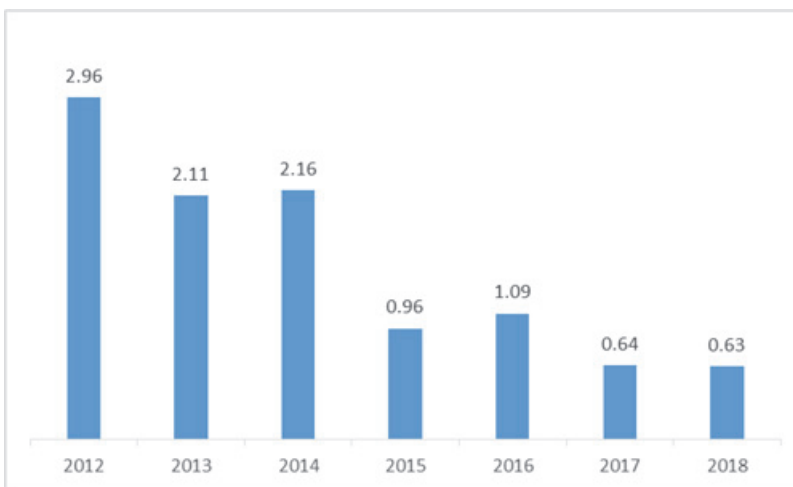


*Total Recordable Incident Rate – Employees and Contractors*

Ecopetrol S.A. places an important emphasis on understanding, monitoring and controlling our impacts on workers and contractors.

TRIF has improved from 2.96 incidents per million hours worked in 2012 to 0.63 in 2018. In 2018, 68 recordable cases occurred, where 24% led to restricted work, 7% required medical treatment and 69% led to lost days. Additionally, we had a 12% increase in occupational incidents compared to 2017 due to a higher level of activity at the Company which led to a higher exposure of workers to incidents.

**Graph 7 – Total Recordable Incident Rate – Employees and Contractors (\*) (\*\*)**



\* Number of employee or contractor injuries requiring medical treatment or time off for every million hours worked.  
 \*\* Includes data for Ecopetrol S.A. and the Vice-Presidency of Transport and Logistics, but does not include data for subsidiaries of Ecopetrol

### *Contingency Plans and Environmental Remediation*

All of our operational areas have preparedness and emergency response plans, each in accordance with Colombian legal requirements and our new internal guidelines for emergency management.

Our preparedness and emergency response plans have been developed based on our analysis of risk scenarios, the estimated consequences of these events and the implementation of strategies to be followed in response to each scenario. These contingency plans have the approval of the ANLA.

The objectives of our contingency plans are to:

- Protect the health and safety of our workers, contractors and the communities in which we operate; and
- Prevent oil spills and leaks of harmful substances in offshore and onshore areas, fires and explosions and mitigate environmental impacts.

Our contingency plan includes, among others:

- Procedures for the containment of oil and other harmful substances, as well as procedures to safeguard the safety of affected communities, the environment and the personnel involved in such containment actions; and
- Strategies for responding to emergencies located outside of our facilities and mutual aid emergency plans, including actions developed with local environmental authorities, the local community and other organizations for containment and recovery of spilled product, cleaning and recovery of affected areas, monitoring of the environmental effects and, if the spill or leak has an operational source, compensation for local communities and other affected persons.

Further, we are upgrading the skills of our fire brigade, ensuring the reliability of firefighting and emergency equipment and working on improving our performance during emergency drills.

In offshore operations, the operator has the responsibility of designing and implementing plans and strategies aligned with international best practices that cover various emergency response scenarios.

### *Frequency of process safety incidents*

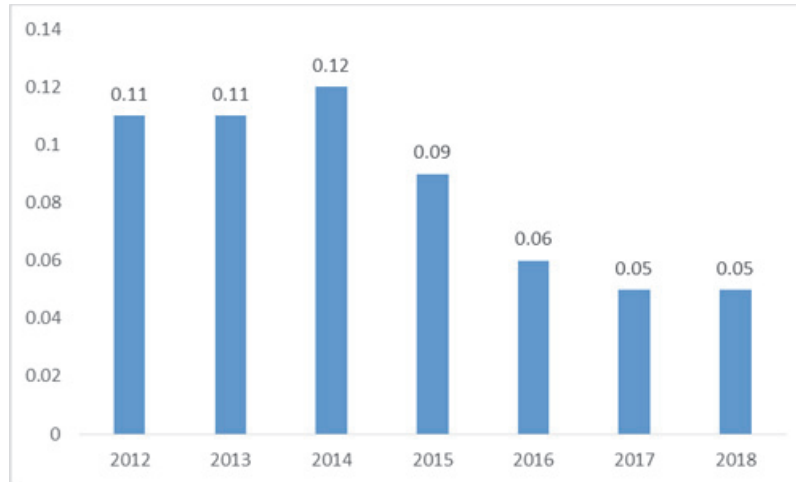
Our “Process Safety Management” (PSM) strategy is to: first, define high-risk processes; second, prioritize intervention in high-risk processes; and third, apply all PSM elements in the prioritized high-risk processes.

Loss of primary containment is the number of unplanned or uncontrolled releases of oil, gas or other hazardous materials.

We report Tier 1 process safety events per million hours worked, which are the losses of primary containment of greatest consequence causing harm to a member of the workforce, costly damage to equipment or exceeding defined quantities according to API-754. We maintained the same Tier 1 process safety performance compared to 2017 (0.05 in both 2017 and 2018). The reporting thresholds for API-754 Tier 1 is an unplanned or uncontrolled release of any material, including non-toxic and non-flammable materials, from a process that results in one or more health, safety or environmental consequences set forth under those guidelines. In 2018, there were 0.05 Tier 1 process safety incidents per million hours worked.

Frequency of Tier 1 process safety incidents per hours worked (per million hours worked):

**Graph 8 – Tier 1 Process Safety Incidents (\*)(\*\*)**



\* Tier 1 process safety incidents per million hours worked (API-754).

\*\* Includes data for Ecopetrol S.A. and the Vice-Presidency of Transport and Logistics classified according to the criteria in API-754 Tier 1, but does not include Ecopetrol S.A.'s subsidiaries.

#### *Environmental Incidents*

In 2018, Ecopetrol S.A. recorded 11 environmental incidents, compared with 14 in 2017 and 8 in 2016. The volume of oil spills was 730.26 barrels in 2018, an increase from 50.7 barrels in 2017 and 202 barrels in 2016. The decrease in the numbers of environmental incidents was the result of improvement in the identification of critical equipment operating in high- or very high-risk conditions, and the implementation of asset integrity plans designed to mitigate those risk conditions. The increase in oil spilled was due mainly to the Lisama 158/La Fortuna incident as described below.

#### *Lisama 158/La Fortuna Incident*

On March 2, 2018, a seepage of water and traces of crude oil occurred near the Lisama 158 well, located in the village of La Fortuna, in the Middle Magdalena Valley of Colombia. Ecopetrol activated its contingency plan to contain the spill. It is estimated that between March 12 and March 15, 550 barrels of crude, mixed with mud and rainwater, seeped into the streams of La Lizama and Caño Muerto. As of March 30, 2018, the Lisama 158 well was sealed and stopped flowing.

Ecopetrol's internal investigation concluded that there were four concurrent critical factors leading to the incident and that in the absence of any of them, the incident would not have occurred.

The four critical factors were the following:

- i. A reservoir in natural overpressure conditions (4,850 PSI). During a well intervention in November 2017, a section of a working string fell to the bottom causing the rupture of the "blanking plug", which served the purpose of preventing reservoir fluids from reaching the wellhead.
- ii. The rupture or failure of the "blanking plug" produced a flow of unexpected fluids that required the injection of fluids at a pressure of 1,250 PSI, which in turn could have generated the loss of the mechanical integrity in the casing of 9 5/8" affected by wear.
- iii. Presence of a natural system of geological faults in the area, which in addition to the other factors, allowed well fluids to migrate to the surface.
- iv. Time of exposure of the upper formations to the over-pressure of the reservoir, which contributed to the emergence of fluids in a farm near the well, a mixture of water, mud, crude oil and gas.

### **Corrective and mitigation actions implemented by Ecopetrol**

With respect to the actions performed by Ecopetrol to address, mitigate other damages and manage the incident, in compliance of the obligations contained in Law 1523 of 2012, Presidential Decree 321 of 1999 and the contingency plan for the Lisama Well, Ecopetrol did the following:

- i. Implementation of control and containment procedures to slow the spread of the spill and keep it contained.
- ii. Activities to protect the life and health of the surrounding communities.
- iii. Monitoring of the following resources: water, air and land.
- iv. Activities to protect and preserve fauna and flora in the area of influence and.
- v. Operational attention and verification of the causes which led to the incident.

In terms of attention to the incident, Ecopetrol coordinated actions and additional mitigation activities with several Colombian governmental authorities, including: the municipalities of Barrancabermeja, San Vicente de Chucurí and Puerto Wilches, the Department of Santander, the Environmental Regional Autonomous Authority of Santander, the Environmental Police of Barrancabermeja, the National Licensing Authority, the Colombian Red Cross, the Civil Defense, the Ministry Public, the Hydrocarbons National Authority, the Ministry of Environment and Sustainable Development, the Institute of Hydrology, Meteorology and Environmental Studies and, the Colombian Public Defender Office.

In addition, for the preparation and performance of the Environmental Recovery Plan (PRA) which Ecopetrol proposed and filed before the environmental authorities, Ecopetrol had the support of the Biological Resources Investigation Institute Alexander Von Humboldt (pursuant to which a contract was entered into between the aforementioned parties). Furthermore, to ensure the attention and management of wildlife actually and potentially affected by the incident, Ecopetrol had the support and advice of Cabildo Verde Sabana de Torres, a non-governmental agency.

On another hand, the government of Colombia, through the Ministry of Environment and Sustainable Development, requested an independent audit review from a group of environmental and humanitarian experts, composed by the Joint UNEP/OCHA Environment Unit (JEU) and the activation of the UNDAC mechanism of the United Nations Office for the Coordination of Humanitarian Affairs. The aforementioned experts delivered a report that included a set of conclusions and recommendations which were accepted and included by Ecopetrol within the guidelines of its Environmental Recovery Plan (PRA).

The following are the most important milestones which were carried out by Ecopetrol in the attention of the incident:

Since April 8, 2018, Ecopetrol intervened the Lisama Well with a snubbing unit (specialized unit which handles pressure), with the purpose to verify the integrity of the casing, the cement used for the casing and to seal off the area where the spill was occurring. These activities finalized successfully on May 8, of 2018, when the Lisama Well was finally plugged with a double seal of cement.

On May 27, 2018, after ensuring that the activities described above were successfully performed to control the spill, the 63 families (approximately 177 individuals) which were directly affected by the spill returned to their homes.

On June 2, 2018, the technical abandonment of the Lisama Well initiated, a process which ended on the July 11, 2018.

On October 19, 2018 and in compliance to Resolution 1767 of 2006, Ecopetrol filed before the ANLA the Environmental Recovery Plan (PRA), whereby a plan to perform several activities to ensure the recovery of affected natural resources (water, air and land) plus fauna and flora was prepared, including the following aspects:

### **Components of intervention:**

1. Activities to recover the biotic environment.



2. Activities to recover the abiotic environment.
3. Socio-economical activities.
4. Follow up activities.

Intervention strategies:

1. Water: Recovery of affected water bodies.
2. Land: Dismantling of the protection and defense mechanisms in place and reconfiguration and land suitability procedures on the site of the spill.
3. Flora: Following up and monitoring of regeneration regarding sapling and pole stage (brinzal y latizal) specimens; following up and monitoring of affected specimens; recovery of vegetation in place; recovery of the riparian vegetation of the gorge La Lizama and La Muerte canyon; incorporation of tree nurseries for the riparian vegetation recovery.
4. Fauna: Activities to manage wildlife specimens affected.
5. Social and Economical: Information and awareness campaigns.
6. Monitoring: Supervising and following up procedures of natural recovery.

Additionally, Ecopetrol has been reporting the advances achieved of the Environmental Recovery Plan (PRA) to all competent authorities.

**Investigations and legal claims**

**Investigations**

As of the date of this report the following investigations are being conducted by environmental authorities and control agencies in respect of the incident:

- The National Environmental Licensing Authority opened an investigation for environmental damages alleging violation of, among others, the due implementation of the Contingency Plan. The investigation is currently in the evidentiary stage.
- The Attorney General's Office (First Solicitor's Office Delegate for Administrative Supervision) opened a disciplinary investigations against certain Ecopetrol's employees for alleged disciplinary infringements related to the oil well abandonment process. The Company's employees currently being investigated are:
  - (i) Felipe Bayón (CEO and former Chief Operating Officer)
  - (ii) Héctor Manosalva Rojas (former Vice-President of Development and Production)
  - (iii) Ricardo Ernesto Coral Lucero (former Vice-President of the Central Region)
  - (iv) Oscar Ferney Rincón (Development and Production Operations Manager of the De Mares region)

An initial suspension order against those Ecopetrol workers was at first issued and lifted in August 2018. Currently their investigations are in the probationary stage.

- The Prosecutor's Office – National Human Rights Unit and International Human Rights has conducted a preliminary investigation against Ecopetrol and governmental employees for the alleged crime of environmental pollution due to the exploitation of mining or hydrocarbon deposits. Currently the investigation is in the pre-trial stage.

## Legal Claims

As of the date of this annual report:

- Seven writs of protection (injunctive actions) seeking the protection of fundamental rights have been ruled in favor of Ecopetrol.
- In addition, there are two additional actions that have been filed before the Administrative Court of Santander, related to the Lisama 158 incident:
  - Approximately 600 people, members of the community and fishermen who live in the vicinity of where the incident took place, filed a class action in the amount of COP \$614,503,232,689, seeking compensation for damages allegedly suffered as consequence of the incident.
  - Senator Antonio Eresmid Sanguino filed a class action seeking protection of collective rights (no compensation or indemnification petitions), arguing that the incident led to the destruction of (i) people's health and (ii) damages to the environment caused by the incident.

As of the date of this annual report, both complaints were properly answered and are currently awaiting the commencement of the evidentiary stage.

### **3.9.1.2**      **Cenit**

Cenit established its own HSE Management System based on Decree 1072 of 2015 in 2017, and this was implemented during 2018. Cenit is also leading the definition of standard HSE key process indicators ("KPIs") for all of the midstream subsidiaries to be able to measure the transportation business as a whole and share the lessons learned and best practices within the industry. Cenit consolidated the 2018 KPIs and agreed upon the goals for 2019 for the transportation business to obtain the results for each subsidiary and for the entire group. Local and field operations are mainly conducted under Ecopetrol's HSE model and guidelines.

### **3.9.1.3**      **Cartagena Refinery**

In 2018, around 6,779,729 man-hours were employed conducting Reficar's business activities. Our HSE performance indicators for Process Safety Incident (ISP) and Environmental Incident (EI) were well within our established expectations, but the indicator for Total Recordable Cases (TRIF) exceeded our established expectations (TRIF=1.2).

The following table covers Reficar's TRIF for 2016, 2017 and 2018, which include Ecopetrol Operation and Maintenance (O&M), Reficar and subcontractors. The table presents statistics related to construction, pre-commissioning, start-up and operating activities. Reficar has not reported fatalities (accidents that caused deaths) during the period 2010 – 2018.

**Table 39 – Performance Indicators**

<b>METRIC</b>	<b>2018</b>	<b>2017</b>	<b>2016</b>
Man-hours	6.779.729	7.495.531	10.351.896
Recordable accidents	12	9	29
Total recordable cases (TRIF)*	1,77	1,2	2,80
Environmental Incidents (EI)	0	0	0
Process Safety Incidents (ISP)*	0	0,13	0,19

\* In the second half of 2016, these risks were associated with the new stage of operation of the units. For 2017 and 2018, these risks were associated with normal operations.

The results of other related performance indicators during 2018 were:

- i. Lost Time Injury Incidents: 7 incidents, which include for 7 Ecopetrol O&M and 0 incident for Reficar and subcontractors;

- ii. Medical Treatment Injury: zero incidents.
- iii. Restricted Work Incidents: 5 incidents, which include 5 for Ecopetrol O&M, and 0 incidents for Reficar and subcontractors;
- iv. Environmental Incidents: zero; and
- v. Process Safety Incidents: zero.

### 3.9.2 ***Corporate Responsibility***

During 2018, Ecopetrol updated its corporate responsibility strategic guidelines. These updated guidelines were developed based on the following three pillars:

- **Corporate Integrity:** seeks for coherence between what we declare and what we and our workers practice, in such a way that trusting relationships are generated and maintained with our stakeholders.
- **Business and Human Rights:** Seeks for us to behave in accordance with current international standards, which call for respect for human rights in all our activities.
- **Sustainable Development Goals and the 2030 Agenda:** We frame our business activities and business actions in compliance with the sustainable development goals and targets, taking into account the Colombian Government's international commitment to reach them by 2030. Of the 17 goals, Ecopetrol prioritized five, which we believe we can contribute to their achievement from a business know-how standpoint.

As in previous years, during 2018 the Corporate Responsibility Area consulted the perceptions and expectations of our seven stakeholder groups (shareholders and investors; associates and partners; clients; contractors and its employees; employees and pensioners; community and local government; and national government) in respect of eleven attributes (i.e. compliance with made commitments, ethical and transparent behavior, responsibility with the community, the environment and Human Rights, among others).

On average, 73% of respondents rated these attributes in the two highest options on the scale. This represents an improvement of 3% to the result obtained in 2017 (70%). Of particular note, are the improvements in results obtained in the community and local government and associates and partners stakeholder groups.

During 2018, following the United Nations Guiding Principles on Business and Human Rights, we conducted two Human Rights risk assessments for the activities we carry out in our Oriente and Orinoquía regions, which represent the largest part of our gross production. As a result of the evaluations, action plans were proposed, which will guide the incorporation of the results in the processes of each relevant company.

Additionally, in 2018 we applied the Corporate Social Responsibility self-diagnosis designed by UNICEF for children and adolescents. The recommendations we received from this self-diagnosis will also be incorporated into the processes of each relevant company.

### 3.9.3 ***Environmental Sustainability***

#### 3.9.3.1 ***Environmental Practices***

##### ***Ecopetrol S.A.***

During 2018, the environmental management strategy of Ecopetrol included the following components:

- (i) **Environmental Viability:** this strategy concentrates on obtaining environmental licenses and permits as well as adequate land management that ensures the sustainability of operations through timely prevention efforts and management of environmental impacts, constant and systematic relationships with stakeholders and participation in the sustainable development of the territories in which we operate.

- (ii) **Climate Change:** this strategy aims to decrease our carbon emissions and reduce the vulnerability of our operations and our facilities to the effects of climate change through the implementation of four strategic action lines:
  - a. **Mitigation:** reducing our carbon dioxide emissions and creating carbon offset alternatives;
  - b. **Vulnerability and Adaptation:** reducing the risks and impacts to our operations posed by climate variability and change;
  - c. **Research and Technology:** reducing our greenhouse gas emissions through action on research and development, process optimization, implementation of energy efficient strategies, carbon capture and sequestration and diversification into low-carbon energy sources; and
  - d. **Involvement in Policymaking:** informing and influencing government policies on climate change.
- (iii) **Sustainable productive projects and biodiversity:** this strategy has as its main objective the adequate management of biodiversity and ecosystem services, aiming to work for the welfare of communities. It has four major areas of work: (i) multifunctional landscape management, (ii) biodiversity conservation, (iii) non-oil income generation and (iv) transfer of technical capabilities for developing sustainable projects.
- (iv) **Eco-efficiency:** this strategy aims to maximize our efficient use of resources and mitigate our environmental impacts. Through this strategy, which extends to our supply chain, we seek to utilize energy, materials and, in general, all natural resources as efficiently as we can, thereby reducing the environmental impacts from our operations and projects and minimizing emissions, effluents and waste disposal from our operations and projects while taking into account our production benchmarks.
- (v) **Integrated Management of Water Resources:** In 2018 Ecopetrol updated its water management strategy to focus on the following areas: (i) operational efficiency in water management; (ii) sustainability and water security in the environment; and (iii) water planning and governance. This strategy is aligned with the 2010 National Water Resources Policy, the 2018-2022 National Development Plan, the Green Growth Mission and the UN 2030 Sustainable Development Goals.

In 2018, Ecopetrol reported its performance related to environmental management in its Sustainability Management Report to relevant institutions focused in promoting sustainable issues, such as the environmental benchmarking of Asociación Regional de Empresas del Sector Petróleo, Gas y Biocombustibles en Latinoamérica y el Caribe (ARPEL).

Ecopetrol is committed to improving the quality of the fuels it supplies in order to contribute to a better air quality for Colombians and comply with fuel quality regulations. Taking advantage of being an integrated company, after April 2018, we reduced the sulfur content in our diesel B2 (98% fossil and 2% biodiesel) to under 25 ppm. In particular, in December 2018, the diesel that we distributed in Colombia had an average of 16 ppm of sulfur and the gasoline we distributed had an average of 108 ppm of sulfur, values that are lower than the current local regulations of 50 ppm in diesel and 300 ppm in gasoline.

In compliance with Ecopetrol's Climate Change Strategy, since 2010, we have developed greenhouse gas reduction projects in various of our operating areas. As a result, in 2018, we achieved a reduction of about 1.2 million tons of CO<sub>2</sub>e, through the implementation of projects in energy efficiency and reducing gas flaring, among others.

#### 3.9.4 ***Energy Initiatives***

Ecopetrol has been undertaking significant efforts to make efficient and rational use of energy resources in its production processes and to reduce energy consumption, costs and carbon dioxide emissions. We focus on efficiency, reliability, optimization and energy diversification.

##### *Refining*

During 2018, the Barrancabermeja refinery's average monthly energy consumption was 66 GWhm (gigawatts per hour per month), provided through self-generation. The Cartagena Refinery's average monthly energy consumption was 67 GWhm (gigawatts per hour per month), 100% was provided through self-generation.

##### *Production*

Further, during 2018, Ecopetrol S.A.'s production segment had an average monthly energy consumption of 399 GWhm (gigawatts per hour per month) for its direct operation, from which 68% was provided through self-generation and the remaining 32% with non-regulated energy purchased from the National Transmission System.

The cost of power transmission and the cost of operation and maintenance for the self-generation centers of the Rubiales field were reduced through the renegotiation of the contracts.

We also began the construction of our first solar complex that will allow us to supply part of the energy required by the Castilla field, becoming the largest self-generation park with non-conventional renewable sources in Colombia.

#### *Transport*

The cost of power transmission for Oleoducto de los Llanos (ODL) was reduced due to the optimization of its take or pay contract.

### **3.10 Related Party and Intercompany Transactions**

Set forth below is a description of material related-party transactions. For additional information about transactions with related parties, see Note 29 to our consolidated financial statements.

#### *Ocensa*

Ecopetrol S.A. has entered into a number of agreements with its 72.65%-owned subsidiary, Ocensa, of which the following are the most significant:

- In March 1995, Ecopetrol S.A. entered into an agreement for the transportation of crude oil through the Ocensa pipeline. Pursuant to the terms of this agreement, Ecopetrol S.A. was required to make monthly payments that varied, depending on both the volume of crude oil transported through the pipeline and a tariff imposed by Ocensa on the basis of Ocensa's financial projections and their expected volumes of crude oil. On January 17, 2013, this agreement was amended as a result of Ocensa's new business model. Among other changes, this amendment to the transportation agreement establishes the payment of the tariff, calculated according to Resolutions issued in 2010 by the Ministry of Mines and Energy. In 2013, another amendment was executed that modified the terms by which the payments of invoices should be made. In 2015 Ecopetrol received a temporary release of capacity from Vitól of 24,000 barrels per day for segment I and II and 14,000 barrels per day for segment III.

On July 29, 2014, after Ocensa implemented and carried out an open process to receive offers to enter into transportation agreements for an extended capacity of approximately 135,000 barrels per day in Ocensa's pipeline (the "P135 Project"), Ocensa accepted the proposal made by Ecopetrol S.A. to enter into a ship-or-pay transportation agreement for 70,000 barrels per day of crude.

On November 20, 2014, after a total and definitive assignment agreement that was notified to Ocensa on December 15, 2016, Ecopetrol became the successor of Hocol, of a ship-or-pay transportation agreement for 17,500 barrels per day, thus increasing Ecopetrol's contracted capacity in the P135 Project to 87,500 barrels per day.

On July 1, 2017, with the consent of Ecopetrol and Ocensa, and as contemplated in the Act of Commencement of Operations issued by the Ministry of Mines and Energy (Resolution 31344 dated April 27, 2017), Ocensa started supplying increased capacity in the P135 Project.

On July 17, 2018, Ecopetrol and Ocensa entered into an amendment to the P135 ship-or-pay transportation agreements mentioned above (consisting of a capacity of 87,500 barrels of crude per day) in order to adjust the standard tariff and monetary conditions. This followed Ocensa having entered into a settlement agreement as approved by an arbitration panel with Frontera Energy Colombia and executed on May 15, 2018 pursuant to which the transportation tariff and monetary conditions in Ocensa's ship-or-pay transportation agreement with Frontera Energy Colombia in respect of the P135 Project were adjusted. Therefore, in application of regulatory principles, Ocensa offered similar terms to the remaining shippers of the P135 Project, including Ecopetrol, and executed (i) settlement agreements with those who accepted Ocensa's offer and (ii) the corresponding amendments to the transportation agreements.

In 2018, payments made by Ecopetrol S.A. under these two agreements amounted to US\$1.049 million.

- On July 10, 2012, Ecopetrol entered into a ship-or-pay agreement for the unloading of up to 8 thousand barrels per day of crude oil barrels at Ocesa's unloading facilities. This agreement was later amended on March 12, 2013 and on July 19, 2013. The fees correspond to a cost of US\$1.50 per barrel of crude oil that is unloaded. The agreement has a term of five years. On April 11, 2014 Ecopetrol entered into an additional ship-or-pay agreement for the operation of Ocesa's unloading facilities by means of which Ecopetrol has the right to unload an additional volume of up to 2,000 barrels per day. The additional agreement has a five-year term. On 2015, as a result of certain modifications made by Ocesa to the unloading facilities that make it possible to receive crude with lower API gravity, the parties signed an addendum to the agreement whereby crude of 18 API can be unloaded by Ecopetrol at Ocesa's facilities. On March 2016 Ocesa temporarily modified the fee for unloading operations based on the stretch market conditions to US\$0.50 per barrel of crude oil that is unloaded. By virtue of these agreements, Ecopetrol S.A. paid fees of US\$2.39 million to Ocesa in 2017. On December 2017 the parties agreed to extend the term of the agreements for one year until April 2019. In 2018 Ocesa added an additional discount of US\$0.45 per barrel of crude oil that is unloaded. In 2018, payments made by Ecopetrol S.A. under these agreements amounted to US\$3.54 million.
- On October 28, 2013, Ecopetrol entered into a natural gas supply contract in force until November 30, 2018, pursuant to which Ecopetrol S.A. supplies gas to Ocesa and receives a fixed price per MBTU (million British Thermal Units). This agreement replaced the contract for natural gas supply in Cusiana entered into in December of 2004, under which Ocesa paid a variable rate to Ecopetrol. In 2018, Ecopetrol S.A. received an aggregate sum of US\$5.25 million under the contract.

Ocesa has entered into the following agreements, among others, with some of our other subsidiaries:

- In March 1995, Equion and Santiago Oil Company entered into agreements for the transportation of crude oil through the Oleoducto Central S.A. (Ocesa) pipeline. In November 2012, Equion and Santiago Oil Company transferred, by means of various transactions, its shares (24.8%) and transportation rights (19.8%) holdings in the Ocesa pipeline to wholly owned subsidiaries of Ecopetrol S.A. (51%) and Talisman (49%). Equion and Santiago Oil Company kept 5% of transportation rights in Ocesa. In 2014, the transportation fees billed by Ocesa were: Equion (US\$44.4 million), Santiago Oil Company (US\$3.8 million) and Hocol (US\$30.8 million). On January 17, 2013, this agreement was amended as a result of Ocesa's new business model. Among other changes, the amendment to the transportation agreement establishes that tariff payments are to be calculated according to resolutions issued by the Ministry of Mines and Energy. On May 23, 2013, another amendment was executed that modified the terms by which the payments of invoices should be made. In 2018, Equion paid Ocesa US\$2 million and Santiago Oil Company US\$0.025 million, in each case for transportation fees. Hocol paid Ocesa, as assignee of transportation rights from original shippers, US\$ 10.8 million in 2018.
- On July 9, 2012, Ocesa and ODL entered into a strategic alliance for the dilution of crude oil in the Cusiana station. The term of this contract is of five years. Once the initial term of the agreement ends, Ocesa has a purchase option over the assets that perform the dilution process. In 2015, the parties signed two addenda to the agreement in order to include additional construction work to be conducted by ODL and supervised by Ocesa for an agreed fee. In 2018 the parties agreed to extend the agreement for six months in order to negotiate the general terms and conditions for the following years. ODL paid Ocesa US\$4.1 million under this contract in 2018.

#### *Oleoducto de Colombia S.A. (ODC)*

Ecopetrol S.A. entered into the following agreements with its 73%-owned subsidiary, ODC:

- In July 1992, a ship-and-pay agreement was signed for the transportation of hydrocarbons. Pursuant to this agreement, Ecopetrol S.A. must pay a previously agreed tariff for the volume of hydrocarbons transported. The duration of this agreement is indefinite; however, the contract will remain in force as long as Ecopetrol S.A. holds shares in Oleoducto de Colombia S.A., whether directly, or through an affiliate. As of January 2013, the parties agreed that the applicable tariff would be the one set by the Ministry of Mines and Energy (the "MME Tariff"). The MME Tariff had been set in 2011 for a four-year term, with a yearly adjustment based on the consumer price index. In 2018, payments made by Ecopetrol S.A. under this agreement amounted to US\$80 million.

- In August 1992, an operation and maintenance agreement was signed for the Vasconia and Coveñas terminals both property of ODC. The duration of this agreement is indefinite, but can be terminated by any party upon six months' notice. The initial contract included services rendered by Ecopetrol directly or by third-party contractors hired by Ecopetrol through mandate, with a variable surcharge over expenses and third-party contracts between 5% and 12% plus any applicable taxes. In 2014, an amendment to the agreement was signed, adjusting the monthly fixed rate to include expenses of services rendered directly by Ecopetrol, plus an additional 10% fee, and to eliminate the administrative surcharge. The contract also includes a variable sum related to contracts and purchases made by Ecopetrol through mandate. In March 2015, the monthly rate was adjusted for both Vasconia and Coveñas Stations. In March 2016, an amendment to the agreement was signed, adjusting the agreement's scope to include the pipeline's maintenance and adjusting the monthly fixed rate. In December 2017, an amendment to the agreement was signed, adjusting the agreement's scope according to the change of the maintenance model of the midstream segment. In March 2018, the parties amended the agreement in order to narrow the scope to the purchase and contracting management, and adjust the monthly rate. Pursuant to the terms of this agreement, ODC paid approximately US\$5.8 million in 2018.
- In March 1998, a joint operation agreement was signed for the TLU-1 Coveñas buoy. The duration of this agreement is indefinite and can be terminated by mutual agreement. In December 2013, Ecopetrol S.A. assigned its rights under this agreement to Cenit, though Ecopetrol S.A. kept its role as operator under the agreement. Pursuant to the terms of this agreement, ODC paid Ecopetrol S.A. approximately US\$7 million in 2018.
- In September 1999, a joint operation agreement was signed for the TLU-3 Coveñas buoy between Ocesa, ODC and Ecopetrol. Pursuant to the terms of this agreement, ODC paid approximately US\$2.7 million in 2018. The duration of this agreement is indefinite. In December 2013, Ecopetrol S.A. assigned its rights under this agreement to Cenit, though Ecopetrol S.A. kept its role as operator under the agreement.
- In July 2006, an operation and maintenance agreement was signed for the Caucasia station and the Vasconia-Coveñas pipeline system. The duration of this agreement is indefinite. Since 2010, this agreement only covers the operation of the Caucasia station and the Vasconia-Coveñas pipeline system, both property of ODC. The initial contract included services rendered by Ecopetrol directly or by third-party contractors hired by Ecopetrol through mandate; with a variable surcharge over expenses and third-party contracts between 5% and 12% plus any applicable taxes. In 2014, an amendment to the agreement was signed, adjusting the monthly fixed rate to include expenses of services rendered directly by Ecopetrol, plus an additional 10% fee, and to eliminate the administrative surcharge. The contract also includes a variable sum related to contracts and purchases hired by Ecopetrol through mandate. In 2015, an addendum was signed which adjusted the fixed rate. In March 2016, an amendment to the agreement was signed, adjusting the agreement's scope to include the station's maintenance and adjusting the monthly fixed rate. In December 2017, an amendment to the agreement was signed, adjusting the agreement's scope according to the change of the maintenance model of the midstream segment. In 2018, the agreement was terminated and the scope of services was incorporated into the parties' Operation and Technical Supervision Agreement in respect of the Vasconia and Coveñas fields.

ODC has entered into the following agreements with some of our other subsidiaries:

- Between March 1992 and January 1993, Hocol, Equion and Santiago Oil Company each entered into agreements with ODC for the transportation of crude oil through the Vasconia-Coveñas pipeline. The term of each of these agreements is indefinite. As of January 2013, the applicable tariff is the one set by the Ministry of Mines and Energy. In 2018, the transportation fees billed by ODC were: Equion (US\$2.5 million), Santiago Oil Company (US\$0.0001 million) and Hocol (US\$0.17 million).

*Oleoducto de los Llanos Orientales (ODL)*

Ecopetrol S.A. has entered into the following agreements, among others, with its 65%-owned subsidiary, ODL:

- In March 2009, Ecopetrol S.A. entered into a ship-or-pay agreement with ODL that establishes a financing tariff used to pay ODL's indebtedness to Grupo Aval for five years. This agreement was superseded by a new contract executed in May 2010, with a seven-year term, to reflect new conditions agreed with Grupo Aval. In August 2013, this contract was amended, providing a new term of seven years, including a two-year grace period, and an interest rate of DTF + 2.5%. This financing tariff is collected through a trust fund, which in turn is responsible for making the debt service payments to Grupo Aval. Under this agreement, ODL has committed to transport 75,000 bpd during the initial two-year grace period of the facility and 90,000 bpd during the remaining years, including the new term. Ecopetrol S.A. is responsible for 65% of this capacity. Payments by Ecopetrol S.A. under this contract were COP\$96.9 billion in 2018.
- In September 2009, Ecopetrol S.A. entered into a second ship-or-pay agreement with ODL that establishes a financing tariff collected through a trust fund that in turn is responsible for making debt service payments to security holders. Under this agreement, ODL committed to transport 19,500 bpd during the first phase of the ODL project (which began in September 2009 and ended in the first quarter of 2010) and 39,000 bpd upon commencement of the second phase of the ODL project which occurred in the first quarter of 2010 and was completed in the third quarter of 2016, the termination date of the agreement.
- In December 2009, Ecopetrol S.A. entered into a service agreement with ODL to transport crude oil. This agreement was replaced in January 2014 by a new agreement that expires in December 2020. This is a ship-or-pay agreement covering 167,000 bpd for 2014, 149,000 bpd for 2015 and 139,000 bpd until 2020. In January 2017, this agreement was amended in order to maintain the economic and commercial balance for the parties, based on changes to the standard condition of the system (to transport crude oil with a 690 cStk viscosity), reducing the "ship-or-pay" capacity from 139,000 bpd to 129,139 bpd until 2020. Payments by Ecopetrol S.A. under this contract were COP\$627.4 billion in 2018.
- In March 2010, Ecopetrol S.A. entered into a pipeline operating and maintenance agreement with ODL. This agreement had an original five-year term and was amended in 2015 to extend the term another ten years, adjusting certain conditions. In January 2017, this agreement was partially assigned by Ecopetrol to Cenit, due to matters related to the management of plants and pipeline assets. In August 2017, the maintenance obligations were partially assigned by Ecopetrol to a third party. In October 2017 and February 2018, the name of the contract, some technical definitions and the annexes of the contract were updated and certain Ecopetrol's obligations were removed, in line with the partial assignment. Pursuant to the terms of this agreement, ODL paid to Ecopetrol S.A. COP\$6.17 billion, plus applicable taxes, in 2018. In addition, pursuant to the partial assignment ODL paid to Cenit COP\$1.18 billion, plus applicable taxes, in 2018.
- In June 2013, Ecopetrol S.A. entered into a five-year service agreement with ODL to dilute, in the facilities of the Cusiana field, crude oil transported in the Rubiales – Monterrey/Cusiana pipeline, with a committed capacity of 182,000 bpd. In January 2014, this agreement was amended to include an oil transfer service that has a take-or-pay volume of 15,000 bpd, and the term was renewed for a new five-year period. In November 2017, this agreement was amended to reflect new commercial conditions related to fees. Pursuant to the terms of this agreement, Ecopetrol paid to ODL COP\$27.8 billion in 2018.
- In August 1, 2015, ODL entered into an indefinite management agreement with Oleoducto Bicentenario by means of which ODL receives legal representation and provides management services to Oleoducto Bicentenario. In August 1, 2017, the agreement was amended in order to change the way ODL is remunerated by this service, improving the structure of the agreement. Pursuant to the terms of this agreement, Bicentenario paid to ODL COP\$8.2 billion plus applicable taxes in 2018.



Ecopetrol S.A. has entered into the following agreements, among others, with its 55.97% owned subsidiary, Oleoducto Bicentenario:

- In June 2012, Ecopetrol S.A. entered into ship-or-pay and ship-and-pay agreements with Oleoducto Bicentenario for the transportation of crude oil from Araguaney to Banadía that established a price which requires the payment of Oleoducto Bicentenario's indebtedness to local banks for 12 years. This tariff is collected through a trust; the trust is also responsible for making the debt service payments to the banks. The duration of the ship-or-pay agreement is the earlier of 12 years or when the credit has been entirely paid, and the duration of the ship-and-pay agreement is 20 years after the ship-or-pay terminates. Under these agreements, Oleoducto Bicentenario has committed to transport at least 110,000 bpd, of which 55% of the agreement volume is provided directly by Ecopetrol S.A. and 0.97% indirectly by Hocol. In March 2014, the parties signed an amendment to these agreements under which Oleoducto Bicentenario acknowledges having received an advance tariff payment which can be amortized through volumes of crude transported in excess of 110,000 bpd. In April 2015, these agreements were amended to modify certain definitions to reflect new terms from the negotiation of the debt, which included a modification of participant banks and a reduction of the interest rate. In March 2017, the parties signed an amendment to these agreements in order to include the terms and conditions of the "contingent service" that involves the transportation of crude oil from Banadía to Araguaney when this service is required, and includes a ship-or-pay commitment of 270,000 bpd when the contingent service is needed. In addition, this amendment includes an equivalent credit note of one and a half days of service into the original ship-or-pay agreement for the transportation of crude oil from Araguaney to Banadía. Hocol has signed an amendment to the transportation agreement from Araguaney to Banadía, in order to receive the related credit note in case that the availability of the service in that direction is suspended in order to enable the contingent service (Banadía-Araguaney). In September 2017 the agreement was amended to specify that the "contingent capacity" could be over 180,000 barrels per any "contingent service" operation and to extend the term until July 30, 2018. In July 2018, the agreement was amended to extend the term to provide the "contingent service" until March 23, 2019. In September 2018, this agreement was assigned by Hocol to Ecopetrol. In November 2018, the agreement was amended to remove the restriction on the number of contingent services during 2018. Pursuant to the terms of these agreements, in 2018 Ecopetrol and Hocol paid to Bicentenario S.A. COP\$785.4 billion.
- In June 2012, Ecopetrol S.A. and Hocol entered into storage or pay and storage and pay agreements with Oleoducto Bicentenario. Under these agreements, Oleoducto Bicentenario is committed to receive, store, preserve and deliver our crude oil. The storage or pay agreement will terminate when Oleoducto Bicentenario's indebtedness to local banks has been entirely paid, and the duration of the storage and pay agreement is 20 years after the storage or pay agreement terminates. In April 2015, this contract was amended to modify certain definitions to reflect new terms from the negotiation of the debt, which included a modification of participant banks and a reduction of the interest rate. In September 2018, this agreement was assigned by Hocol to Ecopetrol. Pursuant to the terms of this agreement, Ecopetrol and Hocol paid to Bicentenario COP\$24.8 billion, plus applicable taxes, in 2018.
- In August 2012, Ecopetrol S.A. entered into an Operation and Maintenance agreement for the Araguaney – Banadía pipeline system. The duration of this agreement is 15 years. This agreement was partially assigned in January 2017 by Ecopetrol to Cenit due to matters related to the management of plants and pipeline assets. In July 2018 Oleoducto Bicentenario and Cenit signed a settlement agreement to recognize costs related to this contract. Pursuant to the terms of those agreements, Bicentenario paid to Cenit COP\$1.47 billion, plus applicable taxes, in 2018.
- In November 2017, the maintenance obligations of the transportation system were partially assigned to Cenit S.A.S. During December 2017 the agreement was modified to exclude from its scope the Araguaney and Banadía Stations' maintenance. In November 2018 the pipeline maintenance obligations were extended until April 2019. Pursuant to the terms of this agreement, Bicentenario paid to Ecopetrol S.A. COP\$8.33 billion, plus applicable taxes, in 2018.

### *Ecodiesel*

- Ecopetrol S.A. entered into a supply agreement with Ecodiesel Colombia S.A. (“Ecodiesel”), a company in which Ecopetrol S.A. has a 50% equity interest. This agreement has been operative since August 1, 2010. Pursuant to the terms of this agreement, Ecodiesel must deliver to Ecopetrol S.A. and Ecopetrol S.A. must in turn purchase 48,100 barrels of Ecodiesel’s biodiesel production each month. Payments vary depending on the purchased volumes and the prices of biodiesel. This agreement was renewed on January 25, 2018 and expires on January 31, 2021. In 2018, a total of COP\$266 billion was paid under this contract.

### *Savia Peru S.A.*

- On February 19, 2016, Ecopetrol S.A., as lender and shareholder of 50%, and Savia Perú, as borrower, entered into a five-year loan agreement for an aggregate principal amount not to exceed US\$70 million. The proceeds of the facility will be used to (i) repay short term loans and (ii) pay shortfalls related to final judgments (in case they materialize). The loan agreement accrues interest at an annual rate of 4.99%, which can be adjusted on an annual basis, with semi-annual interest payments and principal payments beginning on the 21<sup>st</sup> month following the disbursement date. Total disbursement was US\$57 million through the disbursement period ended on December 31, 2017. As of April 2019, the outstanding balance of the obligation with Ecopetrol is US\$35 million under the loan agreement. Korea National Oil Corporation (KNOC), as shareholder of the other 50% of Savia Perú, signed a facility under the same terms and conditions as described above.

### *Transactions with Other State-Controlled Entities*

Other than the agreements that we have entered into with the ANH, in the ordinary course of business we enter into transactions with other state-owned entities that include but are not limited to the following:

- Selling and purchasing goods, including crude oil purchases of ANH royalties (see below);
- Properties and other assets;
- Rendering and receiving services;
- Leasing assets;
- Depositing and borrowing money; and
- Using public utilities.

For the years ended December 31, 2018, 2017 and 2016, we purchased the following volumes of crude oil from the ANH (National Hydrocarbon Agency) corresponding to royalties paid in kind by oil producers in Colombia: 37.6 million barrels, 40.3 million barrels and 42.9 million barrels, respectively. See the section [Business Overview—Applicable Laws and Regulations—Regulation of Exploration and Production Activities—Business Regulation—Royalties](#) for a description of the current royalty scheme.

### **3.11 Insurance**

We have a clear and defined corporate policy based on risk financing guidelines that summarizes the Company’s risk transfer and retention alternatives and provides support and guidance for all the insurance-related issues of all of our affiliated and subsidiary companies.

There are three corporate insurance programs covering Ecopetrol S.A. and its subsidiaries. In the text and tables below, we set forth our insurance programs and the companies covered, along with limits and coverage details.

*Group 1- Downstream Program:* This insurance program provides coverage for downstream (assets and operations) of Ecopetrol S.A. and all of its subsidiaries in excess of their local insurance programs, when applicable. Coverage includes all physical damage and sabotage and terrorism, which were designed to cover downstream operations.

**Table 40 – Group 1 Downstream Program**

Policies	Limit (eel/agg) <sup>(1)</sup>		Deductible		Ecopetrol Downstream	Reficar	Bioenergy	Esenttia
	Onshore	Off shore	On shore	Off shore				
Property all risk	3.50	N/A	5	N/A	X	X	X	X
Sabotage and terrorism	600	N/A	0.5	N/A	X	X	X	X

(1) Eel: each and every loss. Agg: Aggregate.

*Group 2 – Upstream Program:* This program provides coverage for upstream (assets and operations) of Ecopetrol’s interests and all of its upstream subsidiaries. Coverage includes all physical damage, sabotage and terrorism and control of wells.

**Table 41 – Group 2 Upstream Program**

Policies	Limit (eel/agg)* <sup>(1)</sup>		Deductible		Ecopetrol Upstream	Equion	Hocol	Santiago Oil	ECP America	Brazil	ODL	Cenit	ECP Costa Afuera
	Onshore	Offshore	Onshore	Offshore									
	(figures in USD millions)												
Property all risk	400 <sup>(2)</sup>		0.25 for assets over 5 million; 0.05 for assets under 5 million	0.5	X	X	X	X	N/A	N/A	N/A	N/A	X
Sabotage and terrorism	55	0	0.5	N/A	X	X	X	X	N/A	N/A	N/A	N/A	X
Control of Wells	250 / 100 <sup>(3)</sup>	800/ 162.5 / 135	0.25	5/6	X	X	X	N/A	X	X	N/A	N/A	X

(1) Eel: each and every loss. Agg: Aggregate.

(2) US\$250 million Property All Risk but US\$400 million Maximum Loss limit and in the aggregate in respect of earthquakes.

(3) Drilling: US\$250 million; Production: US\$100 million for wells with a depth of 10.001 or more feet, US\$75 million for wells with a depth between 5.001 and 10.000 feet, and US\$50 million for wells with a depth between 0 and 5.000 feet.

*Group 3 – Transversal Program:* This program provides coverage for downstream, upstream and midstream operations of Ecopetrol and its subsidiaries and all of its subsidiaries in excess of their local insurance programs. Coverage includes general liability, directors and officers, cargo, crime and charterers’ liability.

**Table 42 – Group 3 Transversal Program**

Policies	Limit (eel/agg) <sup>(1)</sup>		Ecopetrol	Reficar	Esenttia	Bioenergy	Equion	Hocol	Santiago Oil	ECP America	Brazil	Cenit	Ocensa	ODL	OBC	ODC
	(eel/agg) <sup>(1)</sup>	Deductible														
Third Party Liability	500	1	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Crime	75/150	Various	X	X	X	X	X	X	X	X	X	N/A	N/A	N/A	N/A	N/A
Directors & Officers	170	Various	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Cargo	120	3% dispatch	X	X	N/A	N/A	N/A	X	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Charterers	750	0.02	X	X	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

(1) Eel: each and every loss. Agg: Aggregate.

Our third-party liability insurance policies cover Ecopetrol S.A., our subsidiaries and affiliates in excess of local underlying policy limits for claims made against them by third parties. Our commercial general liability coverage will pay on behalf of or indemnify amounts for which an insured becomes legally obligated to pay, including damages in respect of bodily injury, property, pollution and product liability. Coverage of bodily injury and property damage is subject to coverage territory during the policy period.

Ecopetrol's midstream subsidiaries (Cenit, Ocesa, ODL, Bicentenario and ODC) have an independent program for its oil transportation companies (including crime and directors & officers policies).

**Table 43 – Midstream Program**

	Limit (eel/agg) <sup>(1)</sup>		Deductible		Cenit	Ocesa	ODL	OBC	ODC
	Onshore	Offshore	Onshore	Offshore					
	(figures in millions of USD)								
Policies									
Property all risk	200 <sup>(2)</sup>	200 <sup>(2)</sup>	0.25	0.5	X	X	X	X	X
Sabotage and terrorism	70	20 <sup>(3)</sup>	0.075	0.5	X	X	X	X	X
Third Party Liability	100	100	0.35 <sup>(4)</sup>	0.35 <sup>(4)</sup>	X	X	X	X	X

(1) Eel: each and every loss. Agg: Aggregate.

(2) US\$200 million each company and an aggregated excess shared limit of US\$500 million.

(3) Included in property all risk policy.

(4) US\$0.35 million for pollution and US\$0.09 million other events.

The corporate insurance programs detailed above are subject to particular conditions, limits, sub-limits, deductibles, guarantees and exclusions applying for each line of insurance and each coverage. For purposes of this annual report, only the main limits and deductibles were mentioned in each group.

With respect to offshore operations in the U.S. Gulf Coast, Ecopetrol America Inc. is party to Operating Agreements, or OAs, that include customary conditions and which contain similar terms and provisions to those in the Model Form of Offshore Deepwater Operating Agreement of the American Association of Professional Landmen. In general, pursuant to these OAs, the obligations, duties, and liabilities of the contract parties are several, and not joint or collective, for all operations covered by the OAs.

Ecopetrol S.A. has a contract with two local insurance companies for domestic operations. The local policies relate to transit, accidents, mandatory policies, liability mandatory policies, and personal accidents policies, among others. Additional policies are requested from the insurers as they are needed.

### 3.12 Human Resources/Labor Relations

#### 3.12.1 Employees

As of December 31, 2018, the Ecopetrol Corporate Group had 12,228 employees, an increase of 4.3% from 2017. Most of our employees are located in Colombia. The table below presents the breakdown of Ecopetrol employees according to the business segments where they work, and the personnel of our subsidiaries for the years ended December 31, 2018, 2017 and 2016.

**Table 44 – Corporate Group's Employees**

	As of December 31,		
	2018	2017	2016
	(number of employees)		
<b>Ecopetrol S.A.</b>			
Exploration and Production			
Exploration	215	197	225
Production	2,258	2,141	2,095
Others	758	639	452
<b>Total Exploration and Production</b>	<b>3,231</b>	<b>2,977</b>	<b>2,772</b>
<b>Downstream</b>			
Refining	2,696	2,669	2,685
Marketing	136	132	133
Others	74	67	72
<b>Total Downstream</b>	<b>2,906</b>	<b>2,868</b>	<b>2,890</b>
Transport	798	817	949
Others	351	330	244
<b>Total Operations</b>	<b>7,286</b>	<b>6,992</b>	<b>6,855</b>
<b>Corporate</b>	<b>2,417</b>	<b>2,290</b>	<b>1,993</b>
<b>TOTAL ECOPETROL S.A.</b>	<b>9,703</b>	<b>9,282</b>	<b>8,848</b>

	As of December 31,		
	2018	2017 (number of employees)	2016
Ecopetrol America Inc.	68	70	71
Bioenergy S.A.S.	441	358	145
Bioenergy Zona Franca S.A.S.	279	316	258
Hocol S.A.	221	205	179
Equion Energía Limited	284	298	321
Oleoducto Central S.A.	275	290	290
Oleoducto de Colombia S.A.	3	1	2
Oleoducto de los Llanos S.A.	75	68	55
Oleoducto Bicentenario de Colombia S.A.S.	0	0	0
Ecopetrol del Perú S.A.	0	0	0
Ecopetrol Costa Afuera de Colombia S.A.S.	0	6	0
Refinería de Cartagena S.A.S.	153	185	170
Ecopetrol Óleo e Gás do Brasil Ltda.	16	16	16
Polipropileno del Caribe S.A. (now Esenttia S.A.)	428	417	408
Cenit Transporte y Logística de Hidrocarburos S.A.S.	282	217	156
<b>TOTAL</b>	<b>12,228</b>	<b>11,729</b>	<b>10,919</b>

The number of Polipropileno del Caribe S.A. (now Esenttia S.A.) employees reported in 2017 was re-stated to include Esenttia Masterbach's employees. Esenttia Masterbach is a subsidiary of Esenttia S.A.

#### *Loans and investment on training and development for our employees*

As part of its total compensation programme, Ecopetrol S.A. extends various types of loans to its employees, including housing loans and general-purpose loans. The principal amount of the loan depends on the applicant's tenure. Ecopetrol S.A. does not guarantee any loans made by third parties. Since January, 2018 and up February 2019, Ecopetrol S.A. extended 913 housing loans for a total of COP\$184 billion and 2,329 general-purpose loans for a total of COP\$21 billion. In 2018, Ecopetrol S.A. also provided on-site and external training and development, which totaled to COP\$20.8 billion, and it extended a total of COP\$213 billion in subsidies for education.

We have not provided loans (including housing loans), extended or maintained credit lines, arranged for the extension of credit by third parties, materially modified or renewed an extension of credit lines, in the form of a personal loan to or for any of our executive officers (defined as first line management under the bylaws of Ecopetrol S.A.) since our ADSs were registered under the Exchange Act.

There are no executive officers with housing loans from Ecopetrol.

#### *Labor Regulation*

In accordance with article 123 of the Colombian Constitution and the article 7th of the Law 1118 of 2006, our employees are considered "public servants," even though they are subject to the common labor law. As such, their behavior is subject to the rules to those who handle public interests and goods and could be held liable for their illegal actions and omissions pursuant to the following regimes: (i) disciplinary (Law 734 of 2002), (ii) criminal or (iii) civil.

#### **3.12.2 Collective Bargaining Arrangements**

##### *Ecopetrol S.A.*

A collective bargaining agreement between us and our main labor unions governs labor relations with our unionized employees, which amounted to 50.3% employees as of January 1, 2019. The agreement also governs our labor relations with the 2,657 non-unionized employees who, according to current labor legislation, have been beneficiaries of the collective bargaining agreement.

We currently have eight industry-wide labor unions and seven company labor unions:

- Unión Sindical Obrera de la Industria del Petróleo — USO (industry labor union);
- Asociación de Trabajadores Directivos Profesionales y, Técnicos de las Empresas de la Rama de Actividad Económica del Recurso Natural del Petróleo, los combustibles y sus Derivados— ADECO (industry labor union);
- Sindicato Nacional de Trabajadores de Empresas Operadoras, Contratistas, Subcontratistas de Servicios y Actividades de la Industria Petrolera, Petroquímica y Similares — SINDISPETROL (industry labor union);
- Unión de Trabajadores de la Industria Petrolera y Energética de Colombia – UTIPEC, former UTEN (industry labor union);
- Asociación Sindical de Trabajadores de la Industria del Petróleo – ASTIP (industry labor union);
- Sindicato Nacional de Trabajadores de la Industria de los Hidrocarburos – SINATRINHI (industry labor union);
- Asociación Sindical de Trabajadores de la Industria de Hidrocarburos de Colombia - ASINTRAHC, (industry labor union);
- Sindicato Nacional de Trabajadores de Mantenimiento de la Industria del Petróleo, Gas y Carbón - SINTRAMANPETROL (industry labor union);
- Asociación de Profesionales de Ecopetrol — ASPEC (company labor union);
- Asociación Sindical de Empleados de Ecopetrol – ASOPETROL (company labor union);
- Asociación Sindical de Trabajadores de Ecopetrol – TRASINE (company labor union);
- Asociación Sindical de Trabajadores de Ecopetrol – ASTECO (company labor union);
- Sindicato de Trabajadores Petroleros de Ecopetrol – SINPECO (company labor union);
- Sindicato de Profesionales de Ecopetrol S.A. – SINPROECOP (company labor union); and
- Asociación de Profesionales y Tecnólogos Empleados de ECOPETROL S.A. – APROTECO (company labor union).

Any employee working for any company in the oil and gas industry may join the USO, ADECO, SINDISPETROL, UTIPEC, ASTIP, SINATRINHI, ASINTRAHC or SINTRAMANPETROL. Only our employees may join the company labor unions.

Ecopetrol S.A. relations with unions are based on a permanent dialogue and communication sessions where different matters are discussed in order to solve and prevent any labor conflict.

Our current collective bargaining agreement has been in effect since July 1, 2018 and has a term of four and half years, expiring on December 31, 2022. The collective bargaining agreement included an increase in salaries at an annual rate of the local consumer price index (CPI) +1.21% for the remainder of 2018 and CPI +1.70% every year for the remainder of its duration. The agreement covers health, food, loans and transportation, among other benefits for workers, within reasonable criteria. It also includes union guarantees and addresses regulatory issues. The following unions are parties to the new collective bargaining agreement: USO, ADECO, TRASINE, UTIPEC, APROTECO, SINDISPETROL and ASINTRAHC.

#### 4. **Financial Review**

Our consolidated financial statements for the years ended December 31, 2016, 2017 and 2018 were prepared in accordance with IFRS.

IFRS differs in certain significant aspects from the current Colombian IFRS (which is the accounting standard we use for local statutory reporting purposes). As a result, our financial information presented under IFRS is not directly comparable to certain of our financial information presented under Colombian IFRS. A description of the differences between Colombian IFRS and IFRS is presented under *Summary of Differences between Internal Reporting (Colombian IFRS and IFRS)* below.

Our consolidated financial statements were consolidated line by line and all transactions and significant balances between affiliates have been eliminated. These financial statements include the financial results of all subsidiaries companies controlled, directly or indirectly, by Ecopetrol S.A. See Exhibit 1— Consolidated companies, associates and joint ventures, to our consolidated financial statements included in this annual report.

##### 4.1 **Factors Affecting Our Operating Results**

Our operating results were affected mainly by international prices of crude oil, international prices for refined products and local prices for natural gas, as well as sales volumes, product mix, exchange rate and our operational performance. Crude oil prices and volumes are particularly important to the results of our exploration and production segment. This is because as export volumes or export prices of crude oil and products decrease or increase, our revenues do also. Results from our refining activities are also affected by the price of crude oil used as raw material, changes in product prices in the international market, change in environmental regulations, conversion ratios and utilization rates and refining capacity, all of which affect our refining margins. Terrorist attacks by guerillas against our pipelines and other facilities or social unrest can lead to loss of revenues by restricting the availability of transport systems for exports or sales of crude oil and products and/or production activities, in addition to the direct costs of repairing and cleaning. Finally, changes in the value of foreign currencies, particularly the U.S. dollar against the Colombian Peso, can also have a significant effect on our financial statements.

##### *Sales volumes and prices*

Our results from the exploration and production segment depend mainly on our sales volumes and average local and international prices for crude oil and natural gas. Additionally, sales volumes also reflect the purchase of crude oil and natural gas that we make from third parties and the ANH.

We sell crude oil and natural gas in the local and the international market. We also process crude oil at Barrancabermeja and Reficar and sell refined and other petrochemical products in the local and international markets.

##### *Local sales and prices*

We have a number of crude oil short-term commercial agreements with local customers, and natural gas short and long-term supply contracts with gas-fired power plants and local natural gas distribution companies. Local sale prices are determined in accordance with existing regulations, contractual arrangements and the spot market linked to international benchmarks. Local sales represent 49.9% of our total revenues, on average, for the past three years.

##### *International Sales and Prices*

Our foreign sales represented 50.1% of our total revenues, on average, for the past three years.

International sale prices are determined in accordance with contractual arrangements and the spot market linked to international benchmarks primarily ICE Brent benchmark.

A market diversification strategy has allowed us to capture markets where we have been able to obtain higher prices for our crudes and refined products. We sell our crudes and refined products in various regions, such as the U.S., Central America and the Caribbean, Asia and Europe. In our negotiations with potential customers, we seek to use the most liquid benchmark reference prices in each region.

### *Exploration costs*

We account for exploratory drilling costs using the successful efforts method, whereby all costs associated with the exploration and drilling of productive wells are initially capitalized. Costs incurred in exploring and drilling dry or unsuccessful wells are expensed in the period in which the well is determined to be a dry or unsuccessful well and are accounted for under "Exploration and Project expenses." Consequently, an increase in the number of exploratory wells we declare as dry or unsuccessful will negatively affect our results and may cause volatility in our operating expenses. See Note 4.7 to our consolidated financial statements for a summary of our accounting policy for exploration costs.

### *Royalties*

Each of our production contracts has its own royalty arrangement in accordance with applicable law. Law 141 of 1994 established a royalty fixed rate equivalent to 20% of total production. In 1999, a modification to the royalty system established a sliding scale for royalty percentage linked to the production level of crude oil and natural gas to fields discovered after July 29, 1999, depending on whether the production is crude oil or natural gas, and on the quality of the crude oil produced. Since 2002, as a result of the enactment of Law 756 of 2002, the royalty percentage has ranged from 8% for fields producing up to five thousand bpd to 25% for fields producing an excess of 600 thousand bpd. Producing fields pay royalties in accordance with the applicable royalty rate at the time of the discovery. Also, Law 756 of 2002 establishes that in the fields of the association contracts that finalize or revert back, an additional royalty rate of 12% of the basic production applies.

Since January 2014, the ANH has collected natural gas production royalties from producers settled in cash based on a formula, regardless of whether a producer has sold the gas. As a result, we no longer commercialize this gas on behalf of the ANH. In addition, because the royalties are now payable to the ANH in cash, all the gas we produce is considered part of our reserves and production, without any deduction for royalties. The cost of natural gas royalties totaled COP\$423,939 million in 2018.

### *Purchases of hydrocarbons*

We purchase all crude oil delivered to the ANH as royalties by us and by third parties. The purchase price is calculated according to a formula set forth in a contract between Ecopetrol and the ANH that reflects our export sales prices (crudes and products), a quality adjustment for API gravity and sulfur content, transportation rates from the wellhead to the Coveñas or Tumaco ports and a marketing fee. We sell the physical product purchased from the ANH as part of our ordinary business. The contract between the ANH and us was extended until January 31, 2020.

Since 2016, we have imported crude oil for Reficar feedstock when such imports result in better operational or economic performance of the Ecopetrol Group.

## **4.2 Effect of Taxes, Exchange Rate Variation, Inflation and the Price of Oil on our Results**

### **4.2.1 Taxes**

In December 2016, the Colombian Congress adopted Law 1819, which introduced changes to the Colombian tax system, applicable beginning in 2017, including the following aspects:

- A unified income tax rate was set, which will be 34% for 2017 and 33% for 2018 and subsequently.
- An income tax surtax for profits above COP\$800 million is set which will be 6% for 2017 and 4% for 2018.
- Taxpayers must calculate their taxable income taking as initial base the year and result under Colombian IFRS. Accounting profit is reconciled to obtain the net income tax, which is the basis to calculate the income tax.
- For fiscal year 2017 and 2018 the newly enacted dividends tax applies as follows:



- (i) For non-resident shareholders: (i) a 5% dividend tax if the dividend is paid out of profits that were accrued as of January 1, 2017 and were taxed at the corporate level; (ii) no dividend tax if the dividend is paid out of profits that accrued prior to and including December 31, 2016 and were taxed at the corporate level; (iii) a 35% withholding tax rate on dividends distributed from profits not taxed at the corporate level if the dividend is paid out of profits that accrued as of January 1, 2017, plus an additional, 5% dividend tax after applying the initial 35% withholding tax rate; and (iv) a 35% withholding tax rate on dividends distributed from profits not taxed at the corporate if the dividend is paid out of profits that accrued prior to and including December 31, 2016.
  - (ii) For Colombian individuals: dividends paid were taxed at 5% if they were between 600 and 1,000 Tax Value Unit (“UVT” or *Unidad de Valor Tributario* for its acronym in Spanish) and 10% if they were greater than 1,000 UVT.
- Dividends paid to local corporations during 2017 and 2018 were not subject to any income tax, provided that such dividends were taxed at the corporate level.
  - Tax losses accrued as of fiscal year 2017 may be offset against ordinary net income obtained in the following 12 taxable years.
  - Depreciation and amortization methods and annual percentages are limited to those established in the tax rule and depend on the type of asset. For example, machinery and equipment depreciate at an annual rate of 10%, infrastructure (including pipelines) at 2.22% and vehicles and computers at 20%, among others.
  - Income tax for free trade zone users increased from 15% to 20% as of fiscal year 2017. The tax rate for free trade zone users with a legal stability agreement (in which the income tax rate was stabilized) remains at 15% during the term of said agreement.
  - The general value added tax (“VAT”) rate increased to 19% and a differential rate of 5% for certain goods and services is maintained. The modification of the general VAT rate is effective from January 1, 2017
  - The charge on financial transactions is 0.4%, with half of the tax liability being deductible.
  - Carbon tax accrues on the carbon content of fossil fuels used for combustion. The rate will be COP\$15,000 per ton of CO<sub>2</sub>.

For additional information See Note 10.4 of our Financial Statements.

The 2016 Tax Reform included two tax benefits that are expected to improve the operations of the oil and gas industry:

“CERT: Certificado de Reembolso Tributario” incentive:

- For exploration activities, the “CERT” (for its acronym in Spanish) incentive was approved, consisting of the reimbursement of part of the investment made in the exploration phase.
- The CERT will be granted when the income tax return is filed.
- The CERT can only be redeemed to pay taxes at the national level and its effective maturity date is two years after it is issued. Nevertheless, Decree 2253 of 2017 establishes that a CERT redemption can be made from year two to year five, as from the date of the granting of the incentive. The CERT can also be sold and traded in fixed income market.
- For production activities, the CERT reimbursement will be granted exclusively to investments that increase the recovery factor, *i.e.* investments that increase the reserves that are currently proved in certain wells.

- On December 29, 2017, the Colombian Government issued Decree 2253, which establishes that companies who (i) qualify as operators of association agreements entered into with Ecopetrol, (ii) have exploration and production of hydrocarbons agreements and (iii) are currently involved in the exploration and production of hydrocarbons, among others, can also qualify for the CERT. Additionally, the CERT will not qualify as taxable income or capital gain for the taxpayer receiving or acquiring such incentive.
- On March 23, 2018, the following Resolutions were issued in order to regulate the procedures and requirements that companies must comply to claim the CERT: 0860 of Ministry of Finance and Public Credit, 108 of ANH and 40284 and 40285 of Ministry of Mines and Energy.

Refundable VAT on O&G exploration:

- Taxpayers in the oil and gas industry are entitled to refund VAT paid in the exploration phase for offshore projects. Taxpayers can request for this VAT as of the next fiscal year in which the investment was made. VAT that is reimbursed cannot be used as a higher cost or expense for income tax purposes.

In December 2018, the Colombian Congress adopted Law 1943, which introduced the following key changes to the Colombian tax system, among others:

- The corporate income tax rates will be gradually reduced from 33% to 30% as follows: 33% in 2019, 32% in 2020, 31% in 2021 and 30% 2022 onwards.
- The presumptive income tax rate will be reduced to 1.5% for fiscal years 2019 and 2020 and 0% from 2021 onwards.
- The creation of a “normalization tax” in order to enable taxpayers to regularize certain omissions of information about their assets and/or incorrect information about their liabilities, subject to the payment of a 13% tax on the value of the amount of the omitted information.
- Introduces the Colombian Holding Companies (CHC) regime.
- As of 2019, taxes are fully deductible if they are effectively paid during the fiscal year, except for: (i) income tax, equity tax and normalization tax are non-deductible; (ii) only 50% of the financial transactions tax is deductible; and (iii) only 50% of the industry and commerce tax can be taken as a discount (tax credit) to income tax.
- VAT paid on the acquisition, import, creation or construction of tangible fixed assets used in income generating activities may be treated as discount (tax credit) for income tax purposes, in the same year or in future years.
- The dividend tax regime was modified and, as of 2019, will be as follows:
  - (i) For resident companies and non-resident shareholders (companies and individuals): (i) a 7.5% dividend tax on dividends distributed from profits taxed at the corporate level (except that dividends paid to non-resident shareholders out of profits taxed at the corporate level prior to and including December 31, 2016, are not subject to this tax); and (ii) 33% withholding tax rate on dividends distributed from profits not taxed at the corporate level (32% for 2020, 31% for 2021 and 30% as of 2022), plus an additional 7.5% dividend tax after applying the initial 33% withholding tax rate.
  - (ii) For Colombian resident individuals: dividend income in excess of 300 UVT is taxed at a rate of 15%.

#### 4.2.2 Exchange Rate Variation

The functional currency of each of the companies of Ecopetrol Group is determined in relation to the main economic environment where each company operates; however our consolidated financial results are reported in Colombian Pesos, which is the Ecopetrol Group's functional and presentation currency. A substantial part of our consolidated revenues comes from Ecopetrol Group companies whose functional currency is the Colombian Peso. The conversion effect from U.S. dollar to Colombian Peso is mainly due to local sales and exports of crude oil, natural gas and refined products whose prices are based on benchmarks quoted in U.S. dollars. Therefore, they are exposed to foreign currency exchange risk on revenues, capital expenditures and financial instruments that are denominated in a currency other than its functional currency.

Fluctuations in the U.S. dollar-Colombian Peso exchange rate have effects on our consolidated financial statements. As crude oil is priced in U.S. dollars, fluctuations in the exchange rate of the Colombian Peso against the U.S. dollar may have a significant impact on revenues, cost, monetary assets and liabilities held in foreign currency.

An appreciation of the Colombian Peso has a negative impact on our results of operations because our revenues from exports of crude oil, natural gas and refined products are primarily expressed in U.S. dollars. Costs of imported products and contracted services expressed in U.S. dollars will also be lower when expressed in Colombian Pesos, but on balance, our operating income in Colombian Pesos tends to decline when the Colombian Peso appreciates, other factors being equal. The appreciation of the Colombian Peso against the U.S. dollar also decreases the debt service requirements of our Companies with the Colombian Peso as their functional currency, as the amount of the Colombian pesos necessary to pay principal and interest on foreign currency debt decreases with the appreciation of the Colombian Peso.

Conversely, when the Colombian Peso depreciates against the U.S. dollar, our reported revenues, costs related to imported products and services, interest costs, and operating income, all tend to increase.

During 2018, the Colombian Peso depreciated slightly on average 0.2% against the U.S. dollar. During 2017, the Colombian Peso appreciated on average 3.35% against the U.S. dollar. In 2016, the Colombian Peso depreciated on average 11.18% against the U.S. dollar. Additionally, as of December 31, 2018 the Colombian Peso/U.S. dollar exchange rate depreciated 8.91% from the rate a year earlier. In contrast, of December 31, 2017 and December 31, 2016, the Colombian Peso/U.S. dollar exchange rate appreciated 0.56% and 4.72% respectively from the rate a year earlier.

In 2018, our consolidated debt in foreign currency decreased by a total of US\$2,123 million mainly as a result of prepayments of local and foreign currency of US\$2,446 million and amortization of foreign currency capital expenditures. In 2017, our consolidated debt in foreign currency decreased by a total of US\$2,582 million mainly as a result of prepayments of foreign currency denominated loans of US\$2,400 million and amortization of foreign currency capital expenditures. In 2016, our consolidated debt in foreign currency increased by a total of US\$975 million as Ecopetrol S.A. raised US\$475 million through international loans and US\$500 million through an international bond issuance.

As of December 31, 2018 our U.S. dollar denominated total debt was US\$10,467 million, which we recognize in our financial statements at its amortized cost, which corresponds to the present value of cash flows, discounted at the effective interest rate. Out of this total, US\$9,689 million relates to Ecopetrol S.A., whose functional currency is the Colombian Peso. Therefore, when the Colombian Peso depreciates against the U.S. dollar, Ecopetrol S.A. is exposed to an exchange rate loss. In contrast, when the Colombian Peso appreciates against the U.S. dollar, Ecopetrol S.A. has an exchange rate gain. Some of the Ecopetrol Group companies have the U.S. dollar as their functional currency and are not exposed to a material exchange rate risk resulting from fluctuations in the Colombian Peso against the U.S. dollar. On the asset side, when the financial statements of the Group are consolidated, the exchange rate differential of the subsidiaries' assets and liabilities whose functional currency is the U.S. dollar is recognized directly in equity, as part of other comprehensive income.

In 2015, Ecopetrol S.A. adopted hedge accounting, using two types of natural hedges with its U.S. dollar debt as a financial instrument: (i) a cash flow hedge for exports of crude oil and (ii) a hedge of the net investment in foreign operations. As a result of the implementation of both hedges 67.1% (US\$6,500 million) of Ecopetrol S.A.'s debt in U.S. dollars, as of December 31, 2018, was designated as a hedge. With the adoption of hedge accounting, the effect of the volatility of the foreign exchange rate on the hedged portion of the debt is recognized directly in equity, as part of other comprehensive income.

The remaining portion of Ecopetrol S.A.'s U.S. dollar-denominated debt, as well as the financial assets and liabilities denominated in foreign currency, continues to be exposed to the fluctuation in the exchange rate, which means that an appreciation of the Colombian Peso against the U.S. dollar could generate a loss for companies whose functional currency is the Colombian Peso that have a net position in U.S. dollars or a gain if they have a net liability position in U.S. dollars. Conversely, a depreciation of the Colombian Peso against the U.S. dollar could generate a gain for companies whose functional currency is the Colombian peso that have a net position in U.S. dollars or a loss if they have a net liability position in U.S. dollars.

As of December 31, 2018, Ecopetrol Group companies have the equivalent of a net U.S. dollar position of US\$0.7 million after the implementation of the natural hedging previously mentioned above, neutralizing the effect of exchange rate fluctuations in their results for the year.

#### **4.2.3 Effects of Inflation**

The average annual rate of inflation in Colombia for the past ten years is 4.04%. It decreased in 2018 as compared to 2017. As measured by the general consumer price index, average annual inflation in Colombia for the years ended December 31, 2018, 2017 and 2016 was 3.18%, 4.09% and 5.75%, respectively. The decrease in inflation in 2018 is mainly due to the favorable price behavior of both tradable and non-tradable items. Cost inflation in the prices of goods, raw materials, interest cost of debt in local currency indexed to inflation and services for operation of oil and gas producing assets can vary over time and between each market segment.

#### **4.2.4 Effects of the Crude Oil Price**

The average price of ICE Brent crude in 2018 was US\$71.7 per barrel as compared to US\$54.7 per barrel in 2017 and US\$45.1 per barrel in 2016. See section Strategy and Market Overview.

In addition, Ecopetrol' average crude oil basket price relative to ICE Brent reported a discount of US\$8.50 per barrel in 2018, a higher discount than the US\$6.90 in 2017 and a lower discount than the \$9.40 observed in 2016 due to: (i) our knowledge of the refining market for heavy and intermediate crudes, (ii) the ability to identify and capture opportunities in the United States and Asia, and (iii) the incorporation of new refinery customers in those markets. Our average price crude oil basket was US\$63.2 per barrel in 2018 as compared to US\$47.8 per barrel in 2017 and US\$35.7 per barrel in 2016, which represents an increase of US\$15.4 per barrel in 2018 compared to 2017.

In the Operating Results section below, we present the impact of the price increase on our revenue and cost of sales.

Additionally, fluctuations in the price of oil had an impact on the value of our oil and gas reserves. Reserves valuation is made in accordance with SEC price regulations. Volatility in hydrocarbon prices, refining margins and reserves, as well as changes in environmental regulations may lead to the recognition of impairment or recovery of non-recurring assets.

For additional information about impairment charges and reversals, see sections Operating Results—Consolidated Results of Operations—Impairment of non-current assets, Segment Performance and Analysis and Note 16 to our consolidated financial statements.

### **4.3 Accounting Policies**

Our consolidated financial statements for the years ended December 31, 2018, 2017 and 2016 were prepared in accordance with IFRS. The detail of the accounting policies is described in Note 4 to our consolidated financial statements.

### **4.4 Critical Accounting Judgments and Estimates**

Critical accounting policies are those policies that require us to exercise judgment or involve a higher degree of complexity in the application of the accounting policies that currently affect our financial condition and results of operations. The accounting judgments and estimates we make in these contexts require us to calculate variables and make assumptions about matters that are highly uncertain. In each case, if we had made other estimates, or if changes in the estimates occur from period to period, our financial condition and results of operations could be materially affected.

See Note 3 to our consolidated financial statements for a summary of the critical accounting judgments and estimates applicable to us. There are many other areas in which we use estimates about uncertain matters, but we believe the reasonably likely effect of changed or different estimates would not be material to our financial presentation.

#### 4.5 Operating Results

The following discussion is based on information contained in our audited consolidated financial statements and should be read in conjunction therewith.

##### 4.5.1 Consolidated Results of Operations

The following table sets forth components of our income statement for the years ended December 31, 2018, 2017 and 2016.

**Table 45 – Consolidated Income Statement**

<i>Income Statement</i> <i>(Colombian Pesos in millions)</i>	For the Years ended December 31,			% Change	
	2018	2017	2016	2018/2017	2017/2016
Revenue	68,603,872	55,954,228	48,485,561	22.6	15.4
Cost of sales	41,184,379	36,908,325	34,251,423	11.6	7.8
<b>Gross Profit</b>	<b>27,419,493</b>	<b>19,045,903</b>	<b>14,234,138</b>	<b>44.0</b>	<b>33.8</b>
Operating expenses	4,592,445	4,185,186	4,400,843	9.7	(4.9)
Impairment of non-current assets	368,634	(1,311,138)	928,747	(128.1)	(241.2)
<b>Operating Income</b>	<b>22,458,414</b>	<b>16,171,855</b>	<b>8,904,548</b>	<b>38.9</b>	<b>81.6</b>
Finance results, net	(2,010,375)	(2,495,731)	(1,175,367)	(19.4)	112.3
Share of profit of companies	165,836	93,538	61,345	77.3	52.5
<b>Income before income tax</b>	<b>20,613,875</b>	<b>13,769,662</b>	<b>7,790,526</b>	<b>49.7</b>	<b>76.7</b>
Income tax	(8,258,485)	(5,800,268)	(4,543,046)	42.4	27.7
<b>Net Income (loss)</b>	<b>12,355,390</b>	<b>7,969,394</b>	<b>3,247,480</b>	<b>55.0</b>	<b>145.4</b>
Net income (loss) attributable to:					
Company's shareholders	11,381,386	7,178,539	2,447,881	58.5	193.3
Non-controlling interest	974,004	790,855	799,599	23.2	(1.1)
<b>Net Income (loss)</b>	<b>12,355,390</b>	<b>7,969,394</b>	<b>3,247,480</b>	<b>55.0</b>	<b>145.4</b>

##### 4.5.1.1 Total Revenues

The following table sets forth our principal sources of third-party revenues by business segment for the years ended December 31, 2018, 2017 and 2016. An explanation of how we classify our operations into business segments is included in Section 4.5.1.8 below.

**Table 46 – Third-Party Revenues by Business Segment**

Revenue by segment	2018			2017			2016			Change Sales Revenues (%)	
	Volume (barrels equivalent)	Average price US dollars / barrels	Sales revenues (Colombian Pesos in millions)	Volume (barrels equivalent)	Average price US dollars / barrels	Sales revenues (Colombian Pesos in millions)	Volume (barrels equivalent)	Average price US dollars / barrels	Sales revenues (Colombian Pesos in millions)	2018/2017	2017/2016
Local Crude oil	2,919,416	60.8	550,479	6,629,362	46.5	909,871	5,288,631	35.0	553,666	(39.5)	64.3
Foreign Crude oil	143,208,235	63.2	26,898,737	151,619,346	47.8	21,426,666	159,311,257	35.7	17,278,579	25.5	24.0
Natural gas local	28,065,889	22.5	1,885,846	26,998,537	22.8	1,815,754	27,543,046	23.6	1,988,336	3.9	(8.7)
Foreign natural gas	530,945	17.7	27,899	618,022	17.7	32,303	931,754	20.9	58,809	(13.6)	(45.1)
Other income <sup>(1)</sup>	3,216,650	-	749,939	3,412,568	-	819,726	1,288,736	-	647,942	(8.5)	26.5
<b>Exploration and production sales</b>	<b>177,941,135</b>		<b>30,112,900</b>	<b>189,277,835</b>		<b>25,004,320</b>	<b>194,363,424</b>		<b>20,527,332</b>	<b>20.4</b>	<b>21.8</b>
Local refined products	108,781,359	81.9	26,354,549	106,891,163	67.2	21,187,091	106,047,637	54.9	17,771,166	24.4	19.2
Foreign refined products	41,577,284	68.6	8,485,932	38,268,394	53.2	6,005,556	51,843,743	40.4	6,330,648	41.3	(5.1)
Foreign Crude oil	-	-	-	341,366	53.0	52,397	-	-	-	(100.0)	-
Other income <sup>(1)</sup>	-	-	107,467	-	-	98,315	-	-	92,210	9.3	6.6
<b>Refining and petrochemicals</b>	<b>150,358,643</b>		<b>34,947,948</b>	<b>145,500,923</b>		<b>27,343,359</b>	<b>157,891,380</b>		<b>24,194,024</b>	<b>27.8</b>	<b>13.0</b>
Transportation services	-	-	3,543,024	-	-	3,606,549	-	-	3,764,205	(1.8)	(4.2)
<b>Transportation and logistics</b>	<b>-</b>		<b>3,543,024</b>	<b>-</b>		<b>3,606,549</b>	<b>-</b>		<b>3,764,205</b>	<b>(1.8)</b>	<b>(4.2)</b>
<b>Total sales</b>	<b>328,299,778</b>		<b>68,603,872</b>	<b>334,778,758</b>		<b>55,954,228</b>	<b>352,254,804</b>		<b>48,485,561</b>	<b>22.6</b>	<b>15.4</b>
Crude Oil	146,127,651	63.2	27,449,216	158,590,074	47.8	22,388,934	164,599,888	35.7	17,832,245	22.6	25.6
Natural gas	28,596,834	22.4	1,913,745	27,616,559	22.7	1,848,057	28,474,800	23.5	2,047,145	3.6	(9.7)
Refined products	153,575,293	77.3	35,590,420	148,572,125	62.7	28,012,373	159,180,116	50.1	24,101,814	27.1	16.2
Transportation services and others	-	-	3,650,491	-	-	3,704,864	-	-	4,504,357	(1.5)	(17.8)
<b>Total sales</b>	<b>328,299,778</b>		<b>68,603,872</b>	<b>334,778,758</b>		<b>55,954,228</b>	<b>352,254,804</b>		<b>48,485,561</b>	<b>22.6</b>	<b>15.4</b>

(1) In the case of the exploration and production segment, other income corresponds to services and sales of refined products (mainly LPG and asphalt) allocated to our exploration and production segment. In the case of the refining and petrochemicals segment, other income corresponds to industrial services.

In 2018, total revenues increased by 22.6% as compared to 2017, primarily as a result of: (i) a COP\$12,898,392 million increase in revenues mainly due to the 32.2%, or US\$15.4 per barrel increase of our average crude oil basket price, which in turn was primarily the result of the better performance of the Brent crude benchmark price and the 23.3%, or US\$14.6 per barrel increase, of our average refined products basket price, which in turn was primarily due to strengthening of diesel prices, and (ii) the 0.2% depreciation of the Colombian Peso against the U.S. dollar, from an average exchange rate of COP\$2,951.15 /US\$1.00 in 2017 to an average exchange rate of COP\$2,956.55/US\$1.00 in 2018, resulting in an increase in sales revenue from exports, which represented an increase of COP\$297,937 million. This increase was partially offset by: (i) a COP\$407,261 million revenue decrease attributable to the decrease in our sales volume explained below and (ii) a COP\$139,424 decrease in services revenue from our transportations and logistics segment, primarily due to the resolution of the disagreement regarding the P135 Project tariffs leading to lower tariffs, which was partially offset by higher volumes transported through the San Fernando – Apiay system and the expansion of the P135 Project.

The decrease of our sales volume in 2018 as compared to 2017 was the result of (i) the 7.9%, or 12.5 mbe, decrease in our crude sales volume was primarily the result of lower crude exports due to a greater allocation of domestic crudes to supply Reficar in order to replace imports. This decrease was partially offset by (i) the 3.4%, or 5.0 mbe, increase in refined products volumes due to greater refining throughput and (ii) the 3.5%, or 1.0 mbe, increase in natural gas sales volume, primarily due to greater demand and active incremental sales.

In 2017, total revenues increased by 15.4% as compared to 2016, primarily as a result of a COP\$10,971,709 million increase in revenues mainly due to the 33.9%, or US\$12.1 per barrel increase of our average crude oil basket price and a smaller discount of Ecopetrol's average crude oil basket price from international prices. This increase was partially offset by: (i) a COP\$1,894,819 million decrease in revenues attributable to the decrease in our sales volume and a COP\$261,200 decrease in services provided by our transportations and logistics segment and (ii) the 3.35% appreciation of the Colombian Peso against the U.S. dollar, from an average exchange rate of COP\$3,053.42/US\$1.00 in 2016 to an average exchange rate of COP\$2,951.15/US\$1.00 in 2017, resulting in a decrease in sales revenue from exports, which represented a decrease of COP\$1,347,023 million.

The decrease of our sales volume in 2017 as compared to 2016 was the result of (i) the 3.7%, or 6 mbe, decrease in our crude sales volume caused mainly by lower crude exports due to a greater allocation of domestic crudes to supply Reficar in order to replace imports, (ii) the 6.7%, or 10.7 mbe, decrease in refined products volumes due to lower exports of diesel, primarily due to: (a) our strategy of focusing on allocating higher volumes to the domestic market to supply local demand and replace imports which resulted in lower cost of sales and better gross margin, (b) lower exports of fuel oil, and (c) a decrease in production at the Barrancabermeja refinery as a result of reliance on more efficient alternative sources, and (iii) the 3%, or 0.86 mbe, decrease in natural gas sales volume due to continued lower thermal demand as a result of no effect of the "El Niño" weather phenomenon that ended in the middle of 2016.

#### 4.5.1.2 Cost of Sales

Our cost of sales was principally affected by the factors described below. See Note 24 to our consolidated financial statements for more detail.

Cost of sales in 2018 was COP\$41,184,379 million, representing a COP\$4,276,054 million or 11.6% increase as compared to 2017, primarily as a result of the following factors:

- A COP\$3,225,596 million increase in the purchase costs of crude oil, natural gas and refined products, which were purchased for sales and, in the case of crude oil, for refining, which was primarily the result of (i) higher average purchase prices due to the COP\$5,359,427 million increase in international benchmark prices for crude oil, natural gas and refined products, (ii) a COP\$59,117 million increase in natural gas purchase volume, primarily to ensure the supply to our refineries during periods of ongoing maintenance in our natural gas production fields and (iii) a COP\$52,233 million increase in costs in Colombian Peso terms due to the depreciation of the average exchange rate of the Colombian Peso against the U.S. dollar. This increase was partially offset by (i) a COP\$1,478,718 million decrease in crude oil volumes purchased due to lower imports of light crude used by Reficar that were replaced by our own crude volumes and (ii) a COP\$766,463 million decrease in products purchase volume, primarily medium distillates and gasolines, primarily due to higher production at Barrancabermeja and Reficar in order to supply the local market.
- A COP\$700,715 million increase in maintenance cost and contracted services, primarily due to: (i) additional costs for community management and well integrity and (ii) services contracted for water treatment, workover campaigns, surface maintenance, as well as costs associated with higher production and the increase in the throughput of our refineries.
- A COP\$477,829 million increase in inventory consumption associated with higher level of sales volumes in 2018 compared to 2017.
- A COP\$290,590 million increase in labor costs, which is primarily the result of: (i) the recognition of employee benefits under the new collective bargaining agreement, (ii) a 4.4% salary increase in 2018 and (iii) an increase in the number of employees.
- A COP\$177,158 million increase in the cost of processing materials and operating supplies due to an increase in our operational activities.

The factors mentioned above were partially offset by:

- A COP\$512,341 million decrease in depreciation, amortization and depletion charges due to (i) an increase in hydrocarbon proved developed reserves in 2018 as compared to 2017, which in turn led to a decrease in depreciation expenses. This decrease was partially offset by (i) higher production levels associated with the results of our drilling campaign, and (ii) increase in our level of capital expenditures.
- A COP\$83,493 million decrease in other minor items.

Cost of sales in 2017 was COP\$36,908,325 million, representing a COP\$2,656,902 million or 7.8% increase as compared to 2016, primarily as a result of the following factors:

- A COP\$1,439,366 million increase in the purchase costs of crude oil, natural gas and refined products, which were purchased for sales and, in the case of crude oil, for refining, which was primarily the result of (i) higher average purchase prices due to the COP\$4,322,867 million increase in international benchmark prices for crude oil, natural gas and refined products, and (ii) increased crude oil imports required at Reficar for its operations. This increase was partially offset by (i) a COP\$2,399,596 million decrease in volumes purchased due to lower imports of fuels, especially diesel and gasoline, due to our strategy described above of replacing imports with products produced by Reficar, and lower diluent consumption, due to the strategy of marketing high-viscosity crudes and co-dilution with LPG, and (ii) COP\$543,905 million decrease in costs in Colombian Peso terms due to the appreciation of the average exchange rate of the Colombian Peso against the U.S. dollar.

- A COP\$ 748,051 million increase in depreciation, amortization and depletion charges due to (i) higher depreciation as a result of the beginning of operations of the Gunflint field by Ecopetrol America Inc. in August 2016, (ii) a decrease in hydrocarbon proved developed reserves in 2016 as compared to 2015, which in turn led to an increase in depreciation expenses, and (iii) the capitalization of project costs and maintenance in our transportation system.
- A COP\$415,534 million increase in the cost of processing materials and operating supplies due to an increase in our operational activities.
- A COP\$243,702 million increase in labor costs, which is primarily the result of: (i) no performance variable bonus payment in 2016, (ii) a 5.2% salary increase in 2017 and (iii) the payment of salaries and health services for employees of the Rubiales field for the entire year of 2017, after Ecopetrol assumed operations in July 2016.
- A COP\$41,471 million decrease in other minor items.

The factors mentioned above were partially offset by a COP\$231,222 million increase in inventories and an increase in unit costs associated with the increase of the Brent price of crude oils and products.

#### 4.5.1.3 Operating Expenses before impairment of non-current assets effects

Operating expenses and selling, general and administrative expenses before taking into account the impairment of non-current assets amounted to COP\$4,592,445 million in 2018, a COP\$407,259 million or 9.7% increase as compared to 2017, mainly as a result of the following factors (see Notes 25 and 26 to our consolidated financial statements for more detail).

- A COP\$463,160 million decrease in other income due to the acquisition of an additional 11.6% interest at the K2 field in the Gulf of Mexico, which generated a gain due to the increase in the book value of the asset above the price paid for the additional interest. This non-cash gain is the result of the fair value valuation of the interest acquired, reflecting a price increase between the date of the deal and the price outlook by the end of 2017, among other factors.
- A COP\$188,304 million increase in general expenses due to the negative impact in our midstream segment of attacks by third parties and higher expenses incurred in respect of environmental incidents in our upstream segment.
- A COP\$133,828 million decrease in other income due to the sale of the following fields in 2017: Sogamoso, Río Zulia, Río de Oro and Puerto Barco, Santana, Nancy Maxine Burdine and Valdivia Almagro.
- A COP\$45,439 million increase in exploratory expenses as a result of a (i) higher seismic activity and (ii) the recognition of spending on exploratory activity mainly at the León 1, León 2, Bonifacio, Huron and Payero wells in 2018.

This increase was partially offset by:

- A COP\$214,563 million decrease in taxes mainly due to the elimination of the wealth tax since 2018.
- A COP\$72,318 million decrease in expenses related to our gas pipeline availability BOMT contracts with Transgas that terminated in August 2017.



- A COP\$136,591 million decrease in other minor items, particularly a reversal of a provision we had set aside in respect of the tariff dispute we were having in connection with the P135 Project

Operating expenses and selling, general and administrative expenses before taking into account the impairment of non-current assets, amounted to COP\$4,185,186 million in 2017, a COP\$215,657 million or 4.9% decrease as compared to 2016, mainly as a result of the following factors (see Notes 25 and 26 to our consolidated financial statements for more detail).

- A COP\$451,095 million increase in other income due to the acquisition of an additional 11.6% interest at the K2 field in the Gulf of Mexico, which generated a gain due to the increase in the book value of the asset above the price paid for the additional interest. This non-cash gain is the result of the fair value valuation of the interest acquired, reflecting a price increase between the date of the deal and the price outlook by the end of 2017, among other factors.
- A COP\$263,034 million decrease in taxes mainly due to the reduction of the wealth tax rate from 1% in 2016 to 0.4% in 2017, which was partially offset by an increase in Hocol's tax expenses as a result of a regulatory trial on deductible expenses.
- A COP\$122,427 million increase in other income due to the sale of the following fields in 2017: Sogamoso, Río Zulia, Río de Oro and Puerto Barco, Santana, Nancy Maxine Burdine and Valdivia Almagro.

This decrease was partially offset by:

- A COP\$613,350 million increase in exploratory expenses as a result of a higher seismic activity and the recognition of spending on exploratory activity mainly at the Kronos-1, Parmer-1, Warrior 2, Lunera-1, Brama-1, Molusco-1, Godric, Dumbo and Pollera wells,
- A COP\$7,549 million increase in other minor items.

Each of our operating segments bears the costs and expenses incurred for product use and marketing and each segment assumes administrative expenses and all non-operational transactions related to its activity. Discussion of operating expenses by business segment is included in the section *Financial Review—Operating Results—Consolidated Results of Operations—Segment Performance and Analysis*.

#### **4.5.1.4 Impairment of non-current assets**

The impairment of our non-current assets includes expenses (or recovery) of impairment of property, plant and equipment and natural resources, investments in companies, goodwill and other non-current assets. The Company is exposed to future risks derived mainly from variations in: (i) oil prices outlook, (ii) refining margins and profitability, (iii) cost profile, (iv) investment and maintenance expenses, (v) amount of recoverable reserves, (vi) market and country risk assessments reflected in the discount rate, and (vii) changes in domestic and international regulations, among others.

Any change in the foregoing variables used to calculate the recoverable amount of a non-current asset can have a material effect on the recognition of either losses or recovery of impairment charges in the profit or loss statement. In our business segments highly sensitive variables can include among others: (i) in the exploration and production segment, variations of the hydrocarbon prices outlook; (ii) in the refining segment, changes in product and crude oil prices, discount rate, refining margins, changes in environmental regulations, cost structure and the level of capital expenditures; (iii) in the transportation and logistics segment, changes in tariffs regulation and volumes transported. (See Notes 3.2, 4.12 and 16 to our consolidated financial statements for more detail).

In 2018, we recognized impairment losses of non-current assets of COP\$368,634 million as compared to a COP\$1,311,138 million net reversal of impairment of non-current assets in 2017 and impairment losses of COP\$928,747 million in 2016. These impairments are a non-cash accounting effect and consequently do not involve any disbursement or cash inflow. Further, any cumulative impairment amount of non-current assets is susceptible to reversion when the fair value of the asset exceeds its book value. On the contrary, in the event that the book value exceeds the fair value of the asset, an additional impairment expense could be recognized.

As mentioned above, in 2018, Ecopetrol recognized impairment losses, net of non-current assets of COP\$368,634 million, which corresponds to the net result of:

- An impairment of non-current assets in the refining and petrochemicals segment, primarily due to adjustments in market expectations with respect to the impact of implementation of IMO regulations on projected margins for Reficar's refined products, (ii) a decrease in the short-term outlook for the ethanol prices given a global over-supply of ethanol, (iii) downward updates to Bioenergy's near-term agricultural outputs and (iv) an increase in the discount rate used for Reficar and Bioenergy, reflecting updated macroeconomic conditions. These negative impacts were partially offset by the commencement of the stabilization period at both Reficar and Bioenergy as well as tax benefits associated with Law 1942, 2018.
- An impairment of non-current assets in the transportation and logistics segment, primarily the result of a decrease in the forecast of the volume to be transported by the southern transportation unit and an increase in investment needs to mitigate the operative risk of our transportation systems.
- A reversal of impairment of non-current assets in the exploration and production segment primarily due to an improved short-term hydrocarbon price outlook, incorporation of new reserves and technical and operational information variables.

The partial reversal of the impairment recorded in 2017 is primarily the result of an improved hydrocarbon prices outlook, incorporation of new reserves, Ecopetrol's crude oil basket price discounts as compared to the ICE Brent crude price, favorable refining margins outlook, market conditions affecting the discount rate and technical operational capacity, among other factors.

The impairment losses recognized in 2016 were mainly due to lower estimates of the outlook for oil prices given the oil price environment during those years, operational variables in the exploration and production and refining segments, market and country risk assessments reflected in the discount rate, and a reduction in the amount of recoverable reserves, among others.

For more information regarding impairment by segment, see the section *Financial Review—Operating Results—Consolidated Results of Operations—Segment Performance and Analysis*.

#### **4.5.1.5 *Finance Results, Net***

Finance results, net, mainly includes exchange rate gains or losses, interest expense, yields and interest from our investments and non-current liabilities financial costs (asset retirement obligation and post-benefits plan).

Finance results, net, amounted to a loss of COP\$2,010,375 million in 2018 as compared to a loss of COP\$2,495,731 million in 2017. This decrease in loss was mainly due to:

- The positive impact resulting from the 8.9% depreciation of the Colombian Peso against the U.S. dollar on our U.S. dollar net asset position. In 2018 our exchange rate gain was COP\$372,223 million, as compared to a gain of COP\$5,514 million in 2017.
- A COP\$84,265 million decrease in financial costs related to long term obligations mainly due to a lower interest rate on our asset retirement obligation.
- A COP\$13,420 million increase in interest expenses, primarily the result of premiums paid in respect of prepayments of debt in 2018 which will generate interest savings in the first half of 2019, which was partially offset by lower interest expenses given (i) use of cash surpluses to pre-pay foreign currency-denominated loans totaling US\$2,006 million and local loans totaling the equivalent of US\$440 million in 2018 and (iii) a decrease in interest on local currency-denominated loans with a lower interest rate indexed to the Consumer Price Index (CPI).

- A COP\$47,802 million increase in losses related to other minor financial items.

Finance results, net, amounted to a loss of COP\$2,495,731 million in 2017 as compared to a loss of COP\$1,175,367 million in 2016. This increase in loss was mainly due to:

- The negative impact (COP\$970,916 million) resulting from the 0.56% appreciation of the Colombian Peso against the U.S. dollar on our U.S. dollar net asset position. In 2017 our exchange rate gain was COP\$5,514 million, as compared to a gain of COP\$976,430 million in 2016.
- A COP\$688,664 million decrease in financial income corresponding to the reversal of a provision we had set aside in 2016 relating to a litigation concerning Santiago de las Atalayas (the “Comuneros”). See below and Note 27 to our consolidated financial statement for more detail.
- A COP\$39,814 million increase in losses related to other minor financial items.

This increase in our financial loss was partially offset by: (i) the use of cash flow and net investment hedge accounting, which has allowed us to neutralize, overall, the effect of the exchange rate fluctuation on 71.2% of the U.S. dollar debt of Ecopetrol S.A., since exchange rate changes are recognized under other comprehensive income within equity, (ii) the efficient allocation of debt within the companies that make up the Ecopetrol Group, thereby achieving an approximately zero net position in U.S. dollars as of December 31, 2017, and (iii) a COP\$379,030 million decrease in interest expenses as a result of: (i) the use of cash surpluses to pre-pay foreign currency-denominated loans totaling US\$1,925 million in June 2017 and US\$475 million in December 2017 and (ii) a decrease in interest on local currency-denominated loans with a lower interest rate indexed to the Consumer Price Index (CPI) and a decrease in interest on capital payments.

For more details on our financial income and expenses see Note 27 to our consolidated financial statements for more details.

#### 4.5.1.6 Income Tax

Income taxes amounted to COP\$8,258,485 million in 2018, COP\$5,800,268 million in 2017 and COP\$4,543,046 million in 2016. The above is equivalent to an effective tax rate of 40.1%, 42.1% and 58.3% in 2018, 2017 and 2016, respectively.

The decrease in the effective tax rate from 2017 to 2018 was mainly due to: (i) the positive impact of Law 1943, 2018 that led to higher deferred asset taxes, primarily at Reficar and Bioenergy, given the lower presumptive income rate of 0% starting in 2021, which will allow them to offset higher tax losses from previous years; (ii) the 300 basis points nominal tax decrease as a consequence of the 2016 tax reform; and (iii) an increase in the contribution of our income from Reficar, which is taxed at a lower nominal rate of 15%. This decrease was partially offset by (i) a non-deductible expense effect, primarily due to exploratory activity at Ecopetrol América Inc.’s León 1 and 2 wells and (ii) exchange rate effects on tax bases for companies with the U.S. dollar as their functional currency but with profit or tax losses in Colombian pesos, which required them to recognize a deferred taxes according to IAS 12.41 between the carrying amount of non-monetary assets in their financial statements and their respective tax bases converted from Colombian pesos to U.S dollars using the exchange rate on December 31, 2018.

The decrease in the effective tax rate from 2016 to 2017 was mainly due to: (i) the better financial performance of the exploration and production segment, (ii) the reduction of losses at Reficar and Ecopetrol America Inc, which also resulted in lower tax rates and (iii) the reduction of the wealth tax rate from 1% in 2016 to 0.4% in 2017.

See Note 10 to our consolidated financial statements for more details.

#### 4.5.1.7 Net Income (Loss) Attributable to Owners of Ecopetrol

As a result of the foregoing, in 2018, net income attributable to owners of Ecopetrol was COP\$11,381,386, in 2017, net income attributable to owners of Ecopetrol was COP\$7,178,539 million whereas and, in 2016, net income attributable to owners of Ecopetrol was COP\$2,447,881 million.

#### 4.5.1.8 Segment Performance and Analysis

In this section, including the tables below, we present our financial information by segment: Exploration and Production, Refining and Petrochemicals and Transportation and Logistics. See the section Business Overview for a description of each segment.

The following tables present our revenues and net income by business segment for the years ended December 31, 2018, 2017 and 2016:

**Table 47 – Revenues by Business Segment**

	Year ended December 31,			% Change	
	2018	2017	2016	2018/2017	2017/2016
	(Colombian Pesos in millions)				
<b>Exploration and Production</b>	<b>50,372,764</b>	<b>36,494,934</b>	<b>28,221,210</b>	<b>38.0</b>	<b>29.3</b>
<b>Third parties</b>	<b>30,112,900</b>	<b>25,004,320</b>	<b>20,527,332</b>	<b>20.4</b>	<b>21.8</b>
Local crude oil	550,479	909,871	553,666	(39.5)	64.3
Foreign crude oil	26,898,737	21,426,666	17,278,579	25.5	24.0
Natural gas local	1,885,846	1,815,754	1,988,336	3.9	(8.7)
Foreign natural gas	27,899	32,303	58,809	(13.6)	(45.1)
Other income	749,939	819,726	647,942	(8.5)	26.5
<b>Inter-segment net operating revenues</b>	<b>20,259,864</b>	<b>11,490,614</b>	<b>7,693,878</b>	<b>76.3</b>	<b>49.3</b>
<b>Refining and Petrochemicals</b>	<b>37,011,373</b>	<b>28,644,016</b>	<b>24,823,714</b>	<b>29.2</b>	<b>15.4</b>
<b>Third parties</b>	<b>34,947,948</b>	<b>27,343,359</b>	<b>24,194,024</b>	<b>27.8</b>	<b>13.0</b>
Local refined products	26,354,549	21,187,091	17,771,166	24.4	19.2
Foreign refined products	8,485,932	6,005,556	6,330,648	41.3	(5.1)
Foreign crude oil	-	52,397	-	(100.0)	-
Other income	107,467	98,315	92,210	9.3	6.6
<b>Inter-segment net operating revenues</b>	<b>2,063,425</b>	<b>1,300,657</b>	<b>629,690</b>	<b>58.6</b>	<b>106.6</b>
<b>Transportation and Logistics</b>	<b>11,354,167</b>	<b>10,598,064</b>	<b>10,648,776</b>	<b>7.1</b>	<b>(0.5)</b>
<b>Third parties</b>	<b>3,543,024</b>	<b>3,606,549</b>	<b>3,764,205</b>	<b>(1.8)</b>	<b>(4.2)</b>
<b>Inter-segment net operating revenues</b>	<b>7,811,143</b>	<b>6,991,515</b>	<b>6,884,571</b>	<b>11.7</b>	<b>1.6</b>
<b>Eliminations of consolidations</b>	<b>(30,134,432)</b>	<b>(19,782,786)</b>	<b>(15,208,139)</b>	<b>52.3</b>	<b>30.1</b>
<b>Total revenues</b>	<b>68,603,872</b>	<b>55,954,228</b>	<b>48,485,561</b>	<b>22.6</b>	<b>15.4</b>

Total revenues by segment include exports and local sales to third-parties and inter-segment sales. See the section Financial Review—Operating Results—Consolidated Results of Operations—Total Revenues for prices and volumes to third parties.

Table 48 – Operating and Net Income by Business Segment

	Year ended December 31,			% change	
	2018	2017	2016	2018/2017	2017/2016
	(Colombian Pesos in millions)				
<b>Exploration and Production</b>					
Operating Income	15,899,337	8,061,484	2,912,307	97	177
Net income attributable to owners	9,930,519	3,820,501	1,322,370	160	189
<b>Refining and Petrochemicals</b>					
Operating Income	(757,793)	1,362,934	(595,712)	(156)	(329)
Net income attributable to owners	(1,973,075)	358,859	(1,823,020)	(650)	(120)
<b>Transportation and Logistics</b>					
Operating Income	7,317,513	6,748,047	6,589,251	8	2
Net income attributable to owners	3,424,234	2,999,978	2,960,449	14	1
<b>Eliminations in consolidation</b>					
Operating Income	(643)	(610)	(1,298)	5	(53)
Net income attributable to owners	(292)	(799)	(11,918)	(63)	(93)
<b>Ecopetrol consolidated</b>					
Operating Income	22,458,414	16,171,855	8,904,548	39	82
Net income attributable to owners	11,381,386	7,178,539	2,447,881	59	193

#### 4.5.1.9 Exploration and Production Segment Results

In 2018, exploration and production segment sales were COP\$50,372,764 million, compared to COP\$36,494,934 million in 2017. In 2018, our segment sales increased by 38.0% as compared with 2017 mainly as a result of:

- Increased sales of crude oil to third parties, which increased by 20.4% in 2018 as compared to 2017 primarily due to: (i) an increase in the price of our crude oil basket of US\$15.4 per barrel, (ii) the depreciation of the Colombian Peso against the U.S. dollar, resulting in an increase in sales revenue recorded in U.S. dollars, (iii) an increase of 1.0 mmbbl in sales of natural gas mainly due to greater demand and management of incremental sales. This increase was partially offset by the decrease in local and exports sales of crude oil (12.1 mmbbls) mainly due to an increase in the use of local crude by Reficar and Barrancabermeja for their operations.
- Increased inter-segment revenues, which increased by 76.3% in 2018 as compared to 2017 mainly due to: i) higher production volumes as a result of drilling campaigns, emphasized deliveries of crude oil in order to supply Reficar and Barrancabermeja in order to replace imported crudes and ii) an increase in the price of our crude oil basket due to the better performance of the Brent crude benchmark prices.

In 2017, exploration and production segment sales were COP\$36,494,934 million, compared to COP\$28,221,210 million in 2016. In 2017, our segment sales increased by 29.3% as compared with 2016 mainly as a result of:

- Increased sales of crude oil to third parties, which increased by 21.8% in 2017 as compared to 2016 primarily due to: (i) an increase in the price of our crude oil basket of US\$12.1 per barrel, (ii) an increase in local sales of crude oil (1.3 mmbbls) mainly due to sales of crude oil as a result of the Bicentenario alternative transport system which mitigated the effect of the attacks on the Caño Limon-Coveñas Oil pipeline. This increase was partially offset by: (i) a decrease of 7.7 mmbbls in crude oil exports due to an increase in the use of local crude oil by Reficar for its operations, (ii) the appreciation of the Colombian Peso against the U.S. dollar resulting in a decrease in sales revenue recorded in U.S. dollars and (iii) a decrease of 0.9 mmbbl in sales of natural gas mainly due to the end of the El Niño phenomenon in 2017, which reduced thermal generation by gas.

- Increased inter-segment revenues, which increased by 49.3% in 2017 as compared to 2016 mainly due to sales of crude oil in order to supply Reficar.

Cost of sales affecting our exploration and production segment are mainly related to: (i) the amortization and depletion of our production assets, (ii) contracted services and (iii) costs related to maintenance, operational services, electric power, projects and labor in the exploration and production segment. In addition, this segment's costs are impacted by the purchases of crude oil from ANH and third parties, naphtha for dilution and transportation services.

In 2018, the cost of sales for this segment increased by 22.5% as compared with 2017, due to the net effect of:

- Fixed costs increasing by 10.1%, or COP\$815,784 million, in 2018 as compared to 2017, mainly due to (i) an increase in contracted services mainly due to the reactivation of the activity at the CPO 09 block, an environmental audit contract primarily at the Rubiales and Cira-Teca fields, as well as water treatment expenses at the Magdalena Medio and Meta fields, (ii) an increase in maintenance and operating materials due to greater well preventive interventions, mainly in assets of the Central and Orinoquía Regional Vice-Presidencies, as well as an increase in maintenance in the K2 field for corrosion management, and (iii) higher labor costs due the recognition of salary increases and benefits for employees under our new collective bargaining agreement along with an increase in the number of employees.
- Variable costs increasing by 28.0%, or COP\$5,113,316 million, in 2018 as compared to 2017, as a result of (i) an increase of purchases of crude oil due to the increase in international benchmark prices, (ii) higher transportation costs due to the use of alternative oil pipelines to transport crude oil given attacks against the Caño Limón-Coveñas pipeline, (iii) an increase in operating activity costs such as electricity, process materials and services contracted associated with higher production. This increase was partially offset by lower depreciation and amortization mainly due of an increase in hydrocarbon proved developed reserves in 2018 as compared to 2017, which led to a decrease in depreciation expenses.

In 2017, the cost of sales for this segment increased by 14.5% as compared with 2016, due to the net effect of:

- Fixed costs increasing by 16.1%, or COP\$1,115,851 million, in 2017 as compared to 2016, mainly due to (i) an increase in contracted services, maintenance and operating materials, which included preventative surface maintenance activities at our production facilities and well services as a strategy to mitigate natural decline rates and (ii) an increase in the costs of hydrocarbon transportation services as a result of paying for alternative routes to bypass the attacks on the Caño Limon-Coveñas oil pipeline. This increase was partially offset by a decrease in contracted services as a result of the full return of the Recetor field to Ecopetrol on May 30, 2017 and our full operation of the Rubiales field for the entire year.
- Variable costs increasing by 13.9%, or COP\$2,221,585 million, in 2017 as compared to 2016, as a result of (i) an increase of purchases of crude oil due to the increase in international benchmark prices, (ii) higher depreciation, mainly as a result of the beginning of operations of the Gunflint field by Ecopetrol America Inc. in August 2016, (iii) a decrease in hydrocarbon proved developed reserves in 2016 as compared to 2015 which led to an increase in depreciation expenses, and (iv) higher transportation costs due to the use of alternate pipelines in order to transport the crude oil despite the attacks on the Caño Limon-Coveñas oil pipeline. This increase was partially offset by: (i) lower imports of fuels, especially diesel and gasoline, due to the replacement of imports with products produced by Reficar, lower diluent consumption, due to the strategy of marketing high-viscosity crudes and co-dilution with LPG use of products by Reficar rather than the use of imported products, and (ii) the positive effect of the appreciation of the Colombian peso against the U.S. dollar on our purchases in U.S. dollar.

In 2018, operating expenses before impairment of non-current assets increased by 30.9% as compared to 2017, primarily as a result of (i) the bargain purchase in our acquisition of an additional stake in the K2 field in 2017, (ii) the sale of the following fields in 2017: Sogamoso, Río Zulia, Río de Oro and Puerto Barco, Santana, Nancy Maxine Burdine and Valdivia Almagro, (iii) the recognition of exploratory activity at Ecopetrol America Inc.'s León 1 and 2 wells and Hocol's Bonifacio, Hurón and Payero wells in 2018, (iv) an increase in operation expenses related to the Lizama's well environmental incident that occurred in the first half of 2018. This increase was partially offset by (i) the elimination of the wealth tax since 2018 and (ii) a decrease in exploratory activity at the Kronos-1, Parmer-1, Warrior 2, Lunera-1, Brama-1, Molusco-1, Godric, Dumbo and Pollera wells recognized in 2017.

In 2017, operating expenses before impairment of non-current assets increased by 7.8% in 2017 as compared to 2016, primarily as a result of (i) higher expenses related to our exploratory activity as we engaged in more seismic activity and recorded expenses related to exploratory activity at the Kronos-1, Parmer-1, Warrior 2, Lunera-1, Brama-1, Molusco-1, Godric, Dumbo and Pollera wells, (ii) the termination in 2016 of the deferred income amortization we had been recognizing since 2007 for the advance payment by the Ministry of Finance and Public Credit of the obligations under Ecogas, in relation to the Built, Operate and Transfer contracts (BOMT's) for the construction, operation, maintenance and transfer of gas pipelines. This increase was partially offset by (i) increased income due to the acquisition of an additional 11.6% interest at the K2 field in the Gulf of Mexico which generated a gain due to the increase in the book value of the asset above the value paid for the additional interest and (ii) the reduction of the wealth tax rate from 1% in 2016 to 0.4% in 2017.

The net reversal of impairment of non-current assets recognized in the exploration and production segment in 2018, which totaled COP\$785,940 million in 2018 as compared to COP\$183,718 million in 2017, increased by 327.8 % as compared to 2017 mainly due to due to the incorporation of new reserves, improved short-term hydrocarbon price outlook and improvements in technical operational capacity.

The net reversal of impairment of non-current assets recognized in the exploration and production segment in 2017 totaled COP\$183,718 million as compared to an impairment loss of COP\$196,448 million in 2016. The net reversal of the impairment was primarily due to the increased value of offshore oil fields, partially offset by an impairment of onshore fields, both as a result of calculating their valuation taking into account market variables, reserves, price spreads as compared to the ICE Brent price, and available technical and operational information.

The segment recorded net income attributable to owners of Ecopetrol of COP\$9,930,519 million in 2018 as compared to net income attributable to owners of Ecopetrol of COP\$3,820,501 million in 2017 and net income attributable to owners of Ecopetrol of COP\$1,322,370 million in 2016.

#### *Lifting and Production Costs*

The aggregate average production cost, on a Colombian Peso basis, has increased to COP\$27,782 per boe during 2018 from COP\$23,684 per boe during 2017. On a dollar basis, our aggregate average production cost increased to US\$9.40 per boe in 2018 from US\$8.02 per boe in 2017, due to a 0.18% depreciation of the average exchange rate of the Colombian Peso against the U.S. dollar in 2018.

The aggregate average lifting cost, on a Colombian Peso basis, increased to COP\$25,614 per boe during 2018 from COP\$22,585 during 2017. On a dollar basis, it increased to US\$8.66 per boe in 2018 from US\$7.65 per boe in 2017 also due partially to the 0.18% depreciation of the average exchange rate of the Colombian Peso against the U.S. dollar in 2018.

The abovementioned increases were primarily due to:

- An increase in energy costs, primarily due to higher prices in liquid fuels purchased for electric generation in our fields (diesel, fuel oil no. 4 and reduced crude) and an increase in unregulated tariffs.
- An increase in costs due to subsoil maintenance, primarily due to an increase in the number and complexity of well interventions and services, mainly to support and improve our basic production curve.
- An increase in costs of services due to a 2% increase in crude volumes and an 8% increase in water production in fields of direct and associated operation.
- Higher water volumes which augmented energy consumption and fluid treatment utilized for injection techniques, disposal and recovery projects.

- An increase in others operational costs as per field support and logistics services.

The difference between the aggregate average lifting cost and aggregate average production cost is that lifting cost does not include the costs related to hydrocarbon self-consumption required in the production process or the deliveries we make to our refineries and natural gas liquid plants.

The following table sets forth crude oil and natural gas average sales prices, the aggregate average lifting costs and aggregate average unit production cost for the years ended December 31, 2018, 2017 and 2016.

**Table 49 – Crude Oil and Natural Gas Average Prices and Costs**

	2018	2017	2016
Crude Oil Average Sales Price (U.S. dollars per barrel) <sup>(1)</sup>	63.2	47.8	35.7
Crude Oil Average Sales Price (COP\$ per barrel) <sup>(1)</sup>	187,845	141,175	108,337
Natural Gas Average Sales Price (U.S. dollars per barrel equivalent)	22.4	22.7	23.5
Natural Gas Average Sales Price (COP\$ per barrel equivalent)	66,922	66,919	71,893
Aggregate Average Unit Production Costs (U.S. dollars per boe) <sup>(2)</sup>	9.40	8.02	6.88
Aggregate Average Unit Production Cost (COP\$ per boe) <sup>(2)</sup>	27,782	23,684	20,993
Aggregate Average Lifting Costs (U.S. dollars per boe) <sup>(3)(4)(5)</sup>	8.66	7.65	6.49
Aggregate Average Lifting Costs (COP\$ per boe) <sup>(3)(4)(5)</sup>	25,614	22,585	19,799

(1) Corresponds to our average sales price on a consolidated basis.

(2) Unit production costs correspond to consolidated average costs on total production volumes net of royalties. Production costs do not include costs related to transport, commercialization and administrative expenses.

(3) Lifting costs per barrel are calculated based on total production (excluding production tests and discovered undeveloped fields), which are net of royalties, and correspond to our lifting costs on a consolidated basis.

(4) The cost indicator is calculated by using the cost of production (does not include costs related to hydrocarbons consumption by Ecopetrol in the production process, such as by our refineries and natural gas liquid plants) and dividing by the net produced volume (excluding royalties) as the denominator.

(5) As a result of the evaluation of control over companies under IFRS, Ecopetrol does not consolidate Savia Perú and Equion.

#### **4.5.1.10 Transportation and Logistics Segment Results**

In 2018, our transportation and logistics segment sales were COP\$11,354,167 million compared to COP\$10,598,064 million in 2017. The 7.1% increase in 2018 as compared with 2017 was mainly due to (i) higher volumes of crude oil transported by our pipelines which was primarily due to reversal cycles through the Bicentenario pipeline, the startup of the San Fernando-Apiay System and the expansion of the P135 Project, (ii) an increase in the volume of refined products transported mainly due to the increase in production at Barrancabermeja and Reficar, (iii) the positive effect on our U.S. dollar-indexed transportation fees resulting from the depreciation of the Colombian peso against the U.S. dollar. This increase was partially offset by a decrease in revenue due to the resolution of the disagreement regarding the P135 Project tariffs, leading to lower tariffs.

In 2017, our transportation and logistics segment sales were COP\$10,598,064 million compared to COP\$10,648,776 million in 2016. The 0.5% decrease in 2017 as compared with 2016 was mainly due to (i) a 5% decrease in the volume of crude oil transported by our pipelines, which was primarily due to the production decrease at the national level and (ii) the negative effect on our U.S. dollar-indexed transportation fees resulting from the appreciation of the Colombian Peso against the U.S. dollar. This decrease was almost offset by a 1.9% increase in the volume of refined products transported primarily due to the increase in demand for refined products in Colombia and the elimination of restrictions in the Pozos Colorados - Galán system. Sales to third parties decreased in 2017 as compared to 2016 primarily due to the fact that the segment received income from the transportation services to Frontera Energy for its participation in the Rubiales field, and once the field returned to us in July 2016, these services were recognized as inter-segment sales.



The cost of sales for our transportation and logistics segment is mainly related to: (i) project costs associated with the maintenance of transportation networks and (ii) operating costs related to these systems, including the costs of labor, energy, fuels and lubricants and others.

The cost of sales amounted to COP\$3,402,087 million in 2018 as compared to COP\$3,271,835 million in 2017. The cost of sales for this segment increased by 4.0% in 2018 as compared with 2017 mainly due to (i) an increase in costs associated with higher volumes transported, primarily due to the reasons described above and (ii) increased consumption of materials, supplies and depreciation resulting from the start of the San Fernando – Apiay system at Cenit since January 2018 and the expansion of the P135 Project since July 2017.

The cost of sales amounted to COP\$3,271,835 million in 2017 as compared to COP\$3,349,791 million in 2016. The cost of sales for this segment decreased by 2.3% in 2017 as compared with 2016 mainly due to a decrease in costs associated with maintenance, operating supplies and materials due to the continuity of our efficiency program to optimize our operating costs. This decrease was partially offset by (i) an increase in material processing costs needed for power generation in three new pumping stations to operate Ocesa's P135 project and (ii) an increase in depreciation resulting from the start of P135.

In 2018, operating expenses before the impairment of non-current assets decreased by 27.1% as compared to 2017 due to: (i) a reversal of a provision we had set aside in respect of tariff dispute we were having in connection with the P135 Project and (ii) the elimination of wealth tax since 2018. This decrease was partially offset by higher expenses associated with attacks on our infrastructure by third parties.

In 2017, operating expenses before the impairment of non-current assets decreased by 15.1% as compared to 2016 due to lower administrative expenses mainly as a result of the consolidation of administration areas within the segment and a decrease in taxes because of the reduction of the wealth tax rate discussed previously.

The impairment losses of non-current assets recognized in the segment in 2018, totaled COP\$169,870 million in 2018 as compared to an impairment recovery of COP\$59,455 million in 2017. The difference in impairment from a reversal in 2017 to a loss in 2018 was primarily the result of a decrease in the forecast of the volume to be transported by the southern cash generating unit and an increase in investment needs to mitigate the operative risk of our transportation systems.

The impairment recovery of non-current assets recognized in the segment in 2017, totaled COP\$59,455 million in 2017 as compared to an impairment recovery of COP\$41,062 million in 2016. The increase in the impairment recovery was due to the inclusion, in the assessment of the recovery amount of this segment's assets, of flows associated with the Port of Tumaco that positively affects the recoverable amount of the southern cash generating unit (See Note 16.3 to our consolidated financial statements for more detail).

The segment recorded net income attributable to owners of Ecopetrol of COP\$3,424,234 million in 2018 as compared to net income of COP\$2,999,978 million in 2017 and COP\$2,960,449 million in 2016.

#### **4.5.1.11 Refining and Petrochemicals Segment Results**

In 2018, the refining and petrochemical segment sales were COP\$37,011,373 million compared to COP\$28,644,016 million in 2017. In 2018, sales of refined products and petrochemicals increased by 29.2% as compared with 2017, mainly due to: (i) an increase of our average products basket price due to the increase in international prices and (ii) increased sales volumes, primarily of medium distillates, and gasoline in Colombia and international markets, due to higher refining throughput and positive operating performance at our refineries.

In 2017, the refining and petrochemical segment sales were COP\$28,644,016 million compared to COP\$24,823,714 million in 2016. In 2017, sales of refined products and petrochemicals increased by 15.4% as compared with 2016, mainly due to an increase of our average products basket price due to the increase in the international prices. This increase was partially offset by (i) a decrease in exports of fuel oil primarily due to reduced production at the Barrancabermeja refinery as a result of reliance on more efficient alternative sources and stabilization of the coker unit at the Cartagena Refinery and (ii) a decrease in exports of diesel due to our commercial strategy of focusing on selling to the domestic market due to better commercial conditions, replacing lace imports of such products.

The cost of sales for our refined products and petrochemicals segment is mainly related to the purchase of crude oil and natural gas for our refineries, imported crude oil and products to supply local demand, feedstock transportation services, services contracted for maintenance of the refineries and the amortization and depreciation of refining assets. Cost of sales amounted COP\$35,658,753 million in 2018, compared to COP\$26,855,395 million in 2017 and COP\$22,843,987 million in 2016.

In 2018, the cost of sales for this segment increased 32.8% as compared with 2017, principally due to (i) an increase in purchases of crude oil at higher international benchmark prices, (ii) higher volumes purchase of crude oil for use by our refineries due to higher throughput, (iii) an increase in cost of transportation associated with higher production in our refineries. This increase was partially offset by: (i) lower imports of products primarily medium distillates and gasolines as a result of higher production at Barrancabermeja Reficar and (ii) lower imports of light crude used at the Cartagena Refinery as a result of the substitution of such crude, which resulted in a more cost-effective crude slate for the Cartagena Refinery.

In 2017, the cost of sales for this segment increased 18% as compared with 2016, principally due to (i) an increase in purchases of crude oil at increased international benchmark prices and (ii) higher volumes of imports of crude oil and inter-segment purchases of crude oil for the Cartagena Refinery. This increase was partially offset by lower imports of other fuels, especially diesel and gasoline, due to the use of products produced by the Cartagena Refinery rather than imported products.

In 2018, operating expenses before the impairment of non-current assets decreased by 24.6% as compared to 2017, due to stabilization expenses of the Cartagena Refinery which was reflected in lower maintenance expenses, contracted services and general expenses.

In 2017, operating expenses before the impairment of non-current assets decreased by 17.2% as compared to 2016, due to a decrease of stabilization expenses of the Cartagena Refinery and a decrease in taxes because of the reduction of the wealth tax rate.

The impairment losses of non-current assets recognized in the segment in 2018, which totaled COP\$984,704 million in 2018, as compared to a net reversal of impairment of COP\$1,067,965 million in 2017, is primarily the result of: (i) adjustments in market expectations with respect to the impact of implementation of IMO regulation on projected margins for the Cartagena Refinery's refined products, (ii) a decrease in the short-term outlook for the ethanol prices given a global over-supply of ethanol, (iii) downward updates to Bioenergy's near-term agricultural outputs and (iv) an increase in the discount rate used for Reficar and Bioenergy, reflecting updated macroeconomic conditions. These negative impacts were partially offset by the commencement of the stabilization period at both Reficar and Bioenergy as well as tax benefits associated with Law 1942, 2018.

The net reversal of impairment of non-current assets recognized in the segment in 2017, which totaled COP\$1,067,965 million in 2017 as compared to an impairment loss of COP\$773,361 million in 2016, decreased as compared to 2016 as a result of (i) a net reversal of the impairment of Reficar as a result of an improved outlook in refining margins due to the anticipated effects of the ratification of Marpol which goes into effect in 2020, (ii) a lower discount rate resulting from the application of WACC methodology and (iii) operational and financial optimization due to the stabilization of the refinery. This reversal was partially offset by Bioenergy's impairment related to the change of the project start date, the process of stabilization of the industrial plant, the updating of operational variables and the financial expenses of the Barrancabermeja refinery's modernization project, which is currently postponed.

As mentioned earlier, the refining segment is highly sensitive to changes in product prices and feedstock in the international market, discount rate, refining margins, changes in environmental regulations and cost structure and the level of capital expenditures.

The refining and petrochemicals segment recorded net loss attributable to owners of Ecopetrol of COP\$1,973,075 million in 2018, as compared to a net income to owners of Ecopetrol of COP\$358,859 million in 2017, and a net loss attributable to owners of Ecopetrol of COP\$1,823,020 million in 2016.

#### 4.6 Liquidity and Capital Resources

Our principal source of liquidity in 2018 was cash flows from our operations amounting to COP\$22,469,194 million.

Our main uses of cash in 2018 were (i) COP\$11,363,077 in debt payments through the pre-payment of local and foreign currency-denominated loans totaling the equivalent of US\$2,446 million in 2018 and amortizations to capital and interest payments, (ii) COP\$8,460,426 million in capital expenditures, which included investments in property, plant and equipment, natural and environmental resources and intangibles, (iii) dividend payments amounting to COP\$4,427,701 million, which includes dividends relating to fiscal year 2017 for COP\$3,659,373 million and the payment of dividends to non-controlling interest for COP\$768,328 million.

For more information regarding our debt, see the section Financial Review—Financial Indebtedness and Other Contractual Obligations.

##### 4.6.1 Review of Cash Flows

###### ***Cash from operating activities***

Net cash provided by operating activities increased by 32.4% in 2018 as compared to 2017, mainly as a result of a 31.9% increase in our operational income before depreciation, depletion and amortization (DD&A) and impairment of non-current assets primarily due to (i) higher hydrocarbon production levels, (ii) an increase in our refining throughput, (iii) our continued strategy of replacing imports of crude oil and refined products with domestic production, (iv) the commencement of operations of the San Fernando – Apiay project and expansion of the P135 Project in our the midstream segment, (v) cost efficiencies from our transformation plan and (vi) a favorable price environment. This increase was partially offset by higher working capital needs mainly due to an increase in accounts receivable from the FEPC and the payment in advance of the capital gains tax due in 2019 pursuant to Decree 2146, 2018.

Net cash provided by operating activities increased by 19.3% in 2017 as compared to 2016, mainly as a result of (i) a 32.7% increase in our operational income before depreciation, depletion and amortization (DD&A) and impairment of non-current assets and efficiency gains and cost-savings generated by our corporate strategy. This increase was partially offset by (i) higher working capital needs mainly due to increase in accounts receivable from the FEPC and commercial receivable accounts and (ii) an increase in our costs due to the effect of recovery in international crude oil prices on our purchases and an increase in maintenance activities, contracted services and operating supply needs associated with an increase in our operational activities.

###### ***Cash used in investing activities***

In 2018, net cash used in investing activities increased by 98.9% as compared to 2017, mainly as a result of: (i) a 38.5% increase in investments in capital expenditures, which was driven mainly by drilling in the Castilla and La Cira Infantas fields and the B3 module of the Rubiales field and (ii) a 249.4% increase in our investment portfolio as a result of excess liquidity.

In 2017, net cash used in investing activities decreased by 53.3% as compared to 2016, mainly as a result of a 110.4% decrease in our investment portfolios as a result of pre-payments of foreign currency-denominated loans totaling US\$2,400 million in 2017. This decrease was partially offset by (i) cash proceeds from the sale of our shares in Empresa de Energía de Bogotá, which totaled COP\$56,930 million in the aggregate and (ii) a 4.6% increase in investments in capital expenditures, which was driven mainly by the reactivation of activity in our Castilla and Rubiales fields, the development of improved recovery projects in fields such as La Cira and Chichimene, and an increase in exploration activities.

###### ***Cash used in financing activities***

Net cash used in financing activities increased by 23.7% in 2018, as compared to 2017, due to (i) prepayments of local and foreign currency-denominated loans totaling the equivalent of US\$2,446 million as compared to US\$2,400 million in prepayments of foreign currency-denominated loans made in 2017 and (ii) an increase in dividend payments to the shareholders of Ecopetrol of COP\$2,713,712 million and in dividend payments made by certain of our subsidiaries to their non-controlling shareholders of COP\$209,342 million.

Net cash used in financing activities increased by 362% in 2017, as compared to 2016, due to (i) prepayments of foreign currency-denominated loans totaling US\$2,400 million and (ii) an increase in dividend payments to the shareholders of Ecopetrol of COP\$255,484 million in 2017 as compared to 2016, which was partially offset by a COP\$463,135 million decrease in dividend payments made by certain of our subsidiaries to their non-controlling shareholders.

#### **4.6.2 Capital Expenditures**

Our consolidated capital expenditures in 2018, 2017 and 2016 were COP\$8,460,426 million, COP\$6,107,506 million and COP\$5,837,477 million, respectively. These investments were distributed by business segment on average, for the past three years as follows: 73.0% for the exploration and production segment, 12.5% for refining and petrochemicals and 14.5% for the transportation and logistics segment. See Note 31.3 to our consolidated financial statements for more detail about capital expenditures by segment.

Our investment plan approved for 2019 is a range of between US\$3,500 million and US\$4,000 million. The investments will be distributed approximately as follows: 81.0% for exploration and production, 11.0% for refining, petrochemicals, and transportation and logistics, and 8.0% for other investments.

The resources required for the investment plan can be funded through internal cash generation with no need to raise additional net financing.

#### **4.6.3 Dividends**

In 2018, we paid dividends for the fiscal year ended December 31, 2017 amounting to COP\$3,659,373 million to Ecopetrol's shareholders, including the Nation, and dividends paid to non-controlling shareholders of our subsidiaries totaling COP\$768,328 million.

In 2017, we paid dividends for the fiscal year ended December 31, 2016 amounting to COP\$945,661 million to Ecopetrol's shareholders, including the Nation, and dividends paid to non-controlling shareholders of our subsidiaries totaling COP\$558,986 million.

In 2016, we paid the last installment of dividends relating to 2014 net income to the Nation for COP\$690,177 million and our transportation and logistics subsidiaries paid dividends to their non-controlling shareholders for COP\$1,022,121 million.

On March 29, 2019, our shareholders at the ordinary General Shareholders Assembly approved a distribution of dividends for the fiscal year ended December 31, 2018 amounting to COP\$9,251,256 million, or COP\$225 per share, based on the number of outstanding shares as of December 31, 2018. Of the total dividends that will be paid, COP\$169 per share corresponds to an ordinary dividend pursuant to our current dividend policy and COP\$56 per share corresponds to an extraordinary dividend given the strong operational results and robust cash position of the Company in 2018. The dividend payment was approved to be made in one installment for the minority shareholders of Ecopetrol on April 25, 2019 and three installments for the Nation, the first to be paid on April 25, 2019, the second to be paid on June 25, 2019 and the final installment to be paid on September 25, 2019.

#### **4.7 Summary of Differences between Internal Reporting (Colombian IFRS and IFRS)**

We prepare our interim and annual statutory financial information in accordance with our internal reporting policies, which follow Colombian IFRS and differ in certain significant aspects from IFRS. The following table sets forth our consolidated net income and equity for years ended December 31, 2018, 2017 and 2016, in accordance with Colombian IFRS and IFRS:

**Table 50 – Consolidated Net Income and Equity**

	For the year ended December 31,			% Change	
	2018	2017	2016	2018/2017	2017/2016
	(Colombian Pesos in millions)				
<b>Net income attributable to owners of Ecopetrol (IFRS)</b>	<b>11,381,386</b>	<b>7,178,539</b>	<b>2,447,881</b>	58.5	193.3
Cash flow hedge for future company exports	(471,314)	(366,048)	(494,604)	28.8	(26.0)
Exchange rate effects on tax bases – Deferred tax	646,333	(192,079)	(388,568)	(436.5)	(50.6)
<b>Net income Attributable to owners of Ecopetrol (Colombian IFRS)</b>	<b>11,556,405</b>	<b>6,620,412</b>	<b>1,564,709</b>	<b>74.6</b>	<b>323.1</b>
<b>Net Equity (IFRS)</b>	<b>57,107,780</b>	<b>48,215,699</b>	<b>43,560,501</b>	<b>18.4</b>	<b>10.7</b>
Cash flow hedge for future company exports	(20,792)	(29,258)	(39,803)	(28.9)	(26.5)
Exchange rate effects on tax bases – Deferred tax	2,217,450	1,594,864	1,799,020	39.0	(11.3)
<b>Net Equity (Colombian IFRS)</b>	<b>59,304,438</b>	<b>49,781,305</b>	<b>45,319,718</b>	<b>19.1</b>	<b>9.8</b>

As noted above, certain differences exist between our net income and equity as determined in accordance with our internal reporting policies, which follow Colombian IFRS, which are used for management reporting purposes, as presented in the business segment information, and our net income and equity as determined under IFRS, as presented in our consolidated financial statements.

The primary differences between Colombian IFRS and IFRS as they apply to our results of operations are summarized below:

**Cash flow hedge for future company exports.** In September 2015, in order to hedge the effect of exchange rate volatility on Ecopetrol’s foreign currency debt, Ecopetrol’s Board of Directors approved a cash flow hedge for future crude oil exports. According to IAS 39 – Financial Instruments, Ecopetrol implemented this hedge beginning on October 1, 2015, the date on which it formally completed the related hedging documentation.

Under Colombian IFRS, the General Accounting Office of the Nation (CGN for its acronym in Spanish) issued Resolution 509, which allows companies to apply hedge accounting for non-derivative financial instruments from any date within the transition period or the first period of application of International Accounting Standards in Colombia, even if such company has not yet formally documented the hedging relationship, the objective or the risk management strategy. Under these rules, Ecopetrol applied cash flow hedge accounting from January 1, 2015 in its financial statements under Colombian IFRS.

As a result of this accounting policy difference, for the year ended December 31, 2018, our net income as reported under IFRS was COP\$471,314 million higher than our net income as reported under Colombian IFRS.

**Exchange rate effects on tax bases – Deferred tax.** According to IAS 12.41, companies with a U.S. dollar functional currency and profit or tax loss in Colombian Pesos are required to recognize deferred taxes attributable to the difference between the carrying amounts of non-monetary assets in their financial statements and their respective tax bases converted from Colombian Pesos to U.S. dollars using the exchange rate on the closing date. The effect of the temporary difference is charged to profit and losses without a cash outflow expected in the future. Under local accounting principles (The General Accounting Office opinion No. 20162000000781 dated January 18, 2016), the result attributable to the aforementioned difference in accounting policies does not generate any deferred taxes.

Ecopetrol's functional currency is the Colombian Peso and it consolidates some subsidiaries whose functional currency is the U.S. dollar but who settled their taxes in Colombian Pesos. As a result of the application of paragraph 41 – IAS 12, such subsidiaries are required to calculate deferred taxes under IFRS.

As a result of this accounting policy difference, for the year ended December 31, 2018, our net income attributable to owners of Ecopetrol as reported under IFRS was COP\$646,333 million lower than our net income attributable to owners of Ecopetrol as reported under Colombian IFRS.

The application of IAS12.41 also generated adjustments to our goodwill and investments in companies impairments of COP\$22,030 million in 2018, COP\$61,893 million in 2017 and COP\$86,781 million in 2016 in connection with our purchase of subsidiaries whose functional currency is the U.S. dollar as well as adjustments to our revenue from the equity method of COP\$11,316 million in 2018, COP\$60,748 million in 2017 and COP\$71,056 million in 2016 in connection with our associates and joint ventures whose functional currency is the U.S. dollar.

As a result of these accounting policy differences described above, for the year ended December 31, 2018, we reported net income attributable to the owners of Ecopetrol under IFRS of COP\$11,381,386 million as opposed to a net income attributable to the owners of Ecopetrol of COP\$11,556,405 million reported under Colombian IFRS for the same period. For the year ended December 31, 2017, these same accounting differences led us to report net income attributable to the owners of Ecopetrol under IFRS of COP\$7,148,539 million as opposed to a net income attributable to the owners of Ecopetrol of COP\$6,620,412 million reported under Colombian IFRS for the same period. For the year ended December 31, 2016, these same accounting differences led us to report net income attributable to the owners of Ecopetrol under IFRS of COP\$2,447,881 million as opposed to a net income attributable to the owners of Ecopetrol of COP\$1,564,709 million reported under Colombian IFRS for the same period.

#### 4.8 Financial Indebtedness and Other Contractual Obligations

As of December 31, 2018, we had outstanding consolidated indebtedness of COP\$33.2 trillion, which corresponded primarily to the following long-term transactions:

**Table 51 – Consolidated Financial Indebtedness**

Company	Type	Initial Date	Original Amount	Maturity	Interest Rate	Amortization
Ecopetrol S.A.	Bonds	September 18, 2013	US\$1,300 million	September 18, 2023	5.875%	Bullet
		September 18, 2013	US\$850 million	September 18, 2043	7.375%	Bullet
		May 28, 2014	US\$2,000 million	May 28, 2045	5.875%	Bullet
		September 16, 2014	US\$1,200 million	January 16, 2025	4.125%	Bullet
		June 26, 2015	US\$1,500 million	June 26, 2026	5.375%	Bullet
		June 15, 2016*	US\$500 million	September 18, 2023	5.875%	Bullet
		December 1, 2010	COP\$479,900 million	December 1, 2020	Floating	Bullet
		December 1, 2010	COP\$284,300 million	December 1, 2040	Floating	Bullet
		August 27, 2013	COP\$168,600 million	August 27, 2023	Floating	Bullet
		August 27, 2013	COP\$347,500 million	August 27, 2028	Floating	Bullet
	August 27, 2013	COP\$262,950 million	August 27, 2043	Floating	Bullet	
	Bank Loans	December 30, 2011**	US\$321 million	December 20, 2025	Floating	Semi-annual
	ECAs	December 30, 2011**	US\$2,650 million	December 20, 2027	Fixed	Semi-annual
		December 30, 2011**	US\$100 million	December 20, 2027	Floating	Semi-annual
		December 30, 2011**	US\$97 million	December 20, 2027	Fixed	Semi-annual
		December 30, 2011**	US\$210 million	December 20, 2027	Floating	Semi-annual
Ocensa	Bond	May 7, 2014	US\$500 million	May 7, 2021	4.000%	Bullet
Oleoducto Bicentenario	Bank Loan	July 5, 2012	COP\$2.1 trillion	July 5, 2024	Floating	Quarterly
ODL	Bank Loan	August 1, 2013	COP\$800 billion	August 1, 2020	Floating	Quarterly

\* Reopening of bond due to 2023.

\*\* Debt originally obtained by Reficar for the Refinery modernization and voluntarily assumed by Ecopetrol.

The long term debt balance for the end of 2018 is explained as follows:

- On April 13, 2018, Ecopetrol redeemed all of its outstanding 4.250% notes due September 18, 2018 in an aggregate principal amount of US\$350 million. The notes were issued in September 2013.
- On July 6 and 25, 2018, Ecopetrol prepaid all loans entered into in 2013 with international banks and guaranteed by the US Export-Import Bank, which was originally due in 2023. The aggregate payment was in the amount of US\$155,979,564, plus accrued interest.
- On August 6, 2018, Ecopetrol prepaid the entire syndicated loan it entered into in 2013 with Colombian banks, which had been scheduled to be amortized up to 2025. The prepayment was in the total amount of COP\$1.43 trillion, plus accrued interest.
- On September 20, 2018, Ecopetrol signed a committed line with international banks for USD\$665 million as a contingent financing mechanism. This facility has a 2 year availability period for disbursements, an interest rate of 6-month LIBOR + 125 basis points and an annual fee of 30 basis points on principal not disbursed during the availability period.
- On December 27, 2018, Ecopetrol redeemed all of its outstanding 7.625% notes due July 23, 2019 in an aggregate principal amount of US\$1,500 million. The notes were issued in July 2009.

Ecopetrol did not incur any short-term or long-term bank loans or bonds in 2018.

### Contractual Obligations

We enter into various commitments and contractual obligations that may require future cash payments. The following table summarizes our contractual obligations as of December 31, 2018.

**Table 52 – Our Contractual Obligations**

COPS in millions	Payments due by period				
	Total	Less than 1 year	1 to 3 years	3 to 5 years	More than 5 years
Contractual obligations					
Employee Benefit Plan	30,269,275	1,281,826	2,657,497	2,755,849	23,574,103
Contract Service Obligations	3,951,217	1,453,298	1,609,737	412,396	475,786
Operating Lease Obligations	407,664	96,976	116,620	86,154	107,914
Natural Gas Supply Agreements	363,735	109,927	99,440	0	154,368
Purchase Obligations	1,653,507	80,698	1,525,351	8,092	39,366
Energy Supply Agreements	848,790	153,205	172,200	70,347	453,038
Capital Expenditures	556,157	397,522	130,214	28,421	0
Build, Operate, Maintain and Transfer Contracts (BOMT)	665,759	64,748	123,481	129,283	348,247
Capital (Finance) Lease Obligations	454,631	55,087	80,812	63,353	255,379
Financial Sector Debt	10,071,534	1,576,597	2,906,067	2,886,955	2,701,915
Bonds	25,986,306	64,995	3,542,961	5,388,600	16,989,750
<b>Total</b>	<b>72,228,575</b>	<b>5,334,879</b>	<b>12,964,380</b>	<b>11,829,450</b>	<b>45,099,866</b>

The table does not include the contractual obligations of Equion, Savia and Ecodiesel, which do not consolidate within the Ecopetrol's Group.

#### 4.9 Off Balance Sheet Arrangements

As of December 31, 2018, we did not have off-balance sheet arrangements of the type that is required to be disclosed under Item 5.E of Form 20-F.

#### 4.10 Trend Analysis and Sensitivity Analysis

##### Trend Analysis

Ecopetrol updated its Business Plan on February 26, 2019. See section Our Corporate Strategy—Business Plan for a discussion of the trends recognized in the development of that plan.

##### Sensitivity Analysis

##### *Sensitivity Analysis of Reserves*

The following table provides information about the sensitivity analysis conducted on our oil and gas reserves as of December 31, 2018, taking into account ICE Brent crude oil prices that reasonably reflect management's view of crude oil prices given prevailing market conditions.

**Table 53 – Sensitivity Analysis of Reserves**

	<b>Oil and NGL (million barrels)</b>	<b>Natural Gas (bcf)</b>	<b>Total Oil and Gas (Mmboe)</b>
Reserves as of December 31, 2018	1,200	3,002	1,727
Sensitivity Scenario	1,155	2,958	1,674
<b>Difference (million barrels)</b>	(45)	(44)	(53)
<b>Difference (%)</b>	(4)%	(1)%	(3)%

The conversion rate used is 5,700 cf = 1 boe.

##### **Assumptions for the Sensitivity Analysis of Reserves**

- The sensitivity of the ICE Brent price index is forecasted to average US\$67 per barrel in 2019, US\$71 per barrel in 2020, US\$69 per barrel in 2021 and between US\$67 and US\$71 onwards.
- The base scenario on which our sensitivity analysis is made corresponds to our oil, NGL and natural gas reserves, as of December 31, 2018, as presented elsewhere in this annual report.
- Other variables such as the operating costs, capital costs and portfolio price remain unchanged for purposes of the analysis.

##### *Sensitivity Analysis of our Results*

The following table provides information about the sensitivity of our results as of December 31, 2018, due to variations of US\$1 in the price of ICE Brent crude and of 1% in the COPS/US\$ exchange rate.



Table 54 – Sensitivity Analysis Results

	Income Statement 2018	Income Statement Case ICE Brent <sup>(1)</sup> + US\$1	Difference Between Real 2018 and Case ICE Brent (COPS in billions)	Income Statement Case TRM <sup>(2)</sup> - 1%	Difference Between Real 2018 and Case TRM
Revenue	68,603.87	69,602.13	998.26	69,324.68	720.81
Cost of sales	41,184.38	41,560.55	376.17	41,514.49	330.11
<b>Gross Income</b>	<b>24,419.49</b>	<b>28,041.58</b>	<b>622.09</b>	<b>27,810.19</b>	<b>390.70</b>
Operating expenses	4,592.45	4,592.45	-	4,592.45	-
Impairment of non-current assets	368.63	368.63	-	368.63	-
<b>Operating income</b>	<b>22,458.41</b>	<b>23,080.50</b>	<b>622.09</b>	<b>22,849.11</b>	<b>390.70</b>
Finance results, net	(2,010.38)	(2,010.38)	-	(2,010.38)	-
Share of profit of associates and joint ventures	165.84	165.84	-	165.84	-
<b>Income before income tax</b>	<b>20,613.87</b>	<b>21,235.96</b>	<b>622.09</b>	<b>21,004.57</b>	<b>390.70</b>
Income Tax	(8,258.49)	(8,507.71)	(249.23)	(8,415.01)	(156.52)
<b>Net Income</b>	<b>12,355.38</b>	<b>12,728.25</b>	<b>372.86</b>	<b>12,589.56</b>	<b>234.18</b>

(1) ICE Brent = US\$72 per barrel

(2) Exchange rate (TRM) = COP\$2,956/US\$1.00

**Assumptions for the Sensitivity Analysis of our Results**

- Our sensitivity analysis is based on the Consolidated Statement of Profit or Loss for 2018, as presented elsewhere in this annual report.
- The sensitivity of the ICE Brent price index is in reference to an increase of US\$1 per barrel of crude oil in the average ICE Brent reference price based on a 365-day year for 2018. Prices assumed correspond to realized prices for crude oil, natural gas and refined products for 2018, adjusted to account for the differences between such realized prices and the ICE Brent reference price.
- The sensitivity of our results to changes in the exchange rate is in reference to a 1% average depreciation of the Colombian Peso against the U.S. dollar during 2018. Prices are the realized prices of crude oil, natural gas and refined products in 2018 and are expressed for the sensitivity using the adjusted exchange rate (*i.e.* a 1% average depreciation of the Colombian Peso against the U.S. dollar during 2018).
- The income tax for each of our sensitivity analyses (price of ICE Brent and COPS/US\$ exchange rate) is estimated using the effective corporate tax rate of 40% for 2018.

The table below sets forth the line items that are being affected by the variation on the reference prices or the average exchange rate.

Table 55

VARIATION ON ICE BRENT REFERENCE PRICE	VARIATION ON AVERAGE EXCHANGE RATE REVENUE
Sales of crude oil	Sales of crude oil
Sales of refined products	Sales of refined products
Sales of natural gas	Sales of natural gas
	<b>COST OF SALES</b>
Local purchases from business partners	Local purchases from business partners
Local purchases of hydrocarbons from the ANH	Local purchases of hydrocarbons from the ANH
Local purchases of natural gas	Local purchases of natural gas
Imports of products	Imports of products

## 5. Risk Review

### 5.1 Risk Factors

The risks discussed below could have a material adverse effect, separately or in combination, on our business's operating results, cash flows, liquidity and financial condition. Investors should carefully consider these risks.

#### 5.1.1 Risks Related to Our Business

This section describes the most significant potential risks to our business.

***Our crude oil and natural gas reserve estimates involve some degree of uncertainty and may prove to be incorrect over time, which could adversely affect our ability to generate revenue.***

Reserves estimates are prepared using generally accepted geological and engineering evaluation methods and procedures. Estimates are based on geological, topographical and engineering facts. Actual reserves and production may vary materially from estimates shown in this annual report, and downward revisions in our reserve estimates could lead to lower future production which could affect our results of operations and financial condition.

Hydrocarbon reserves presented in this annual report were calculated in accordance with SEC regulations. As required by those regulations, reserves were valued based on the unweighted average of closing prices for the first day of each month in the 12-month periods ended December 31, 2018, 2017 and 2016, as well as other conditions in existence at those dates. The average of closing prices of ICE Brent crude oil for the first day of each month in the 12-month period was US\$44.49 per barrel in 2016, US\$54.93 per barrel in 2017 and US\$72.20 per barrel in 2018. In 2017, the Company recognized an increase in oil and gas proven reserves of 4% as compared to 2016, to 1,659 mmboe in 2017 from 1,598 mmboe in 2016. In 2018, the Company recognized an increase in oil and gas proven reserves of 4% as compared to 2017, to 1,727 mmboe in 2018 from 1,659 mmboe in 2017. For more information, see the section Business Overview—Exploration and Production—Reserves.

Furthermore, at least once a year, or more frequently if the circumstances require, the Company ascertains whether there are indicators of impairment to its assets or cash-generating units (CGUs) due to the difference between the carrying amount of such assets or CGUs against to their recoverable amounts, using reasonable assumptions, based on internal and external factors, which reflect market conditions. The recoverable amount is considered to be the higher of the fair value less costs of disposal and value in use, based on the free cash flow method, discounted at the weighted average capital cost (WACC). Whenever the recoverable amount of an asset or CGU is lower than its net carrying amount, such amount is reduced to its recovery amount, recognizing a loss for impairment as an expense in the consolidated statement of profit or loss. External and internal sources of information may indicate that an impairment loss recognized for an asset, other than goodwill, may no longer exist or may have decreased, in this case, the reversal is recognized as an impairment recovery in the consolidated statement of profit or loss.

In 2018, Ecopetrol recognized an impairment loss, net of non-current assets of COP\$368,634 million, which corresponds to the net result of:

- An impairment of non-current assets in the refining and petrochemicals segment, primarily due to (i) adjustments in market expectations with respect to the impact of implementation of IMO regulations on projected margins for Reficar's refined products (ii) a decrease in the short-term outlook for the ethanol prices given a global over-supply of ethanol, (iii) downward updates to Bioenergy's near-term agricultural outputs and (iv) an increase in the discount rate used for Reficar and Bioenergy, reflecting updated macroeconomic conditions. These negative impacts were partially offset by the commencement of the stabilization period at both Reficar and Bioenergy as well as tax benefits associated with Law 1942, 2018.
- An impairment of non-current assets in the transportation and logistics segment, primarily the result of a decrease in the forecast of the volume to be transported by the southern transportation unit and an increase in investment needs to mitigate the operative risk of our transportation systems.

- A reversal of impairment of non-current assets in the exploration and production segment, primarily due to an improved short-term hydrocarbon price outlook, incorporation of new reserves and technical and operational information variables.

Any significant change in estimates and judgments could have a material effect on the quantity and present value of our proved reserves and subsequently on the recognition or recovery of impairment charges. Changes to estimations of reserves are applied prospectively to the amounts of depreciation, depletion and amortization charged and, consequently, the carrying amounts of exploration and production assets.

In order to assess the possible impact of current expected oil price scenarios and market conditions, as well as of further developments driven by the economic environment for the oil and gas industry, the Company has performed a sensitivity analysis over its proved reserve balance as of December 31, 2018. Based on these calculations, assuming an average price per barrel of ICE Brent price of US\$67 per barrel in 2019, US\$71 per barrel in 2020, US\$69 per barrel in 2021, and between US\$66 and US\$71 onwards, Ecopetrol could recognize a decrease in oil and gas proved reserves of approximately 3%. This analysis takes into account Ecopetrol's estimates and expectations regarding the main assumptions used in its proven reserve calculation, which final actual result may fluctuate and differ substantially from those provided herein due to several factors outside of the control of the Company. For additional information see the section [Financial Review—Trend Analysis and Sensitivity Analysis](#).

On the contrary, any upward revision in our estimated quantities of proved reserves would indicate higher future production volumes, which could result in lower expenses for depreciation, depletion and amortization for properties to which we apply the units of production method for calculating these expenses. These lower expenses, and any higher revenues as a result of actual production volumes and realized prices, could benefit our results of operations and financial condition.

***Achieving our long-term growth depends on our ability to execute our strategic plan — specifically, the discovery and/or successful development of additional reserves.***

Our long-term growth objectives depend largely on our ability to develop the reserves recovery potential associated with existing fields and to discover and/or acquire new reserves, and in turn develop them successfully. Our exploration activities expose us to the inherent geological and drilling risks including the risk of not discovering commercially viable crude oil or natural gas reserves, and the risk that some exploratory wells initially budgeted for may be drilled at a later stage or not be drilled at all. Despite the effort we make to control costs associated with drilling, these are often uncertain, and numerous factors beyond our control may cause drilling operations to be curtailed, delayed or cancelled.

Our ability to add and develop reserves also depends on our capacity to structurally reduce costs to maintain the profitability of oil fields already being exploited without compromising infrastructure integrity and HSE performance.

Additionally, our strategy includes the exploration and development of unconventional reservoirs in Colombia, by using fracking technology. However, the implementation of this strategy depends, among others, on the final outcome of the regulatory framework affecting this technology currently being discussed in Colombia, obtaining the requisite environmental license required for the exploratory phase (including pilot wells) to begin and the results of these pilot projects. In February 2019, a commission of experts appointed by the Colombian government submitted its non-binding recommendation to advance in the pilot testing phase with the previous necessary steps to assure effective monitoring, control and communication of the pilot program development to stakeholders. See the section [Business Plan](#). However, we cannot assure you that unconventional reservoirs in Colombia will be able to be exploited.

If we are unable to achieve expected recovery factors in our existing fields, or successfully discover and develop additional reserves, or if we do not acquire properties having proved reserves, our reserves portfolio will decline. Failure to secure additional reserves may impede us from achieving or maintaining production targets, and may have a negative impact on our results of operations and financial condition.

See the section [Strategy and Market Overview—Our Corporate Strategy](#) for a discussion of our strategic plan.

***Our business depends substantially on international prices for crude oil and refined products. The prices for these products are volatile; a sharp decrease could adversely affect our business prospects and results of operations.***

In 2018, in Ecopetrol, approximately 95% of the revenues came from sales of crude oil, natural gas and refined products and 91% of the total volume sold of these products was indexed to international reference prices or benchmarks such as ICE Brent. Consequently, fluctuations in those international indexes have a direct effect on our financial condition and results of operations.

Prices of crude oil, natural gas and refined products have traditionally fluctuated as a result of a variety of factors including, among others, competition within the international oil and natural gas industry, long-term changes in the demand for crude oil (as further explained below), natural gas and refined products, the economic policies in the United States, China and the European Union, regulatory changes, changes in global supply, inventory levels, changes in the cost of capital, adverse or favorable economic conditions, global financial crises, substitute sources of energy, development of new technologies, global and regional economic and political developments in the Organization of the Petroleum Exporting Countries, (OPEC), the willingness and ability of the OPEC and its members to set production levels, local and global demand and supply for crude oil, refined products and natural gas, trading activity in oil and natural gas, which thereby affects their respective margins, derivative financial instruments related to oil and gas; weather conditions, natural events or disasters, and terrorism and global conflict. After experiencing gradual recovery during the first half of 2018 and reaching a peak in October, Brent suffered a downward rally in the latter part of 2018. The outlook of weaker economic growth for 2019 and a mismatch of supply and demand of crude played a fundamental role for this trend. See the section [Strategy and Market Overview](#) for a discussion of the market overview.

When crude oil, refined products and natural gas prices are low, we earn less revenue and we generate lower cash flow and less income. Conversely, when crude oil, refined product and natural gas prices are high, we earn more and generate a larger amount of cash and net income. During 2018, our crude oil basket price was US\$63.2 per barrel versus US\$47.8 in 2017, the refined product basket price was US\$77.3 per barrel versus US\$62.7 per barrel in 2017; and the natural gas price was US\$22.4 per barrel equivalent in 2018 versus US\$22.7 per barrel equivalent in 2017. However, it is important to consider that the margin on refined products can result either in higher or lower margins due to a change in price of crude the same way gas prices can be impacted by local conditions, such as local demand and weather conditions.

In 2018, we had an impairment of non-current assets of COP\$368,634 million compared to the COP\$1,311,138 million net reversal of the impairment of non-current assets in 2017 and the impairment of non-current assets of COP\$928,747 million in 2016. These impairments are an accounting effect that does not involve any inflow of resources and they are susceptible to reversion when the fair value of the asset is below its book value. For additional information about this impairment charges, see the section [Financial Review—Operating Results—Consolidated Results of Operations—Impairment of non-current assets](#) and Note 16 to our consolidated financial statements.

A reduction of international crude oil prices could also result in a delay or a change in our capital expenditure plan, in particular delaying exploration and development activities, thereby delaying the development of reserves and affecting future cash flows. In order to maintain a profitable operation and preserve the cash flow of the Company at certain oil price levels, some of our producing fields may have to be closed or their operations temporarily suspended which would affect our production levels and expected revenues.

***Changes in the Colombian Peso/U.S. dollar exchange rate could have an adverse effect on our financial condition and results of operations given the amount of U.S. dollar denominated debt held by the company and the fact that most of our revenues are derived from sales of products quoted in or with reference to U.S. dollars.***

Most of our revenues are derived from sales of products quoted in or with reference to U.S. dollars. Therefore when the Colombian Peso depreciates against the U.S. dollar, our revenues converted into Colombian Pesos, increase. Conversely, when the Colombian Peso appreciates against the U.S. dollar, our revenues decrease.

On the other hand, imported goods, oil services and the debt, which is mainly denominated in U.S. dollars, become less expensive when the Colombian Peso appreciates against the U.S. dollar and more expensive when the Colombian Peso depreciates against the U.S. dollar.

As of December 31, 2018 our U.S. dollar-denominated total debt was US\$10.5 billion, which we recognize in our consolidated financial statements at its amortized cost, which corresponds to the present value of cash flows, discounted at the effective interest rate. Out of this total, US\$9.7 billion relate to Ecopetrol S.A., whose functional currency is the Colombian Peso. Therefore, when the Colombian Peso depreciates against the U.S. dollar, Ecopetrol S.A. is exposed to an exchange rate loss. In contrast, when the Colombian Peso appreciates against the U.S. dollar, Ecopetrol S.A. is exposed to an exchange rate gain. Some of the Group's affiliates have the U.S. dollar as functional currency and are not exposed to a material exchange rate risk resulting from fluctuations in the Colombian Peso against the U.S. dollar. On the asset side, when the financial statements of the Group are consolidated, the exchange rate differential of the affiliates' assets and liabilities whose functional currency is the U.S. dollar is recognized directly in the equity, as part of other comprehensive income.

The Company adopted hedge accounting as part of its risk management strategy, using two types of natural hedges with its U.S. dollar debt as a financial instrument: i) cash flow hedge for exports of crude oil and ii) hedge of a net investment in a foreign operation. As a result of the implementation of both hedges, US\$6,500 million of Ecopetrol S.A.'s debt in U.S. dollars as of December 31, 2018, was designated as a hedge. With the adoption of hedge accounting, the effect of the volatility of the foreign exchange rate on the hedged portion of the debt is recognized directly in equity, as part of other comprehensive income. The remaining portion of Ecopetrol S.A.'s U.S. dollar-denominated debt as well as the financial assets and liabilities denominated in foreign currency continues to be exposed to the fluctuation in the exchange rate.

The U.S. dollar/Colombian Peso exchange rate has fluctuated during the last several years. On average, the Colombian Peso depreciated 11.18% in 2016, appreciated 3.35% in 2017 and depreciated 0.18% in 2018. Additionally, as of December 31, 2018, the Colombian Peso depreciated 8.91%, as of December 31, 2017, the Colombian Peso appreciated 0.56% and as of December 31, 2016, the Colombian Peso appreciated 4.72%, in each case from year-end exchange in the previous year. In addition, given the performance of interest rates in the U.S., crude oil prices in the next few years and political uncertainty in Colombia, there is no clear view of how the U.S. dollar and the Colombian peso will behave in the medium to long-term. Given that markets are dealing with a great deal of uncertainty, it is expected that U.S. dollar movements will remain difficult to forecast.

A future depreciation in the exchange rate of the Colombian Peso against the U.S. dollar may affect our financial results when converted into Colombian Pesos, given our current net position in U.S. dollars, the fact that most of our revenues are collected in U.S. dollars and the portion of our U.S. dollar debt that is not designated as hedge instrument and the future debt we may acquire. Please see our sensitivity analysis on our results of operation to exchange rate fluctuations in the section *Financial Review—Effect of Taxes, Exchange Rate Variation, Inflation and the Price of Oil on our Results—Exchange Rate Variation* and in Note 28.1 to our consolidated financial statements.

***Increased competition from local and foreign oil companies may have a negative impact on our ability to gain access to additional crude oil and natural gas reserves in Colombia and abroad.***

We must bid for exploration blocks offered by the ANH in Colombia and similar authorities in other countries, which means we compete under the same conditions as other domestic and foreign oil and gas companies, and receive no special treatment. Our ability to obtain access to potential fields also depends on our ability for evaluating and selecting potential opportunities and to adequately bid for such opportunities.

We are also exposed to international competition as a result of our international exploratory activities. Currently, we are exploring in Brazil, Mexico and the US Gulf of Mexico, where we partner and compete with other oil and gas companies operating in those locations.

If we are unable to adequately compete with local and foreign oil companies, or if we cannot enter into joint ventures with market players having high potential exploration projects, our exploration activities may be limited. This could reduce our market share and, in turn, adversely affect our financial condition.

***If operational risks to which we are exposed in Colombia or overseas materialize, the health and safety of our workforce, the local community and the environment may be affected. In addition, we may suffer a disruption or shutdown of our operational activities.***

Our exploration, production, refining and transportation activities in Colombia and in the foreign countries in which we operate are subject to industry-specific operating risks, some of which, despite our internal procedures and adherence to industry best practices, are beyond our control. Our operations may be curtailed, delayed or cancelled due to adverse or abnormal weather conditions, natural disasters, blockages in the communities in which we operate, equipment failures or accidents, oil or natural gas spills or leaks, shortages or delays in the availability or in the delivery of equipment, delays or cancellation of environmental licenses or other government authorizations or judicial decisions, fires, explosions, blow-outs, surface cratering, pipeline failures, theft and damage to our transportation infrastructure, sabotage, terrorist attacks and criminal activities.

Some of our operations in Colombia and abroad could be conducted in remote and uninhabited locations that involve health and safety risks that could affect our workforce. By our own Company policy and practices, as well as under Colombian law and international industrial safety regulations, we are required to have health and safety practices that minimize risks and health issues faced by our workforce. Failure to comply with health and safety regulations in the jurisdictions where we operate may lead to investigations by health officials that could result in lawsuits or fines.

We may be required to incur in additional costs and expenses to allocate funds to industrial safety and health compliance under Colombian law and international industrial safety regulations. Additionally, if any operational incident occurs that affects local communities and ethnic communities in nearby areas, we will need to incur in additional costs and expenses in order to return affected areas to normality and to compensate for any damages we may cause. These additional costs may have a negative impact on the profitability of the projects we may decide to undertake.

The occurrence of any of these operating risks could result in substantial losses or slowdowns to our operations, including injury to our employees, malfunction or destruction of property, equipment and infrastructure, clean-up responsibilities, third-party liability claims, government investigations and imposition of fines, withdrawal of environmental licenses and other government permits, suspension or shutdown of our activities and loss of revenue. The occurrence of any of these events may have a material adverse effect on our financial condition and results of operations.

***Our involvement in deep-water drilling either as direct operator or in conjunction with our business partners involves risks and costs, which may be out of our control.***

Our deep-water drilling activities present severe risks, such as the risk of spills, explosions on platforms and drilling operations, and natural disasters. The occurrence of any of these events or other incidents could result in personal injuries, loss of life, severe environmental damage with the resulting containment, clean-up and repair expenses, equipment damage and liability in civil and administrative proceedings. Heightened risks and costs associated with deep-water drilling may have a negative effect on our results of operations and financial condition and in our reputation.

See the section *Business Overview—Exploration and Production* for a summary of our current deep-water drilling activities.

As a result of the oil spill in the Macondo field operated by BP in the U.S. Gulf Coast in April 2010, significant concerns regarding the safety of deep-water drilling have been raised and, as a result, applicable regulations in various countries have changed. More stringent government regulation may result in increased costs and longer exploration and development timeframes for our deep-water drilling operations and consequently could adversely affect our results of operations and financial condition.

***We are exposed to the credit, political and regulatory risks of our customers and any material nonpayment or nonperformance by our key customers could adversely affect our cash flow and results of operations.***

Some of our customers may experience financial problems that could have a significant negative effect on their creditworthiness. Severe financial problems encountered by our customers could limit our ability to collect amounts owed to us, or to enforce the performance of obligations owed to us under contractual arrangements. In addition, many of our customers finance their activities through their cash flows from operations, short and long term debt or equity.

The combination of decreasing cash flows as a result of declines in commodity prices, a reduction in borrowing bases under reserve-based credit facilities and the lack of availability of debt or equity may result in a significant reduction of our customers' liquidity and limit their ability to make payments or perform their obligations to us according to their contractual terms.

Furthermore, some of our customers may be highly leveraged and subject to their own operating expenses. Therefore, the risk we face in doing business with these customers may increase. Other customers may also be subject to regulatory changes, which could increase the risk of defaulting on their obligations to us. We also could have disagreements with customers regarding tariffs, excusable events, or other aspects of our commercial relations that could lead to contract breaches by our clients. See Note 28.2 to our consolidated financial statements for more details.

Such financial problems experienced by our customers or deterioration in our relations with our customers could result in the impairment of our assets, a decrease in our operating cash flows and may also reduce or restrict our customers' future use of our products and services, which may have an adverse effect on our revenues and our ability to make payments under our existing debt obligations.

***Our ability to access the credit and capital markets on favorable terms to obtain funding to refinance our debt maturities may be limited due to the deterioration of these markets, any change to our credit ratings and the authorizations we need before incurring any financial indebtedness.***

A new financial crisis, volatility in prices in the oil and gas sector, the spread in protectionist policies in the United States, China and Europe, the lack of consensus among OPEC members, the political uncertainty in the region, the discovery of corruption by governments and private companies in emerging markets and further geopolitical disruptions in the Middle East, which could involve developed countries, which in turn could worsen risk perception with respect to the emerging markets, or the occurrence of any of the risks described in the section *Risk Review—Risk Factors—Risks Related to Colombia's Political and Regional Environment* could make it more difficult for us and our subsidiaries to access international and local capital markets and finance our operations and potentially refinance our debt maturities on terms acceptable to us. These conditions, along with significant write-offs in the financial services sector and the re-pricing of credit risk, can make it difficult for us to obtain funding for our capital needs on favorable terms. Access to credit and capital markets is also dependent on our credit ratings, which are mainly determined by our financial and operational strength, oil and gas market conditions and the support that could be provided by the Colombian government. We cannot assure that our credit ratings will continue for any given period of time or that the ratings will not be further lowered or withdrawn. An assigned rating may be raised or lowered depending, among other things, on the respective rating agency's assessment of our financial strength. In addition, a downgrade in the rating of the Republic of Colombia could also trigger a downgrade on our ratings as our rating is capped by the rating of the Republic of Colombia and the implicit support that can potentially be provided to the Company. On February 23, 2018, despite the downgrade of the Republic of Colombia, Moody's maintained our long term international credit rating and outlook. On June 27, 2018, S&P maintained our long-term corporate credit rating at BBB- and our outlook at stable. On July 16, 2018, Moody's upgraded our BCA (Baseline Credit Assessment) to ba1 from ba3 and maintained our long term international credit rating at Baa3 and outlook at stable. On December 6, 2018, Fitch Ratings maintained our long term international credit rating at BBB stable. We cannot offer any assurance that our credit rating will continue.

As a result of these factors, we may be forced to revise the timing and scope of our capital projects as necessary to adapt to existing market and economic conditions, downgrades to our credit ratings or to access the financial markets on terms less favorable, therefore negatively affecting our results of operations and financial condition.

In addition, under applicable regulation, the Government, through the Ministry of Finance and Public Credit and the favorable opinion of the National Planning Department, must authorize all indebtedness of state-owned entities and government-controlled companies through a majority equity stake. Consequently, excluding our foreign subsidiaries or those subsidiaries in which we hold minority interest, most of our indebtedness must be previously authorized by the Colombian Ministry of Finance and Public Credit and the National Planning Department. As such, our indebtedness is subject to the Government's time frames and policies, and we cannot guarantee that such authorizations would be granted in a timely fashion or granted at all.

***We may be exposed to increases in interest rates, thereby increasing our financial costs.***

We may incur debt locally and in the international capital markets and, consequently, may be affected by changes in prevailing interest rates. If market interest rates increase, our financing expenses may increase, which could have an adverse effect on our results of operations and financial condition.

As of December 31, 2018, approximately 13.9%, or a principal of US\$1,569 billion (COP\$5.1 trillion), of our total indebtedness consisted of floating rate debt. If market interest rates rise, our financing expenses will increase, which could have an adverse effect on our results of operations and financial condition. In addition, as we refinance our existing debt in the coming years, the mix of our indebtedness may change, specifically as it relates to the ratio of fixed to floating interest rates, the ratio of short-term to long-term debt, and the currencies in which our debt is denominated in or indexed to. We cannot assure that such changes will not result in increased financing expenses borne by us. Finally, as we incur new debt in the future to fund our capital projects or inorganic acquisitions, the prevailing interest rates and spreads at any specific time could be less favorable in terms of cost when compared to our previous financing transactions, which could adversely affect our financial condition and results of operations.

***Our current and planned investments and exploration activities outside Colombia are exposed to political and economic risks.***

We began exploration activities outside Colombia in 2006 through our Brazilian subsidiary, Ecopetrol Óleo e Gás do Brasil Ltda. We operate through business partners, subsidiaries or affiliates outside Colombia. We currently have investments, joint ventures and subsidiaries incorporated in Peru, Brazil, Mexico, Bermuda, Panama, the Cayman Islands, Switzerland, Spain, the United Kingdom and the United States, and we are analyzing investments in other countries. In connection with making investments, we are and will be subject to risks related to economic and political conditions and governmental economic actions. We cannot predict the positions of foreign governments relating to the oil and gas industry, land tenure, protection of private property, environmental standards, regulation or taxation; nor can we assure that future governments will maintain policies favorable to foreign investment or repatriation of capital. Additionally, we may face new and unexpected risks involving environmental and other legal requirements beyond those we currently experience.

The results of operations and financial condition of our subsidiaries in these countries also may be adversely affected not only by risks associated with hydrocarbon exploration and production, but also by fluctuations in their local economies, political instability and government actions, including: the imposition of price controls, the imposition of restrictions on hydrocarbon exports, fluctuation of local currencies against the Colombian Peso, the nationalization of oil and gas reserves, increases in export and income tax rates for crude oil and oil products, and unilateral (governmental) institutional and contractual changes, including controls on investments and limitations on new projects.

Any of these conditions occurring could disrupt or terminate our operations, causing our development activities to be curtailed or terminated in these areas, or our production to decline, limit our ability to pursue new opportunities, affect the recoverability of our assets, or cause us to incur additional costs or delay the timeline of our projects.

***Our future performance depends on the successful development and deployment of new technologies and the knowledge to apply and improve them.***

Technology, knowledge and innovation are essential to our business, especially for reductions to our operating costs and improvements in processes related to the production, refining and transportation of heavy crude oil and the exploitation of mature fields. If we do not develop the right technology, do not secure access to required third-party technology, fail to deploy the right technology, do not obtain the expertise to operate our deployed technology or to improve our processes, or do not deploy the knowledge necessary to improve such technology effectively, the achievement of our corporate goals, our profitability and our earnings may be adversely affected. In the case of our recovery program, we not only depend on the successful selection, adaptation, demonstration and deployment of appropriate technologies but also in the reservoir response to the application of these recovery technologies.

***Our performance could be negatively affected by a deficiency in leadership capacity and lack of key skilled employees.***

As the oil and gas industry faces an increasing number of challenges, the ability to react quickly to these challenges has become a key factor in achieving efficiency, profitability, growth and sustainability. Our ability to achieve these goals can be negatively affected by a deficiency in leadership capacity and a lack of key skilled employees that can execute our business strategy with competency, creativity and determination.



***Our operations may not be able to keep pace with the increasing domestic demand for natural gas.***

According to CREG Resolution 114 of 2017, former Resolution 089 of 2013, the natural gas market is a physical market, which means that suppliers must comply with the quantities agreed in their contracts. Hence, Ecopetrol will not be able to keep or increase its market participation unless the Company increases its natural gas reserves as local demand grows.

Additionally, we are currently party to a number of national gas supply contracts that have firm gas commitments. If we are unable to deliver natural gas to these clients as a result of cuts in operations, delays in the completion of projects relating to our production facilities or the acceleration of the decline in our gas production, among other reasons, we may be required to compensate our customers for our failure to supply natural gas.

Delays in the start of new projects could result in penalties imposed on us by our clients. Although we did not pay penalties due to delays in the start of new projects in 2018, we cannot assure that in the future we will not be subject to additional monetary fines which can in turn affect our financial condition and results of operations.

We depend on others for the construction and availability of natural gas transportation infrastructure for the transport of our gas, which may limit our ability to develop new or existing fields or lead to the deterioration of related assets and may not allow us to recover the cost of capital invested in natural gas discoveries.

Ecopetrol S.A. can only hold up to 25% of the equity of any natural gas transportation company according to Article 5 of CREG Resolution 057 of 1996. Therefore, there can be no assurance that the transportation infrastructure necessary to transport natural gas from the fields to distribution points and our customers will be built by third parties or that if built there will be sufficient capacity available to us for the exploitation of new natural gas discoveries or the development of existing fields. The failure to commercially exploit new or existing discoveries may result in impairment of the related assets and our inability to recover the capital expenditures invested to make these natural gas discoveries. As a result, we may be required to enter into agreements with natural gas transportation companies on terms that are not favorable to us.

For example, we have developed natural gas reserves in the Cusiana and Cupiagua fields, but transportation capacity to deliver gas from these fields is currently limited. Although there are projects under development that will eliminate this limitation, we can offer no assurance that they will prove successful.

***Our operations could be affected by reactions of labor unions, social organizations, communities and contractors to Colombia's political and social environment, environmental and climate change concerns and organizational changes.***

Due to Colombia's political and social environment, emerging environmental and climate change concerns and organizational changes, social organizations in the communities where we have operations, communities in general, contractors and unions, may have reactions and present their demands through social movements, which could have an adverse effect on our operations and financial condition.

On July 1, 2018, a new collective bargaining agreement became effective for a term of four and half years, expiring on December 31, 2022. We cannot assure you that we will not experience strikes or labor unrest in the future.

***Our activities may be interrupted or affected by external factors, such as abnormal weather conditions and natural disasters.***

We are exposed to several risks that may partially interrupt our activities. They include fires or explosions, natural disasters, criminal acts and acts of terror, malfunction of pipelines and emission of toxic substances.

Also, the effects of climate change could create impacts and losses in any part of our business operations, for instance, as the result of increase in the intensity of the "La Niña" and "El Niño" climate phenomena, causing floods and drought periods, increased temperature and rising sea levels.

The "El Niño" climate phenomenon is characterized by (i) a lack of rainfall, which limits the amount of water necessary for the development of various activities of the company, (ii) increased temperatures, which could have a direct impact on our worker's health given an increased occurrence of heat waves and the increased occurrence of epidemics and diseases and (iii) potential negative impact on energy supply. The "La Niña" climate phenomenon is characterized by increased rainfall, which can generate (i) landslides that threaten pipeline infrastructure and limit road transportation and (ii) flooding, which could limit operations in our production fields and facilities.

As a result, our activities could be significantly affected or even paralyzed. These risks could result in property damage, loss of revenue, loss of life, pollution and harm to the environment, among others. If any of these occur, we may be exposed to economic sanctions, damages, fines or penalties in addition to the costs required to repair or remediate the related damage. These costs, fines and penalties may adversely affect our financial condition and results of operations.

***Our operations, including our activities in areas classified as indigenous reserves and Afro-Colombian lands, are subject to opposition from members of various communities.***

We currently carry out and plan to continue carrying out activities in areas classified by the Government as indigenous reserves and Afro-Colombian lands. In order to undertake these activities, we must first comply with the previous consultation process, set forth by Colombian law. These consultation processes are part of the administrative procedures for obtaining environmental licenses to start our projects, works or activities in areas belonging to ethnic communities. In addition, consultations can be seen as a potential instrument to involve communities in the decision of developing extracting industry and infrastructure projects in their territories. Generally, these consultation processes last between six months to one year depending on the community expectations, but may be significantly delayed if we cannot reach an agreement with the communities. We strive to be respectful of the Constitution and laws and the autonomy of indigenous and Afro-descendant communities, and we therefore do not enter their territories until we have reached an agreement with them.

Our activities are subject to opposition, including protests by various communities, and even in areas in which the previous consultation process does not apply. Recently, through popular consultation, some communities have voted against the development of extractive industry projects. Any such similar situation may affect our future projects.

In recent years, indigenous communities have been claiming their ancestral territories and requesting recognition on previously closed consultation processes. We may be exposed to operational restrictions as a result of the opposition of these communities.

No certainty can be given that we will be able to reach an agreement with the different communities opposed to our operations or that such communities will participate in consultation processes if available. We may be exposed to similar delays due to opposition from local communities in other countries where we carry out our activities.

***We have made significant investments in acquisitions and we may not realize the expected value.***

We have acquired interests in several companies in Colombia and abroad. See the section *Business Overview—Our Corporate Structure*. Obtaining the expected benefits of the acquisitions will depend, in part, on our ability to (i) obtain the expected results of operations and financial condition from these acquisitions, (ii) manage different sets of assets and operations and integrate distinct corporate cultures, (iii) manage our objectives as a corporate group, and (iv) institute our corporate governance rules as well as other factors beyond our control such as the economic and regulatory environment in countries in which we have made acquisitions as well as all other risks affecting the oil and gas industry. These efforts may not succeed. Our failure to successfully obtain the expected results from our acquisitions could adversely affect our financial condition and results of operations.

***We might be required to provide financial support to our subsidiaries in Colombia or abroad.***

Although currently Ecopetrol is not the sponsor and has not provided financing guarantees to any of its subsidiaries, some financial support at any point in time might be needed to assure the long term viability of such subsidiaries when exposed to unexpected conditions or results.

Any situation that could affect the operations of our subsidiaries, particularly for those that recently entered into operations, such as Bioenergy, may have a negative impact on their profitability as well as on their ability to pay their liabilities, which in turn could adversely affect our financial condition and results of operations.

***Ongoing Colombian State control entities investigations regarding our subsidiaries Reficar and Bioenergy could adversely affect us.***

Ecopetrol, Bioenergy and Reficar's employees are generally subject to the control and supervision of the Colombian State control entities. See section [Risk Review—Legal Proceedings and Related Matters](#) for additional information.

The investigations concerning Reficar and Bioenergy that are described in section [Risk Review—Legal Proceedings and Related Matters](#) remain ongoing. While we are cooperating fully with both cases, adverse developments in connection with these investigations, including any expansion of the scope of the investigations, could negatively impact us and could divert the efforts and attention of our management team from our ordinary business operations.

In connection with this investigation or any other investigation carried out by any other authority, there can be no assurance that we will not incur in additional costs and expenses or expose us or our employees to sanctions and lawsuits, any of which could adversely impact our reputation and, in turn, could have adverse effects on our financial condition and results of operations. See section [Risk Review—Legal and Regulatory Risk—We may incur losses and spend time and money defending pending lawsuits and arbitrations and responding to administrative investigations](#).

***Our results may be affected by the performance of our suppliers, our business partners or their third-party service providers.***

Some of our suppliers may face financial or operational problems that could lead them to a breach of their obligations settled under contractual arrangements. Other suppliers may also be subject to regulatory changes or sanctions that could increase the risk of defaulting on their obligations to us, which could have an adverse effect on our operations and financial condition.

In addition, some of our operations and projects are performed through joint ventures or other contractual arrangements with our business partners or third party service providers. Consequently, we depend on the performance of our business partners or third party service providers. The poor performance of any of them, especially in those projects in which we do not act as operator, could negatively impact the execution of projects and operating performance, which in turn could have a negative impact on our results of operations and financial condition. We are exposed to the risk of not finding business partners with the appropriate skills and performance we require for our projects. We are also indirectly exposed to supply agreements and other third-party services contracted by our business partners acting as operators under joint venture agreements.

***Our insurance policies do not cover all liabilities and may not be available for all risks.***

Our insurance policies do not cover all liabilities, and insurance may not be available for all risks. There can be no assurance that incidents will not occur in the future, that insurance will adequately cover the entire scope or extent of our losses or that we will not be found liable in connection with claims arising from these and other events, which could adversely affect our financial condition and results of operations.

***A failure in our information technology systems or cyber security attacks may adversely affect our financial results.***

We depend on the reliability and security of our information technology systems to conduct certain exploration, development and production activities, process financial records and operating data and communicate with our employees and business partners, and for many other activities related to our business. Our information technology systems may fail or have other significant shortcomings due to operational system flaws or employee misuse, tampering or manipulation. In addition, we may become the target of cyber-attacks or information security breaches that could result in the unauthorized release, gathering, monitoring, misuse, loss or destruction of proprietary and other information. Any of these occurrences could disrupt our business, result in potential liability or reputational damage or otherwise have an adverse effect on our financial results.

During 2018, our internal cyber security systems identified and contained cyber security attacks such as malware, phishing and denial of service. In total, we had 20 critical incidents during the year and although we have not experienced any material losses relating to failure of our information technology systems or cyber incidents, there can be no assurance that we will not suffer such losses in the future.

***We are exposed to behaviors incompatible with our ethics and compliance standards.***

Given the large number of contracts that we are a party to in Colombia and abroad with local and foreign suppliers, the geographic distribution of our operations and the great variety of actors that we interact within the course of business, we are subject to the risk that our employees, contractors, or any person having relations with us may misappropriate our assets, manipulate our assets or information or engage in money laundering or the financing of terrorism, for such person's personal or business advantage. Our systems for identifying and monitoring these risks may not be effective to fully mitigate them in all situations. Such acts may result in material financial losses or reputational harm to the Company.

***The reliability and capacity of national power supply systems may affect or limit the continuity of our operations or limit growth.***

Our average energy consumption in 2018 was 7,138 GWh/year, of which 66% was supplied through self-generation, and the remaining 34% through power grid. Our demand is 10.5% of the total energy demand in Colombia.

Our self-generation is subject to fuel availability. In addition, several producing fields are connected to the national transmission system and depend on its expansion and reliability to keep steady production levels. The national electricity market is volatile due to changes in hydrology and availability of fuels (natural gas, diesel etc.), bringing uncertainty to prices. If energy were to become unavailable or difficult to obtain, our results of operation and financial condition could be adversely affected.

***Rising water production levels may affect or constrain our crude oil production.***

During 2018, Ecopetrol produced approximately 13.8 million barrels of water per day. Taking into account the nature of our reservoirs, the water production levels to be managed by the Company may increase in the future. In order to achieve our oil and gas production goals and to avoid any production restrictions going forward, we will need to secure the required capacity to manage water levels. Factors that may trigger a possible constraint in our crude oil production due to the rising water production levels are: (i) ineffective project management of the required facilities, (ii) the Company's and its partners' ability to timely obtain the environmental permits related to water management, (iii) social and community interactions that could affect the development and operation of these projects, and (iv) the availability of capital to execute the required projects.

**5.1.2 Risks Related to Colombia's Political and Regional Environment**

This section discusses potential risks related to our extensive operations in Colombia.

***The Colombian government could seize or expropriate Ecopetrol's assets under certain circumstances for fair compensation.***

Pursuant to Articles 58 and 59 of the Colombian constitution, the Government can exercise its eminent domain powers in respect of private property assets in the event such action is deemed by the Government to be required in order to protect public interests. According to Law 388 of 1997, eminent domain powers may be exercised through: (i) an ordinary expropriation proceeding, or (ii) an administrative expropriation. In all cases we would be entitled to a fair compensation for the expropriated assets. Also, as a general rule, compensation must be paid before the asset is effectively expropriated. However, the compensation may be lower than the price for which the expropriated asset could be sold in a free-market sale or the value of the asset as part of an ongoing business. The aforementioned Article 59 of the Colombian constitution establishes an expropriation for war reasons, which require that compensation be paid before expropriation but can only be executed on a temporary basis.

***Colombia has experienced internal security issues that have had or could have a negative effect on the Colombian economy and on us.***

Colombia has experienced internal security issues, primarily due to the activities of guerrillas, paramilitary groups, drug cartels and criminal bands known as *Bacrim*. From time to time, guerrillas target crude oil and multi-purpose pipelines, including the Oleoducto Transandino, Caño Limón-Coveñas and Oleoducto Bicentenario pipelines, and other related infrastructure disrupting our activities and those of our business partners.

During 2018, the attacks against our pipeline infrastructure increased by 66% in relation to 2017 (63 attacks in 2017 compared with 105 attacks in 2018). In 2019, there have been 20 attacks to date. This situation especially affected the infrastructure located in the following departments: Norte de Santander, Arauca and Nariño and the following pipelines: Caño Limón Coveñas and Transandino. Guerilla attacks have resulted in unscheduled shutdowns of our transportation systems in order to repair or replace sections of pipelines or production facilities that have been damaged with deferral of production in certain fields, as well as caused us to undertake environmental remediation. For example, these attacks led to a deferred production of 11,102 barrels in 2018. This represented a decrease from 2017 (when similar attacks led to a deferred production of 1.6 million barrels) due to the transportation of the crude from the Caño Limón field through the Bicentenario pipeline from Banadia in Arauca to Araguaney in Casanare. However, we cannot offer any assurance that we will continue to ensure such transportation through alternate routes.

The direct cost of repairs due to terrorist attacks and illicit taps in 2018 was approximately COP\$153 billion (US\$47 million, with a COP\$3,249.75/1.00 US exchange rate as of December 31, 2018). Additionally, these attacks have resulted in certain of our customers requesting the early termination of their transport agreements. We are currently disputing such terminations. See Note 21.4 to our consolidated financial statements for further information.

Likewise, the theft of refined products and crude oil, resulting from security issues, may impact our operating and financial results in the future. Theft of refined products, decreased from approximately 34.9 boed in 2017 to approximately 21 boed in 2018. Theft of crude oil decreased from approximately 1,883 bod in 2017 to approximately 1,324 bod in 2018.

These activities and their possible escalation and the effects associated with them have had, and may have in the future, a negative impact on the Colombian economy or on us, which may affect our customers, employees, assets or the environment, with resulting containment, clean-up and repair expenses.

***Despite the peace agreement between the Colombian government and the FARC and the peace negotiation process attempts with the National Liberation Army (the ELN), some illegal and terrorist activities of guerrilla groups or their members may continue.***

On November 30, 2016, the Colombian Congress approved a peace agreement between the Colombian government and the Revolutionary Armed Forces of Colombia, or FARC. Currently, the Colombian government is in the process of gradually integrating FARC members into civilian life.

On the other hand, the National Liberation Army, or ELN, an insurgency guerrilla group, has increased its actions against the Colombian security forces and the critical infrastructure of the Nation, which we believe is an attempt to show its presence and influence in some regions and put pressure to resume peace negotiations which formally began in February 2016. In February 2017, the public dialogue phase began in Quito, Ecuador. These dialogues were interrupted as a result of the terrorist attacks carried out by the ELN since January 2018. In April 2018, the Colombian Government decided to resume the dialogue, due to the suspension of ELN terrorist actions during the electoral period in March 2018.

The new Colombian President Ivan Duque took office in August 2018 and set the following conditions for the continuation of dialogue with the ELN: the suspension of terrorist activities and the release of hostages.

However, following the terrorist attack by ELN against the National Police Academy (*Escuela de Policía General Santander*) on January 17, 2019, the Colombian Government decided to suspend dialogue with the ELN indefinitely.

It is expected that some guerilla groups, such as the ELN, may continue their illegal and terrorist activities, including attacks on our infrastructure, resulting in a deterioration of Colombia's national security and our assets, which consequently may negatively impact our operating results.

***There have been certain events in Colombia and abroad, which have resulted in political tensions between Colombia and some of its neighboring countries.***

There have been certain events in Colombia and abroad, which have resulted in political tensions between Colombia and some of its neighboring countries.

In particular, the economic, political and social crisis in Venezuela is having a severe impact on Colombia's economy and social situation. This situation could affect the countries' diplomatic relations, impact border towns and cities, accelerate Venezuelan migration flow into Colombia, affect our borderline operations and therefore may have a negative impact on Colombia's economy and general security situation as well as in our operating results.

***Companies operating in Colombia, including us, are subject to the prevailing economic conditions and the investment climate in Colombia, which may be less stable than the prevailing economic conditions and investment climate in developed countries.***

Market prices of securities issued by Colombian companies, including us, are subject to the prevailing economic conditions in Colombia. A large portion of our assets and operations are located in Colombia and most of our sales are currently derived from our crude oil and natural gas production and the production of our refineries located in Colombia. Accordingly, our financial condition and results of operations depend to a significant extent on macroeconomic and political conditions prevailing from time to time in Colombia and on the exchange rates between the Colombian Peso and the U.S. dollar.

If the perception of improved overall security in Colombia deteriorates or if the investment climate worsens, the Colombian economy may face lower growth rates than the ones posted recently, which could negatively affect our financial condition and results of operations. Furthermore, the market price of our shares and American Depositary Shares, or ADSs, may be adversely affected by changes in governmental policies, particularly those affecting economic growth, exchange rates, interest rates, inflation and taxes. The Government has changed monetary, fiscal, taxation, labor and other policies over time and has thus influenced the performance of the Colombian economy. We have no control over the extent and timing of government intervention and policies.

***Colombian political and economic conditions have a direct impact on our business and may have a material adverse effect on us.***

Colombia's economic policies may have direct impact on our Company as well as market conditions, the prices of securities and our ability to access national and international capital markets. Our financial condition and results of operations may be adversely affected by the following factors, among others, and the Government's response to such factors: exchange rate movements; inflation; exchange control policies; price instability; interest rates; liquidity of domestic capital and lending markets; tax policy; regulatory policy for the oil and gas industry, including pricing policy; and other political, diplomatic, social and economic developments in or affecting Colombia.

Uncertainty over whether the Government will implement changes in policy or regulations that may affect any of the factors mentioned above or other factors in the future may lead to economic uncertainty in Colombia and increase the volatility of the Colombian securities market and securities issued abroad by Colombian companies.

The administration of President Iván Duque took office in August 2018. Any changes in the ruling government, oil and gas or investment regulations and policies or a shift in political attitudes in Colombia are beyond our control.

Developments and the perception of risk in other countries, especially emerging market countries, may adversely affect the market price of Colombian securities, including our ADSs.

Securities issued by Colombian companies may be affected by economic and market conditions in other countries, including other Latin American and emerging market countries. Although economic conditions in Latin American countries and in other emerging market countries may differ significantly from economic conditions in Colombia, investors' reactions to developments in these other countries may have an adverse effect on the market value of securities of Colombian issuers and our ability to access capital markets.

Due to past financial crises in several emerging market countries (such as the Asian financial crisis of 1997, the Russian financial crisis of 1998 and the Argentinean financial crisis of 2001), the world financial crisis of 2008 and the recent sovereign debt crises in certain European countries, investors may view investments in emerging markets with heightened caution. In the past, as a result of crises in other countries, flows of investments into Colombia have been reduced. Crises in other countries, especially in emerging market countries, may hamper investor enthusiasm for securities of Colombian issuers. If Latin America experiences a new slow-down or if the price for securities of Latin American issuers falls, the price for our ADSs could follow this trend and could be adversely affected, as could our ability to access domestic or international capital markets.

***New or higher taxes resulting from changes in tax regulations or the interpretation thereof in Colombia could adversely affect our results of operations and financial condition.***

New tax laws and regulations, and uncertainties in the interpretation with respect to existing and future tax policies pose risks to us. In recent years, the Colombian Congress and tax authorities have imposed and subsequently eliminated additional taxes such as the Income Tax for Equality (“CREE”) and the wealth tax, and enacted modifications to taxes related to financial transactions, income, value added tax (“VAT”), and taxes on net worth. In addition, in December 2016, pursuant to Law 1819, the Colombian Congress enacted a tax reform, which became effective in 2017. Furthermore, in December 2018, pursuant to Law 1943, the Colombian Congress enacted a tax reform (the Financing Law), which became effective as of January 1, 2019 modifies the Colombian income tax regime. For a description of taxes affecting our results of operations and financial condition in 2018, see section *Financial Review — Effect of Taxes, Exchange Rate Variation, Inflation and the Price of Oil on Our Results — Taxes*. Changes in tax-related laws and regulations, and interpretations thereof, can affect tax burdens by increasing tax rates and fees, creating new taxes, limiting tax deductions, and eliminating tax-based incentives and non-taxed income. In addition, tax authorities and tax courts may interpret tax regulations differently than we do, which could result in tax litigation and associated costs and penalties.

Until 2016, for Colombian income tax purposes, dividends that were distributed from profits taxed at the corporate level were not taxed or subject to withholding tax at the shareholder level. However, beginning in 2017, dividends paid to non-resident shareholders are subject to a withholding tax. Until 2018, the withholding tax rates applicable to dividends paid to non-resident shareholders were: (i) a 5% dividend tax on dividends distributed from profits taxed at the corporate level, with certain exceptions; and (ii) a 35% withholding tax rate on dividends distributed from profits not taxed at the corporate level plus an additional 5% dividend tax after applying the initial 35% withholding tax rate. As of January 1, 2019, the withholding tax rates applicable to dividends paid to non-resident shareholders are: (i) a 7.5% dividend tax on dividends distributed from profits taxed at the corporate level (except that dividends paid to non-resident shareholders out of profits taxed at the corporate level prior to and including December 31, 2016, are not subject to this tax); and (ii) 33% withholding tax rate on dividends distributed from profits not taxed at the corporate level (32% for 2020, 31% for 2021 and 30% as of 2022), plus an additional 7.5% dividend tax after applying the initial 33% withholding tax rate. Tax treaty rules might also apply on dividend distributions when a shareholder is a resident in a country that has executed a tax treaty with Colombia and reduce or eliminate the applicable taxes if the applicable requirements are met.

### **5.1.3 Legal and Regulatory Risks**

This section discusses potential legal and regulatory risks to Ecopetrol, including the risk of having to comply with new laws and regulations.

#### ***Our operations are subject to extensive regulation.***

The Colombian hydrocarbons industry is subject to extensive regulation and supervision by the Government and regulatory agencies in matters including the award of exploration and production blocks by the ANH, the imposition of specific drilling and exploration obligations, restrictions on production, price controls, capital expenditures, liquidation of the Net Position of each refiner or importer with respect to the FEPC and required divestments. Existing regulation applies to virtually all aspects of our operations in Colombia and abroad. The commercialization activities of some of our products also face extensive regulation. Such regulation is subject to change by the applicable regulator affecting our ability to commercialize our products. See section *Business Overview—Applicable Laws and Regulations*.

The terms and conditions of the agreements with the ANH under which we explore and produce crude oil and natural gas generally reflect negotiations with the ANH and other governmental authorities and may vary by fields, basins and hydrocarbons discovered.

We are required, as are all oil companies undertaking exploratory and production activities in Colombia, to pay a percentage of our production to the Government as royalties. The Colombian Congress has modified the royalty program for crude oil and natural gas production several times in the last 20 years, as it has modified the regime regulating new contracts entered into with the Government. In the future, the Colombian Congress may once again amend royalty payment levels for new contracts and such changes could have an adverse effect on our future exploration and production in Colombia. See section *Business Overview—Applicable Laws and Regulations—Regulation of Exploration and Production Activities—Business Regulation—Royalties* for a description of the current royalty scheme.

Our operations in Colombia are subject to extensive national, state and local environmental regulations. Environmental rules and regulations are applicable to our exploration, production, refining, transportation, supply and marketing activities, as well as the biofuels we produce. These regulations establish, among other things, quality standards for hydrocarbon products, air emissions and greenhouse gases, water discharges and waste disposal, soil remediation, water pollution and the general storage, handling, transportation and treatment of hydrocarbons in Colombia. Currently, all exploratory drilling projects in areas that do not yet have a license must undergo an environmental impact assessment and must receive an environmental license from the governmental agency responsible for awarding environmental licenses, the Environmental License National Agency or ANLA. Environmental authorities with jurisdiction over our activities routinely inspect our crude oil fields, refineries and other production sites, and they may decide to open investigations or sanction proceedings, which may result in the imposition of fines, restrictions on operations or other sanctions in connection with potential non-compliance with environmental laws.

We are also subject to control and monitoring by the regional autonomous corporations (CAR), which are regional environmental authorities that grant permits for the use and exploitation of natural resources, establish compensation measures for the use of these resources, and perform monitoring, control and impose sanctions as result of investigations.

If we fail to comply with any of these national or regional environmental regulations, we could be subject to administrative and criminal penalties, including warnings, fines or closure orders of our facilities. Any such criminal penalty would be imposed on the legal representatives of the Company, including any legal representative, director or worker who participated or failed to take action related to the activities that lead to environmental damage. See section *Business Overview—Applicable Laws and Regulations—Regulation of Exploration and Production Activities—Business Regulation—Environmental Licensing and Prior Consultation*.

Environmental regulation has become more stringent in Colombia in recent years. As a result, our operating costs have increased in order to comply with these new technical environmental requirements as well as the need to strengthen our specialized team in charge of environmental compliance in project and operations. If environmental laws continue to impose additional costs on us, we may need to reduce our investments on strategic projects in order to allocate funds to environmental compliance. We are also exposed to delays in obtaining environmental licenses from ANLA, which can lead to cost overruns or to changes in our investment plans. These additional costs may have a negative impact on the profitability of the projects we intend to undertake or may make them economically unattractive, in turn having a negative impact on our results of operations and financial condition.

Some of the companies in the business group perform exploratory activities outside of Colombian territory. As such, such companies are subject to foreign environmental regulations for the exploratory activities conducted by the business group outside of Colombia. Failure to comply with foreign environmental regulations may result in investigations by foreign regulators, which could lead to fines, warnings or temporary suspensions of our operations, which could have a negative impact in the consolidated financial statements and results of operations of the group.

In addition, the companies of the business group conducting upstream activities outside Colombia may be subject to foreign health, safety and environmental regulations. Foreign health and safety regulations may be more severe than those established under Colombian law and, therefore, we may be required to make additional investments to comply with those regulations.

Under certain of our credit agreements, we are under an obligation to comply with international environmental standards established by our lenders or by multilateral institutions. Failure to comply with such environmental standards could result in an event of default under the relevant credit agreements that we, or our subsidiaries, have entered into, which would affect our financial condition.



***We may incur losses and spend time and money defending pending lawsuits and arbitrations and responding to administrative investigations.***

We are currently a party to several legal proceedings filed against us. We are also subject to labor-related lawsuits filed by current and former employees in connection with pension plans and retirement benefits. As of December 31, 2018, Ecopetrol S.A. was a party to 4,681 legal proceedings relating to civil, administrative, environmental, tax, and labor claims, of which 3,279 were filed against us in the Colombian courts and arbitration tribunals and of which 386 had an accrual provision. We allocate substantial amounts of money and time to defend against these claims, in which the claimants often seek substantial sums of money as well as other remedies. See Note 21 to our consolidated financial statements and see section *Risk Review—Legal Proceedings and Related Matters*. In addition, in accordance with Colombian law, we and our employees are subject to surveillance and investigations by certain administrative control entities in Colombia, which are intended to determine whether public funds have been misused, mismanaged or misappropriated or whether they have been used in compliance with applicable law. Such investigations may divert the attention of management and subject the Company to reputational risk and increase difficulties in retaining talent. See section *Risk Review—Legal Proceedings and Related Matters*.

#### **5.1.4 *Risks Related to Our ADSs***

This section discusses potential risks associated with an investment in our American Depositary Shares (as opposed to our common shares) by investors outside Colombia.

***Holders of our ADSs may encounter difficulties in protecting their interests.***

Holders of our ADSs do not have the same voting rights as holders of our common shares. As set forth in the amended and restated deposit agreement, dated December 29, 2017, among Ecopetrol S.A., JP Morgan Chase Bank, N.A., as depositary (the “Depositary”), and all holders from time to time of our American Depositary Receipts (as amended and restated, the “Deposit Agreement”), holders of our ADSs may instruct the Depositary, to vote on shareholder matters prior to a shareholders’ meeting.

Colombian law is not clear about the need to request proxies from existing shareholders. Thus, holders of our ADSs may not become aware of some matters in time to instruct the Depositary to vote their shares.

The Deposit Agreement provides holders of our ADSs with the right to instruct the Depositary to vote common shares separately. However, holders of our ADRs should be aware that in Colombia, it is uncertain whether a depositary must vote all common shares of a Colombian corporation in an American Depositary Receipt, or ADR, program in the same manner as a single block or may vote them separately. Accordingly, if either the custodian or the Depositary are not able to vote the common shares (including the right to receive common shares in the form of ADRs) deposited under the Deposit Agreement and any other securities, cash or property from time to time held by the Depositary in respect or in lieu of deposited common shares (the “Deposited Securities”) separately, all such Deposited Securities shall be voted based on the majority vote of the voting instructions timely received from holders of ADRs. In the case of such single block voting, all holders of ADRs, including holders of ADRs for which no voting instructions are timely received and holders of ADRs with voting instructions contrary to the voting instructions of a majority of the Deposited Securities timely received, should be aware that the Deposited Securities shall all be voted as a single block and that the voting instructions of such holders of ADRs will be deemed given in the manner stated above.

The Depositary will not itself exercise any voting discretion in respect of any Deposited Securities. The holders of our ADRs will be solely responsible for any exercise of the voting rights of the Deposited Securities represented by the ADRs if such vote is made pursuant to the procedures described in the Deposit Agreement. Holders of ADRs are strongly encouraged to forward their voting instructions as soon as possible as voting instructions will not be deemed received until such time as the ADR department responsible for proxies and voting has received such instructions, notwithstanding that such instructions may have been physically received by the Depositary, prior to such time.

In the future, the Colombian regulatory authorities may clarify their interpretation as to how the voting rights should be exercised by holders of our ADSs, and such possible interpretation could adversely affect the value of the common shares and ADSs.

***Our ADSs holders may be subject to restrictions on foreign investment in Colombia.***

Colombia's International Investment Statute (the set of rules and regulations which govern the foreign exchange market and the transactions thereto, which include Decree 1068 of 2015, Resolution 1 of 2018 and External Circular DCIN 83 issued by the Colombian Central Bank among others) regulates the manner in which non-Colombian residents can invest in Colombia and participate in the Colombian securities market. Among other requirements, Colombian law requires foreign investors to register certain foreign exchange transactions with the Colombian Central Bank and outlines the necessary procedures to authorize certain types of foreign investments. Colombian law requires that certain foreign exchange transactions, including international investment in foreign currency between Colombian residents and non-Colombian residents, must be made through the foreign exchange market, either through authorized foreign exchange market intermediaries or compensation accounts, which are regular bank accounts held abroad by Colombian residents and registered with the Colombian Central Bank. Any income or expenses under our ADR program must be made through the foreign exchange market.

Investors acquiring our ADRs are not required to register with the Colombian Central Bank directly, as they will benefit from the registration to be obtained by the custodian for our common shares underlying the ADRs in Colombia. If investors in ADRs choose to surrender their ADRs and withdraw common shares, they must register their investment with the Colombian Central Bank in the common shares as a portfolio investment through their local representative, which may be a brokerage firm, trust company or investment management companies supervised by the Superintendence of Finance. Investors will only be allowed to transfer dividends abroad after their foreign investment registration procedure with the Colombian Central Bank has been completed. Investors withdrawing common shares could incur expenses and/or suffer delays in the application process. The failure of a non-resident investor to report or register foreign exchange transactions with the Colombian Central Bank relating to investments in Colombia on a timely basis may prevent the investor from remitting dividends abroad, or result in the initiation of an investigation and in the imposition of fines. In the future, the Government, the Colombian Congress or the Colombian Central Bank may amend Colombia's International Investment Statute or the foreign investment rules, which could result in more restrictive rules and could negatively affect trading of our ADSs.

Colombia currently has a free convertibility system. If a more restrictive convertibility system is implemented, the Depositary may experience difficulties when converting Colombian Peso amounts into U.S. dollars to remit dividend payments. Also, currently Colombia has a floating exchange rate system that might be subject to change in the future. See section [Shareholder Information—Exchange Controls and Limitations](#).

***Holders of our ADSs may not be able to effect service of process on us, our directors or executive officers within the United States, which may limit your recovery in any foreign judgment you obtain against us.***

We are a mixed economy company organized under the laws of Colombia. In addition, most of the members of our Board of Directors ("Directors") and executive officers reside outside the United States. All or a substantial portion of our assets and the assets of these persons are located outside of the United States. As a result, it may not be possible for you to effect service of process within the United States upon us or these persons or to enforce judgments against us or them in U.S. courts obtained in such courts predicated upon the civil liability provisions of the U.S. federal securities laws. Colombian courts determine whether to enforce a U.S. judgment predicated on the U.S. securities laws through a procedural system known as *exequatur*. For a description of these limitations, see section [Shareholder Information—Enforcement of Civil Liabilities](#).

***The protections afforded to minority shareholders in Colombia are different from those in the United States, and may be difficult to enforce.***

Under Colombian law, the protections afforded to minority shareholders are different from those in the United States. In particular, the legal framework with respect to shareholder disputes is substantially different under Colombian law than U.S. law and there are different procedural requirements for commencing shareholder lawsuits, such as shareholder derivative suits. As a result, it may be more difficult for our minority shareholders to enforce their rights against us or our Directors or controlling shareholder than it would be for shareholders of a U.S. company.

***ADRs do not have the same tax treatment as other equity investments in Colombia.***

Although ADRs represent Ecopetrol's common shares, for Colombian tax purposes, ADRs are securities different from their underlying assets. Therefore, ADR holders are not entitled to the tax treatment granted to holders of the common shares. Such tax treatment includes, among others, benefits relating to dividends and to profits derived from sale of Colombian common shares. For further information, see section [Shareholder Information—Taxation—Colombian Tax Considerations](#).

***Judgments of Colombian courts with respect to our ADSs will be payable only in Colombian Pesos.***

If proceedings are brought in the courts of Colombia seeking to enforce the rights of ADS holders of common shares, we will be required to discharge our obligation amounts in Colombian Pesos. Colombian law provides that an obligation in Colombia to pay amounts denominated in foreign currency may only be satisfied in Colombian currency at the Representative Market Exchange Rate of the date the judgment is obtained, and such amounts are then adjusted to reflect exchange rate variations through the effective payment date.

***The relative volatility and illiquidity of the Colombian securities markets may substantially limit our investors' ability to sell our ADSs at the price and time they desire.***

Investing in securities that are traded in emerging markets, such as Colombia, often involves greater risk when compared with other world markets, and these investments are generally considered to be more speculative in nature.

The Colombian securities market is substantially smaller, less liquid, more concentrated and can be more volatile than other securities markets in the United States. As of December 31, 2018, the Colombian Stock Exchange ("BVC") had a market capitalization of approximately COP\$339,653 billion (US\$104.52 billion using the closing rate for 2018), a 7% decrease when compared with the amount at the end of 2017, a daily average trading volume of approximately COP\$147,031 million (US\$45.24 million, using the average exchange rate for 2018), a 6% increase when compared with the volume in 2017. By comparison, the New York Stock Exchange (the "NYSE") had a market capitalization of US\$25.7 trillion as of December 31, 2018, and a daily trading volume of approximately US\$71.8 billion in 2018.

As of December 31, 2018, our shares represented the highest market capitalization of the BVC accounting for 14.54% of the total COLCAP index, which reflects the price volatility of the 20 most-liquid stocks.

Given the current ownership structure of our shares, it may be difficult for you to purchase large quantities of shares from a single shareholder. We cannot assure you that a liquid trading market for our ADSs will develop or, if developed, that it will be maintained. Without a liquid trading market, the ability of investors in our ADSs to sell them at the desired price and time could be substantially limited.

***We are not required to disclose as much information to investors as a U.S. issuer is required to disclose.***

We are subject to the reporting requirements of the Superintendence of Finance and the BVC - (Colombian Stock Exchange). The corporate disclosure requirements that apply to us may not be equivalent to the disclosure requirements that apply to a U.S. issuer and, as a result, you may receive less interim information about us than you would receive from a U.S. issuer.

**5.1.5 Risks Related to the Controlling Shareholder**

***Our controlling shareholder's interests may be different from those of certain minority shareholders.***

The Nation currently holds 88.49% of our outstanding capital stock, making it our controlling shareholder. The Nation as our controlling shareholder has majority voting rights at the General Shareholders Assembly to elect the members of our Board of Directors and may propose and approve decisions that may be in its own interest and that may not necessarily benefit minority shareholders.

Our controlling shareholder may approve dividends at the ordinary General Shareholders Assembly, notwithstanding the interest of certain minority shareholders, in an amount that results in us having to reduce our capital expenditures or increase our debt levels, thereby negatively affecting our prospects, results of operations and financial condition. See the section [Shareholder Information—Dividend Policy](#).

Additionally, our controlling shareholder may undertake projects, approve decisions or make announcements about its intentions related to its holding of the Company's stock, which may not be in our best interest or in the best interest of our minority shareholders, including holders of our ADSs, and could affect the price of our shares or ADSs.

## **5.2 Risk Management**

### **5.2.1 Managing Risk through Our Internal Control System**

Under the leadership of the Vice-Presidency of Compliance, Ecopetrol S.A. consolidated its internal control systems into a unified system that integrates the best practices called for by the Committee of Sponsoring Organizations of the Treadway Commission (COSO 2013), Sarbanes-Oxley Act (SOX), governance and management of enterprise IT (COBIT), Enterprise Risk Management (ERM) and our ethics and compliance rules, with the aim of establishing an integrated management system for all control components, thereby allowing us to strengthen all of our control system.

The main purpose of the Ecopetrol S.A.'s Internal Control System is to provide reasonable assurance regarding the achievement of all of the Company's objectives relating to operations, strategy, reporting and compliance, through the appropriate risks management and ensuring the effectiveness of its controls. The system performance is systematically monitored by the Board of Directors.

Ecopetrol S.A.'s Internal Control System is aligned to the Company's strategy and business processes and gives responsibility to all employees to manage risk, to maintain the effectiveness of controls, to report incidents in order to preventively correct possible deficiencies and to provide reasonable assurance of achieving corporate objectives and goals.

The risk management component of our Internal Control System is in charge of identifying events or situations that may affect our defined objectives, assessing and prioritizing them to implement the most appropriate response. This component has been designed and implemented across the organization, with a two-level focus: Enterprise Risk and Processes Risks.

- (i) **Enterprise Risks:** Are those risks that are directly associated with the business strategy plan of the Company and are systematically monitored by the Management Committee. The management of those risks is led by the person accountable for the process and each risk has a defined treatment plan and monitoring indicators.
- (ii) **Processes Risks:** Are those risks that tend to identify potential failures in the activities related to our core and support business processes that drive us to achieve our objectives. At this level, our processes have identified risks with their respective mitigation methods, including financial and non-financial controls, treatment plans and/or monitoring indicators.

Our risk management approach is based on the risk management cycle, consisting in five main stages: planning, identifying, evaluating, treatment and monitoring risks, as well as communication across all stages. This cycle is supported in three pillars of risk management: culture, organizational structure and normative and management tools.

Three of our most important tools within the risk management component are:

- (i) **Risk Assessment Methodology:** In order to properly prioritize mitigation, treatment and monitoring efforts of risk management at the process level, a standardized methodology was established to assess inherent and residual risk levels. The risk level (Very High, High, Medium, Low or None) is obtained from the combination of the consequences (impacts) and the probability of occurrence of those consequences. According with the level of risk, action plans for management and mitigation are defined.

- (ii) **Mitigation Plans:** Each year, by performing the stages of the risk management cycle, we define and implement mitigation plans in order to reduce the levels of exposure to risk through mitigation or elimination of some of its causes. Metrics and goals must be defined during the development of each plan to ensure its effectiveness and to prioritize our efforts on those with the greatest impacts.
- (iii) **Monitoring Indicators:** As part of the monitoring stage of the risk management cycle, Ecopetrol has implemented Key Risk Indicators (KRIs) which are metrics used to provide early signals of increasing risk exposures. These signals constitute information for preventative decision making in order to avoid risk materialization.

Ecopetrol has also defined guidelines and implemented an Internal Control System, the scope of which includes its subsidiaries. Under those guidelines, each subsidiary must implement and report the performance of its Internal Control System to Ecopetrol S.A. to ensure compliance with the above measures, and the subsidiaries have methodological support from Ecopetrol S.A. when requested. Ecopetrol S.A. also performs preventive monitoring in selected subsidiaries to assure all the components and principles of their Internal Control Systems are present and operating.

### **5.2.2 Managing Information Security and Cybersecurity**

Ecopetrol S.A. has a dedicated management team focused on information security issues such as risk analysis, treatment of information, safe information management practices and classification of critical business information, control systems compliance and effectiveness of available information security technologies, all of which are articulated with the ERM system at the enterprise level.

Ecopetrol S.A. has included cybersecurity risk as one of the key enterprise risks. Based on that, a working group formed in 2014, coordinated by the cybersecurity area with the participation of industrial control systems specialists, has been understanding the new challenges of cybersecurity risk, developing activities to identify and protect critical digital assets.

During 2018, Ecopetrol S.A., as a NOC (National Oil Company), provided updates to the Cyber Defense Command Unit (an entity under the control of the Colombian Ministry of Defense) the inventory of its critical cybernetic infrastructure that was included in the classified catalogue of national critical cybernetic infrastructure.

Ecopetrol's cybersecurity team established a plan to continue the incorporation of cybersecurity practices to enhance the awareness about these risks at an operational level and adjust current information security practices considering the cyber-threat context. Likewise, as a result of this process, we are currently continuing the incorporation of elements relative to management of the cyber security threat, including policies, specialized monitoring and control mechanisms, vulnerability management and cybersecurity insurance coverage, among others.

Ecopetrol S.A. has a Security Operations Center service, in order to enhance the ability to foresee and identify trends in attacks in Ecopetrol S.A.'s information technology infrastructure and to monitor Ecopetrol's reputation on the internet.

While there were cyber-attacks during 2018, there were no material effects on processes, equipment, products, services, relationships with customers or suppliers, competitive conditions or critical information. Ecopetrol S.A. does not have any current proceedings that relate to cybersecurity issues.

Furthermore, during 2018, the internal audit department conducted an audit on cybersecurity processes with an emphasis on the exploration area and follow up on our prior enhancement plans. As a result of such audit, an action plan was established to be implemented in 2019. The primary goal of the plan is to reinforce our cybersecurity strategy and refine certain technical components of our cybersecurity program.

In connection therewith, Ecopetrol updated its cybersecurity risk profile and its cybersecurity strategy, by naming the management team of the Cybersecurity unit to oversee information technology, operational technology and activities at the Ecopetrol Group level. In addition, the Cybersecurity unit was placed within the Digital Vice Presidency, reporting directly to senior management.

Ecopetrol adopted the ONG-C2M2 (Oil & Gas - Cybersecurity Capability Maturity Model) as a framework to manage its cybersecurity profile. Finally, Ecopetrol updated its cybersecurity policies and cyber-incidents response procedure.

### 5.2.3 *Managing Financial Risk*

We are exposed to certain risks associated with the nature of our operations and the financial instruments we use. Among the risks that affect our financial assets, liabilities and expected future cash flows are changes in commodity prices, currency exchange rates, interest rates and the credit quality of our counterparties.

Commodity price risk is associated with our day-to-day operations as we export and import crude oil, natural gas and refined products. We occasionally use hedges to partially protect our financial results from price fluctuations taking into account that part of our financial exposure under purchase contracts for crude oil and refined products depends on international oil prices. We believe that the risk of such exposure is partially naturally hedged since we are an integrated group (with operations in the upstream, midstream and downstream segments) and either export crude oil at international market prices or sell refined products at prices that are correlated to international market prices. We do not use derivative financial instruments for speculative or profit-generating purposes.

Currency risk arises in our operations given the fact that most of our revenues are derived from sales of products quoted in or with reference to U.S. dollars. Therefore when the Colombian Peso depreciates against the U.S. dollar, our revenues converted into Colombian Pesos increase. Conversely, when the Colombian Peso appreciates against the U.S. dollar, our revenues decrease. On the other hand, imported goods, oil services and the debt, which is mainly denominated in U.S. dollars, become less expensive when the Colombian Peso appreciates against the U.S. dollar and more expensive when the Colombian Peso depreciates against the U.S. dollar.

As of December 31, 2018 our U.S. dollar-denominated total debt was US\$10.5 billion, which we recognize in our consolidated financial statements at its amortized cost, which corresponds to the present value of cash flows, discounted at the effective interest rate. Out of this total, US\$9.7 billion relate to Ecopetrol S.A., whose functional currency is the Colombian Peso. Therefore, when the Colombian Peso depreciates against the U.S. dollar, Ecopetrol S.A. is exposed to an exchange rate loss. In contrast, when the Colombian Peso appreciates against the U.S. dollar, Ecopetrol S.A. is exposed to an exchange rate gain. Some of the Ecopetrol Group's subsidiaries have the U.S. dollar as functional currency and are not exposed to a material exchange rate risk resulting from fluctuations in the Colombian Peso against the U.S. dollar. On the asset side, when the financial statements of the Group are consolidated, the exchange rate differential of the subsidiaries' assets and liabilities whose functional currency is the U.S. dollar is recognized directly in equity, as part of other comprehensive income.

Taking previous considerations into account, Ecopetrol seeks to identify and manage currency risk in a comprehensive manner, using an integrated analysis of natural hedges in order to benefit from the correlation between income or investments in a foreign operation and debt denominated in foreign currency. In addition, the risk management strategy of the Company may involve the use of financial derivative instruments, and non-derivative financial instruments. As a part of its risk management strategy, using the natural hedge between exports and dollar-denominated debt, on October 1, 2015, US\$5.4 billion of Ecopetrol S.A.'s debt in U.S. dollars was designated as hedge instrument of its future export sales for the period 2015 – 2023. On June 8, 2016, Ecopetrol continued its hedge accounting strategy, using the natural hedge between some of its foreign investments and its dollar-denominated debt in an amount of US\$5.2 billion. As of December 31, 2018, the outstanding value of the natural accounting hedges was US\$6.5 billion. The remaining portion of our dollar-denominated debt, as well as the financial assets and liabilities denominated in foreign currency continue to be exposed to the fluctuation of the exchange rate, which means that an appreciation of the Colombian peso against the U.S. dollar could generate a loss if companies whose functional currency is the Colombian peso have an active net position in U.S. dollars or a gain if they have a net liability position in U.S. dollars. Conversely, a depreciation of the Colombian peso against the U.S. dollar could generate a gain if companies whose functional currency is the Colombian peso have a net active position in U.S. dollars or a loss if they have a net liability position in U.S. dollars. Finally, the Company maintains enough cash in Colombian pesos and U.S. dollars to meet its expenses in each currency (see Note 4.1.5 to our financial statements for further explanation of our accounting policy and Note 28.1 for details of the hedge accounting adopted). With the adoption of hedge accounting, the effect of volatility of foreign exchange rate on the effective hedged portion of the debt is recognized directly in equity, as part of other comprehensive income. Our hedge management strategy is completely focused on our accounting, reason why the ultimate effect will only be determined when the hedge operations come to an end. Nevertheless, it is important to bear in mind that for Ecopetrol S.A.'s cash flow, the effect of the Colombian peso appreciation against the U.S. dollar is positive given the fact that we habitually convert our income in foreign currency to Colombian pesos.

Interest rate risk arises from our exposure to changes in interest rates mainly as a result of the issuances of floating rate debt linked to LIBOR, DTF and CPI (with a participation of 4.6%, 5.0% and 4.2%, respectively, of the nominal debt balance as of December 31, 2018). Thus, volatility in interest rates may affect the fair value of and cash flows related to our investments and floating rate debt. In 2018, our analysis of credit risk events and global financial markets drove us to decide not to hedge interest rate risk. Nevertheless, our capital markets office continuously monitors the performance of interest rates and the effect of interest rates on our financial statements.

The trust funds linked to Ecopetrol S.A.'s pension obligations (PAP) are also exposed to changes in interest rates, as they include fixed- and floating-rate instruments that are mark to market. This exposure is continuously monitored by our treasury office given the potential impact volatility may have on our financial results. The treasury office's information is gathered from reports provided by the asset managers. These reports refer to regulatory limits as well as market, credit and liquidity risks. The investment guidelines with respect to the PAPs are issued by the Colombian regulation for pension funds, as stipulated in the Decree 1833 of 2016 and Decree 1913 of 2018, where it is indicated that they have to follow the same regime as the regular obligatory pension funds in their moderate (*i.e.*, neither conservative nor aggressive) portfolio. For further information regarding the trust funds linked to the pension obligations of the company, see Note 20.2 Plan assets to our consolidated financial statements.

Finally, counterparty risk is the potential probability that a borrower or counterparty defaults on any obligation. In our case, we are exposed to this risk as we invest in different financial instruments and receive letters of credit in order to mitigate our exposure with our commercial counterparties. We manage this risk by monitoring and analyzing the counterparty's creditworthiness, stock price behavior, spreads on credit default swaps, probability of default, among others.

## **Investment Guidelines**

### ***Ecopetrol S.A.***

Ecopetrol S.A.'s management established guidelines for our investment portfolios. These guidelines determine that investments in Ecopetrol S.A.'s U.S. dollar portfolio are generally limited to investments of our excess cash in fixed-income securities issued by entities rated A or higher in the long term and A1/P1/F1 or higher in the short term (international scale) by Standard & Poor's Ratings Services, Moody's Investors Service or Fitch Ratings. In addition, Ecopetrol S.A. may also invest in securities issued or guaranteed by the U.S. government or Colombian government, without regard to the ratings assigned to such securities. In Ecopetrol S.A.'s Colombian Peso portfolio, it must invest our excess cash in fixed-income securities of issuers rated AAA in the long term, and F1+/BRC1+ in the short term (local scale) by Fitch Ratings Colombia or BRC Standard & Poor's. In addition, Ecopetrol S.A. may also invest in securities issued or guaranteed by the Colombian government without rating restrictions.

On December 2018, Ecopetrol S.A.'s management approved an update to the investment guidelines applicable for both U.S. Dollars and Colombian Pesos, that has been effective since January 1, 2019. The guidelines were updated in light of the following: the current reality of the financial markets, alignment with the practices of comparable companies in the oil sector, the Ecopetrol Group's current corporate structure and the need to have a larger investment universe with the objective of generating higher returns on resources with an acceptable level of risk. The primary changes are:

- Both the Ecopetrol S.A. U.S. Dollar portfolio and the Colombian Peso portfolio may be invested in fixed income securities issued by entities with a rating equal to or greater than Ecopetrol S.A.'s credit risk rating, but which at all times must be a minimum of investment grade as rated by any of the internationally recognized rating agencies (Standard & Poor's Moody's, and Fitch Ratings).

- In order to diversify risk in both our U.S. Dollar and Colombian Peso portfolios, Ecopetrol S.A.'s management will determine short and long term limits by issuer and issuance based on internal analyzes and external risk ratings.
- Additionally, the portfolios in U.S. Dollar and Colombian Peso of Ecopetrol S.A. will be segmented in the tranches determined by Ecopetrol S.A.'s management, meeting the Company's working capital and liquidity needs, benchmarks and cash flow projections.

### 5.3 Legal Proceedings and Related Matters

We are a party to various legal proceedings in the ordinary course of business. Other than the proceedings disclosed in this annual report, we are not involved in any pending (or, to our knowledge, threatened) litigation or arbitration proceeding that we believe will have a material adverse effect on our Company. Other legal proceedings that are pending against or involve us and our subsidiaries are incidental to the conduct of our and their business. We believe that the ultimate disposition of such other proceedings individually or in an aggregate basis will not have a material adverse effect on our consolidated financial condition or results of operations.

As of December 31, 2018, Ecopetrol S.A. was a party to 4,681 legal proceedings relating to civil, administrative, environmental, tax and labor claims, of which 3,279 were filed against us in the Colombian courts and arbitration tribunals, of which 386 had an accrual provision. We allocate sufficient amounts of money and time to defend these claims. Historically, we have been successful in defending lawsuits filed against us. Other than the environmental administrative proceedings described in the last paragraph of this section, based on the advice of our legal advisors, it is reasonable to assume that the litigation procedures brought against us will not materially affect our financial position or solvency regardless of the outcome. See Note 21 to our consolidated financial statements included in this annual report for a discussion of our legal proceedings.

#### *Caño Limón – Coveñas Crude Oil Pipeline Spill*

On December 11, 2011, the Caño Limón-Coveñas oil pipeline ruptured and caused the spill of approximately 3,267 barrels of crude oil into the Iscala creek, which connects with the Pamplonita River that provides water to the city of Cúcuta. The incident did not cause any fatalities or injuries.

A class action lawsuit has been filed against Ecopetrol S.A. and against employees of the company, and the First Administrative Court has jurisdiction to conduct the case, which is in the probatory stage.

The Regional Environmental authority of Norte de Santander, or Corporación Autónoma Regional de la Frontera Nororiental (CORPONOR) has filed a lawsuit against Ecopetrol at the Administrative Court of Norte de Santander claiming for (i) the environmental loss caused by the incident and (ii) for compensation costs relating to the environment damage for approximately COP\$33 billion. Ecopetrol's legal counsel filed to dismiss the lawsuit on June 2, 2014, based on three grounds: (i) there is no proof of environmental loss, (ii) CORPONOR does not have the authority to file this lawsuit and (iii) CORPONOR's petition for direct compensation is not the proper legal action according to the applicable procedural rules. Currently this lawsuit is in the evidentiary stage.

Ecopetrol and national and local authorities convened to develop a project consisting of an alternative to the water supply in the intake of the aqueduct in Cúcuta, The Company's Board of Directors in December 2011 approved the participation of Ecopetrol in the project as part of the strengthening of its contingency plans and its relationship with its stakeholders. On November 10, 2017, the relevant parties entered into an agreement with the purpose of building the alternative water supply at a cost of approximately COP\$385 billion. According to the agreement Ecopetrol will be in charge of the construction of the above mentioned infrastructure. As of the date of this annual report, Ecopetrol has awarded one construction contract. For the initial segment of the project and a second construction contract for a subsequent segment is soon to be awarded. The corresponding auditing contract has also been awarded.

#### *BT Energy Challenger*

On October 22, 2014, we were served with a class action suit against us seeking monetary damages of approximately COP\$7.4 trillion related to an incident that occurred on August 21, 2014, during the loading operations of the BT Energy Challenger vessel. The claimants alleged possible damage to the port area of Ecopetrol's terminal in Coveñas, as well as of marine and submarine areas and beaches that form the geographical area of the Morrosquillo Gulf. This allegation is currently under investigation by the Harbor Master of Coveñas. Ecopetrol filed a motion requesting the judge to require the claimants to amend their claim to more precisely set forth the facts and evidence it believes establishes Ecopetrol's liability.



On March 3, 2015, Ecopetrol filed its statement of defense arguing the exclusive fault of a third party. On October 20, 2015, the Court denied a class action of more than 100 informal traders in the region because there is no common identity with the initial class (hotel employees). However, during 2016 the Sucre Administrative Tribunal accepted another 1,208 informal traders and fishermen as claimants.

On March 10, 2017, a mandatory conciliatory hearing was held in order to seek an agreement but it failed.

In January 2018, a judicial order was issued to commence the evidence gathering process, a decision which was objected by the parties.

In September 2018, all the ordered statements were made, the evidentiary stage was finalized and the parties filed their final closing briefs. As of the date of this annual report the case remained pending.

#### *PetroTiger*

As highlighted in previous 20-F and 6-K filings, on January 6, 2014, the United States Department of Justice (DOJ) announced the unsealing of charges against two former co-chief executive officers (CEOs) and the former general counsel of PetroTiger Ltd. (PetroTiger), alleging, among other things, violations of the U.S. Foreign Corrupt Practices Act (FCPA) and conspiracy to commit violations of the FCPA and money laundering in connection with payments made to an Ecopetrol employee. By the time of the DOJ announcement, that employee no longer worked at the Company. The DOJ alleged the payments were made to secure Ecopetrol's approval for PetroTiger's entry into an oil services contract with Mansarovar Energy Colombia Ltd. Ecopetrol participated in the Mansarovar project as non-operating partner in a joint operating agreement. Also on January 6, 2014, the DOJ announced that the general counsel of PetroTiger had pled guilty on November 8, 2013, to one count of conspiracy to violate the FCPA and to commit wire fraud. One of the charged former co-CEOs pleaded guilty on February 18, 2014, to the same charge. On May 9, 2014, the DOJ charged the other former co-CEO with conspiracy to violate the anti-bribery provisions of the FCPA, conspiracy to commit wire fraud, conspiracy to launder money, and substantive FCPA anti-bribery and money laundering violations. On June 15, 2015, that co-CEO pleaded guilty to conspiracy to violate the FCPA.

After the DOJ unsealed its charges on January 6, 2014, Ecopetrol filed a complaint the same month, jointly with the Transparency Secretariat of the Presidency of the Republic, to Colombia's Attorney General's office requesting the investigation of individuals who may have been involved in the wrongdoing related to the Mansarovar contract. Colombian authorities initiated a proceeding related to PetroTiger, and on March 11, 2015, arrested four current Ecopetrol employees and two former Ecopetrol employees related to their investigation of the Mansarovar project and five other contracts involving PetroTiger and Ecopetrol. To date, four investigations of the control entities continue in course. During 2017 and 2018 to date, Colombian authorities have resolved an appeal confirming the conviction of a former Ecopetrol employee and another person involved in the case but not linked with Ecopetrol. Likewise, another appeal submitted by Ecopetrol and the Prosecutor's Office is in progress in a case in which a former Ecopetrol employee was acquitted.

Ecopetrol has responded to information requests from the DOJ and Colombian authorities in connection with their investigations of PetroTiger. Ecopetrol has been designated with the formal status of victim in the local Colombian proceedings. It has terminated the employment of the four charged individuals who were Ecopetrol employees at the time of the arrests. Ecopetrol has concluded an internal investigation and has not identified any new issues relating to PetroTiger.

#### *Salgar-Cartago Multipurpose Pipeline Spill*

On December 23, 2011 our Salgar-Cartago pipeline ruptured. Internal and external experts believe this incident occurred as a result of creep movement of soil caused by severe weather conditions, causing the soil surrounding the pipeline to exert strong pressure on the pipeline and rupture it. As of the date of this annual report, there are eight lawsuits related to this incident with possible damages of approximately COP\$7.7 billion.

### *Class action of the AWA Indigenous Community*

On April 2, 2018, a class action lawsuit was filed against Ecopetrol and CENIT by the Inda Guacaray and Inda Sabaleta reservations of the AWA Indigenous community who claim damages to their communities by environmental contamination and damage to natural resources that the defendants supposedly caused by act or omission during various environmental incidents. In August 2018 Ecopetrol answered the complaint. The parties are currently waiting for the evidentiary stage to start.

Although the plaintiffs did not clearly determine the amount of their claims, Ecopetrol and the National Agency for Legal Defense (Agencia Nacional de Defensa Jurídica del Estado or ANDJE) have initially calculated the amount to be up to COP\$358,201,371,800.

### *Environmental Administrative Proceedings*

As of December 2018, Ecopetrol S.A. was party to 218 environmental administrative proceedings, of which 206 were initiated before 2018, and 12 during 2018. During 2018, six proceedings were concluded, in two of them we were subject to monetary fines through Resolutions 200.36.18.0999 of July 16, 2018 and 200.36.18-1028 of July 17, 2018. However, another proceeding was suspended due to the replenishment of resources. It is not possible for us to determine whether the pending proceedings could have a material effect on Ecopetrol.

### *Reficar Investigations*

Reficar is a wholly owned subsidiary of Ecopetrol. According to Colombian regulations, Ecopetrol's and Reficar's employees are considered public servants, and as such can be held liable for negligent use or management of public resources. In this context, given that Ecopetrol is majority owned by the Colombian Government and Reficar is a wholly owned subsidiary of Ecopetrol, Ecopetrol and Reficar administer public resources.

As a result, Ecopetrol and Reficar employees are generally subject to the control and supervision of the following control entities, among others:

- The Office of the Comptroller General (*Contraloría General de la República*) oversees the adequate use of public resources and has the authority to investigate public employees or private sector employees that use or manage public resources.
- The Attorney General's Office (*Procuraduría General de la Nación*) supervises compliance with applicable law by public employees and private sector employees that carry out public functions. The Attorney General's Office investigates and disciplines individuals for compliance failures.
- The Prosecutor's Office (*Fiscalía General de la Nación*) investigates potential crimes and prosecutes alleged crimes before the court in judicial proceedings.

The following are the most significant investigations and proceedings carried out by the aforementioned state entities:

1. The Office of the Comptroller General's investigations and proceedings

- 1.1 Because of the modifications of the schedule and budget related to Reficar's expansion and modernization project (the "Project"), the Office of the Comptroller General initiated a special audit investigation of the Project in 2016 and delivered a final report to Reficar on December 5, 2016. The report made 36 findings most of which were related to increased costs compared to budget for services, labor and materials. As required, on January 18, 2017, Reficar submitted an action plan exposing and addressing the 36 findings in the following areas: (i) contract management, (ii) supervision of engineering standards contracted with third parties, and (iii) documentation of the control, reporting and monitoring mechanisms of subcontracts.

1.2 As a result of the findings described above, on March 10, 2017, the Office of the Comptroller General opened actions for financial responsibility (*proceso de responsabilidad fiscal*) against 36 individuals and the six companies involved in the Project, including former members of Ecopetrol's Board of Directors, former members of Reficar's Board of Directors, former employees of Ecopetrol, and former employees of Reficar, as well as Chicago Bridge & Iron Company N.V., CBI - Chicago Bridge & Iron company (CB&I) Americas Ltd., Chicago Bridge & Iron Company CB&I UK Limited, CBI Colombiana S.A., Foster Wheeler USA Corporation and Process Consultants Inc.

These actions were initiated based on the Office of the Comptroller General's theory that lower than expected profitability at Reficar could have been caused by (i) modifications to the schedule and, (ii) the increase of the budget for the Project.

On June 5, 2018, the Office of the Comptroller General split the initial proceeding in two. The first one is related to the increase of the Project's budget and the second one is related to the modifications in the Project's schedule.

Regarding the first proceeding, on June 5, 2018, the Office of the Comptroller General issued charges for financial responsibility (*proceso de responsabilidad fiscal*) against (i) 15 individuals, which include former members of Reficar's Board of Directors, a current employee of Ecopetrol, and former employees of Reficar, as well as against (ii) Chicago Bridge & Iron Company N.V., CBI - Chicago Bridge & Iron company (CB&I) Americas Ltd., Chicago Bridge & Iron Company CB&I UK Limited, CBI Colombiana S.A., Foster Wheeler USA Corporation and Process Consultants Inc, and the following insurance companies, Compañía Aseguradora de Fianzas S.A, CHUBB de Colombia, Compañía de Seguros S.A., Mapfre Seguros, as third parties with joint liability.

As for the other 21 individuals initially investigated in 2017, the Office of the Comptroller General closed the investigations. Therefore, as of the date of this annual report, no current or former member of Ecopetrol's Board of Directors was charged in the first proceeding relating to the increase in the Project's budget.

As of the date of this annual report, no charges have been issued in the second proceeding relating to the modifications in the Project's schedule.

While the content and status of the proceedings remains confidential, we can report that Reficar and several of its employees have cooperated with and provided the information required by the department of the Office of the Comptroller General in charge of leading the proceedings.

As of the date of this annual report, Reficar has no liability under these proceedings.

1.3 In January 2017, the Office of the Comptroller General initiated a special audit in Reficar and delivered a final report to Reficar on July 12, 2017. In this report the Office of the Comptroller General concluded that, in their opinion, Reficar's 2016 Financial Statements do not reasonably represent, in all important aspects, the entity's financial position as of December 31, 2016.

On February 2, 2018, the Legal Accounts Commission of the National House of Representatives of the Republic of Colombia informed Reficar that the House of Representatives decided, through Resolution No. 2713, that it would not close the General Budget and Treasury Account and the National Balance Sheet for the 2016 fiscal year, since the 2016 Financial Statements of several state entities, among them Reficar, had received a negative opinion from the Office of the Comptroller General. Pursuant to Resolution No. 2713, Colombian control entities were ordered to initiate the corresponding disciplinary, fiscal and/or criminal investigations.

1.4 In December 2017, the Office of the Comptroller General initiated a special audit in Reficar and submitted a final report to Reficar on May 18, 2018. In this report the Office of the Comptroller General concluded that, in their opinion, Reficar's 2017 Financial Statements do not reasonably represent, in all important aspects, the entity's financial position as of December 31, 2017.

On February 6, 2019, the Legal Accounts Commission of the National House of Representatives of the Republic of Colombia informed Reficar that the House of Representatives decided, through Resolution No. 3135, that it would not close the General Budget and Treasury Account and the National Balance Sheet for the 2017 fiscal year, since the 2017 Financial Statements of several state entities, among them Reficar, had received a negative opinion from the Office of the Comptroller General. Pursuant to Resolution No. 3135, Colombian control entities were ordered to initiate the corresponding disciplinary, fiscal and/or criminal investigations.

In respect of the special audits mentioned in sections 1.3 and 1.4 above, as of the date of this annual report, Reficar has no knowledge of any procedural action carried out by any of the Colombian control entities regarding the disciplinary, fiscal and/or criminal investigations ordered neither by the Resolution No. 2713 nor by the Resolution No. 3135.

1.5 In January 2019, the Office of the Comptroller General initiated a financial audit in Reficar. The final report is expected to be submitted on May 2019.

Reficar's external auditors issued an unqualified opinion on Reficar's financial position as of December 31, 2016, 2017 and 2018. As of the date of this annual report, such auditors have not informed Reficar that there has been any change to their opinion.

As of the date of this annual report, to the best of Ecopetrol's knowledge, the financial statements continue to fairly represent the financial and operational condition of the Company in all material aspects and its internal controls remain effective.

2. The Attorney General's Office investigations:

Reficar has been officially informed that the Attorney General's Office currently has five ongoing investigation related to the Project.

Regarding one of these five investigations, on September 12, 2017, the Attorney General's Office issued a list of charges against certain former members of Reficar's Board of Directors, as well as certain former officers of Reficar. The charges were related to the failure to fulfill some of their duties as administrators and/or for acting "ultra vires" in the exercise of their functions against: (i) Javier Genaro Gutiérrez (Ecopetrol CEO, 2007-2015); (ii) Felipe Laverde (Reficar General Counsel, 2009-March 2017); (iii) Pedro Rosales (Ecopetrol Downstream Executive Vice President, 2008-2015); (iv) Diana Constanza Calixto (Ecopetrol Head of the Corporate Finance Unit, 2009-2014) and (v) Reyes Reinoso Yañez (Reficar CEO, 2012-2016). The Attorney General's Office closed the case against the rest of the members of Reficar's Board of Directors and the rest of the former officers of Reficar.

The specific content and status of the remaining four ongoing investigations remains confidential.

3. The Prosecutor's Office investigations:

The Prosecutor's Office has been conducting the following legal proceedings:

3.1 Between July 25 and August 2, 2017, the Prosecutor's Office indicted the following individuals with charges, the majority of which are related to offenses against the public administration and illegal interest in the execution of agreements: (i) Orlando José Cabrales Martínez (Reficar CEO, 2009-2012); (ii) Reyes Reinoso Yañez (Reficar CEO, 2012-2016); (iii) Felipe Laverde Concha (Reficar General Counsel, 2009-March 2017); (iv) Pedro Alfonso Rosales Navarro (Ecopetrol Downstream Executive Vice President, 2008-2015); (v) Masoud Deidehban (CBI Executive Project Director); (vi) Phillip Asherman (CBI CEO) and (vii) Carlos Lloreda (Reficar's statutory auditor from 2013-2015.) The arraignment hearing began on May 30, 2018, and as of the date of this annual report has not yet concluded.

The Prosecutor's Office has already made public the factual basis for such charges, which is based on the theory that: (i) executing a cost reimbursable engineering, procurement and construction contract (EPC) and not a lump sum agreement favored CBI interests, and (ii) executing special invoicing procedures (MOA –Memorandum of Agreement and PIP –Project Invoicing Procedure) with CBI allowed the payments of unreasonable amounts not duly verified by Foster Wheeler USA Corporation. The defense attorneys have not yet had an opportunity to present their case against such facts in a court of law.

On May 9, 2017, Ecopetrol's Audit and Risk Committee retained a U.S.-based outside law firm to commence a third-party investigation into the matters set forth in the Prosecutor's Office announcement. The results were presented in December 2017 to Ecopetrol's Audit and Risk Committee. This investigation concluded that to date there has been no evidence of possible unlawful acts that affect Ecopetrol's internal control over the financial reporting of the Company, on the allegations made by the Prosecutor's Office.

3.2 On October 22 and 23, 2018, the Prosecutor's Office indicted the following individuals with charges related to improper management and obtaining false public documents: Javier Genaro Gutiérrez Pemberthy (Ecopetrol CEO, 2007-2015), Reyes Reinoso Yáñez (Reficar CEO, 2012-2016), Pedro Alfonso Rosales Navarro (Ecopetrol Downstream Executive Vice President, 2008-2015), and Diana Constanza Calixto Hernández (Ecopetrol Head of the Corporate Finance Unit, 2009-2014). As of the date of this annual report, the arraignment hearing has not yet taken place.

3.3 On March 18, 2019, the Prosecutor's Office issued a public statement in which it announced that on April 25, 2019 it was going to indict the following individuals, in an indictment hearing that has not yet taken place, with charges related to entering into agreements without compliance with legal requirements: Orlando José Cabrales Martínez (Reficar CEO, 2009-2012) and Felipe Castilla (Reficar CEO, 2009).

Considering the current stage of these legal proceedings, we are not in a position to predict the outcome of the Prosecutor's Office's investigation or the disposition of any of the charges brought by the Prosecutor's Office.

Ecopetrol and Reficar have cooperated closely and extensively with the control entities in furthering their investigations and will continue to monitor the status and development of these investigations.

#### 4. Arbitration Tribunal

In March 2016, Reficar filed a Request for Arbitration before the International Chamber of Commerce (the "ICC"), against Chicago Bridge & Iron Company N.V., CB&I (UK) Limited, and CBI Colombiana S.A. (jointly, "CB&I") concerning a dispute related to the Engineering, Procurement, and Construction Agreements entered into by and between Reficar and CB&I for the expansion of the Cartagena Refinery in Cartagena, Colombia. Reficar is the Claimant in the ICC arbitration and seeks no less than US\$2 billion in damages plus lost profits.

On May 25, 2016, CB&I filed its Answer to the Request for Arbitration and Counterclaim for approximately US\$106 million and COP\$324,052 million. On June 27, 2016, Reficar filed its reply to CB&I's counterclaim denying and disputing the declarations and relief requested by CB&I. On April 28, 2017, CB&I submitted its Statement of Counterclaim increasing its claims to approximately US\$116 million and COP\$387,558 million. On March 16, 2018, CB&I submitted its Exhaustive Statement of Counterclaim further increasing its claims to approximately US\$129 million and COP\$432,303 million (including in each case interest).

The date for the filing of the Third Written Submission is to be set by the Arbitral Tribunal and the oral hearing is scheduled to begin in April 2020. After the hearing, the Tribunal will analyze the parties' arguments to render its final decision on Reficar's and CB&I's claims. Until then, the outcome of this arbitration is unknown.

#### *Bioenergy Special Audit*

The Office of the Comptroller General, in exercise of its fiscal monitoring duties and authority as set forth in Article 267 of the Political Constitution, has undertaken audits of the performance of the Bioenergy S.A.S. and Bioenergy Zona Franca S.A.S. investments.

On February 6, 2017 the Office of the Comptroller General initiated a Special Intervention (Special Audit) in order to evaluate the use of public funds in the project carried out by Bioenergy Zona Franca S.A.S. and Bioenergy S.A. On July 10, 2017 the Office of the Comptroller General issued its final report with 15 findings related to: (i) acquisition, lease payments and the use of agricultural lands, (ii) loss of profits due to the project's delay; and (iii) execution of contracts related with the building, commissioning and start-up of the industrial plant and the agricultural component of the project. On December 28, 2018, Bioenergy completed all of the activities set forth in the remediation plan to address the 15 findings.

As of the date of this annual report, the Office of the Comptroller General had initiated a financial audit of Bioenergy's financial statements for the year ended December 31, 2018.

## **6. Shareholder Information**

### **6.1 Shareholders' General Assembly**

Our Shareholders' General Assembly was held on March 29, 2019 and the following matters were approved:

- The plan for distribution of the Company's profits, which establishes the distribution of an ordinary dividend per share of 169 Colombian pesos (COP\$169) and an extraordinary dividend per share of 56 Colombian pesos (COP\$56) is as follows: the total amount of the dividend to minority shareholders will be paid in one installment on April 25, 2019; while the dividend for the majority shareholder, the Colombian State, will be paid in three installments on April 25 (50% of the ordinary dividend), June 25 (50% of the ordinary dividend), and September 25, 2019 (100% of the extraordinary dividend).
- Amendment of our bylaws. For further information please see the section Corporate Governance—Bylaws.
- Appointment of Ernst & Young as external auditor of Ecopetrol for fiscal year 2019 and use of option for 2020.
- The new composition of the Board of Directors for a two-year term as follows:

#### **Non-Independent Directors:**

- General Secretary of the Ministry of Finance and Public Credit

#### **Independent Directors:**

- Orlando Ayala Lozano
- Luis Guillermo Echeverri Vélez
- Juan Emilio Posada Echeverri
- Sergio Restrepo Isaza
- Santiago Perdomo Maldonado
- Esteban Piedrahita Uribe
- Hernando Ramírez Plazas (nominated by the hydrocarbon producing provinces)
- Carlos Gustavo Cano Sanz (nominated by the minority shareholders with the greatest share participation)

## 6.2 Dividend Policy

In 2018, the Board of Directors approved a dividend policy consisting of the ordinary distribution of between 40% and 60% of the adjusted net income of the Company of each fiscal year. For this purpose, the Board of Directors shall assess overall delivery against the Company's financial targets, as well as the macroeconomic environment, projected cash requirements for delivering on our Business Plan and strategy, while maintaining appropriate financial flexibility in keeping the Company's debt metrics in line with an investment grade rating. The policy does not preclude the distribution of extraordinary dividends above the 40% to 60% range, under exceptional circumstances and with due consideration of the above criteria. The maximum amount to be distributed is the profits available to shareholders (net income after release and appropriation for legal, fiscal and occasional reserves).

Pursuant to Colombian law, dividend distribution to our shareholders must be approved by a 78% majority of the shares represented in the corresponding General Shareholders Assembly. In the absence of this special majority, at least 50% of the net profits must be distributed.

On March 29, 2019, our shareholders at the ordinary General Shareholders Assembly approved an ordinary dividend of 60% of our net income or COP\$169 per share (within the dividend policy of 40% and 60% of net income), for the fiscal year ended December 31, 2018 and an extraordinary dividend of 20% of our net income or COP\$56 per share, given our strong operational and robust cash position in 2018, for a total dividend per share of COP\$225. On March 23, 2018, our shareholders at the ordinary General Shareholders Assembly approved an ordinary dividend of 55% of our net income for the fiscal year ended December 31, 2017. On March 31, 2017, our shareholders at the ordinary General Shareholders Assembly approved an ordinary dividend of 40% of our net income before the impairment of non-current assets (net of taxes) for the fiscal year ended December 31, 2016. Given that the fiscal year ended December 31, 2015 resulted in a net loss for Ecopetrol S.A., our shareholders at the General Shareholders Assembly held on March 31, 2016, approved that there was no distribution of profits for the fiscal year ended December 31, 2015. See section Financial Review—Liquidity and Capital Resources—Dividends.

Ecopetrol S.A. is required to have legal reserves equal to 50% of its subscribed capital. If the legal reserves are less than 50% of subscribed capital, we will contribute 10% of net income to our legal reserves every year until our legal reserves meet the required level.

## 6.3 Market and Market Prices

On August 2010, our ADSs began trading on the Toronto Stock Exchange ("TSX") under the symbol "ECP." On February 17, 2016, we announced the application for voluntary delisting from the Toronto Stock Exchange following the Board of Directors' decision to delist from the TSX. The decision was based on the Board of Director's assessment of, the limited trading activity of our ADRs in Canada, a liquid market for our ADRs on the NYSE and for our ordinary shares on the local Colombian Stock Exchange (Bolsa de Valores de Colombia), among other factors. The time and administrative efforts associated with maintaining the listing of the ADRs on the TSX were also taken into account. On March 2, 2016, our ADR's were officially delisted from the TSX. On December 7, 2017, we applied to the Alberta Securities Commission and the Ontario Securities Commission to cease our reporting requirements, due to our delisting process. On September 4, 2018, we announced that effective August 29, 2018, we had ceased to be a reporting issuer in each of the provinces of Alberta and Ontario and hence were no longer a reporting issuer in any jurisdiction in Canada. Accordingly, Ecopetrol no longer has any continuous disclosure obligations in Canada. The ADRs have continued to trade on the NYSE and the ordinary shares have continued to trade in the Colombian stock market. Therefore, the Company continues to be subject to United States, as well as Colombian, reporting and corporate governance obligations.

### *Registration and Transfer of Shares*

Under Colombian law, transfers of shares must be registered on the issuer's stock ledger. Only those holders registered on the stock ledger are considered by law as shareholders. Ecopetrol's shares are in electronic form, other than those shares held by the Nation, which are in physical form.

Transfers of electronic shares is required to be negotiated through the Colombian Stock Exchange. In Colombia, only the relevant stockbrokers called *sociedades comisionistas de bolsa* are authorized to make the transfer of shares through the Colombian Stock Exchange. The transfer of shares is registered in the Centralized Security Deposit (*Depósito Centralizado de Valores*) or DECEVAL, through the relevant stockbrokers. DECEVAL records the share transfer on its systems, in order to make the corresponding registration in the issuer stock ledger.

Under Colombian legislation, if a transfer of shares has a value equivalent to or higher than 66,000 UVR (the UVR was COP\$260.6658 as of December 31, 2018) it must be made through the BVC if the shares are registered with the BVC. Otherwise, shareholders can freely negotiate a transfer of shares.

Nevertheless, pursuant to Decree 2555 of 2010 article 6.15.1.1.2 the following transfers are not required to be performed through the BVC:

- Transfers between shareholders who are considered to be the same beneficial owner;
- Transfer of shares owned by financial institutions, under supervision of the Superintendence of Finance, that are in a liquidation process;
- Repurchases of shares by the issuer;
- Property delivered in lieu of payment, or payment of money or other valuable property, different than the amount owed or demanded, in exchange for the payment of the debt;
- Transfer of shares made by the Nation or the Financial Institutions Warranty Fund (*Fondo de Garantías de Instituciones Financieras*) or FOGAFIN;
- Transfer of shares issued abroad by Colombian companies, provided they take place outside Colombia;
- Transfer of shares issued by foreign companies, offered through a public offering in Colombia, provided that they take place outside Colombia; and
- Any other transaction specifically authorized by the Superintendence of Finance to take place outside the BVC.

*For the purposes described above, multiple transfer transactions made within one hundred twenty (120) calendar days, between the same parties on shares of the same issuer and under similar conditions, are considered a single transfer.*

#### **6.4 Ecopetrol ADR Program Fees**

##### ***Fees and Charges That a Holder of Our ADSs May Have to Pay, Either Directly or Indirectly***

JPMorgan Chase Bank, N.A., our Depositary, may charge each person to whom ADSs are issued, including, without limitation, issuances against deposits of shares, issuances in respect of share distributions, rights and other distributions, issuances pursuant to a stock dividend or stock split declared by us or issuances pursuant to a merger, exchange of securities or any other transaction or event affecting the ADSs or Deposited Securities, and each person surrendering ADSs for withdrawal of Deposited Securities in any manner permitted by the Deposit Agreement or whose ADSs are cancelled or reduced for any other reason, US\$5.00 for each 100 ADS (or any portion thereof) issued, delivered, reduced, cancelled or surrendered, as the case may be. The Depositary may sell (by public or private sale) sufficient securities and property received in respect of a share distribution, rights and/or other distribution prior to such deposit to pay such charge.

The Depositary collects its fees for issuance and cancellation of ADSs directly from investors depositing common shares or surrendering ADSs for the purpose of withdrawal or from intermediaries acting for them. The Depositary collects fees for making distributions to investors by deducting those fees from the amounts distributed or by selling a portion of distributable property to pay the fees. The Depositary may collect its annual fee for Depositary services by deduction from cash distributions, or by directly billing investors, or by charging the book-entry system accounts of participants acting for them. The Depositary may generally refuse to provide services to any holder until the fees and expenses owing by such holder for those services or otherwise are paid.



The following additional charges may be incurred by holders of ADRs, by any party depositing or withdrawing common shares or by any party surrendering ADSs and/or to whom ADSs are issued (including, without limitation, issuance pursuant to a stock dividend or stock split declared by us or an exchange of stock regarding the ADRs or the Deposited Securities or a distribution of ADSs), whichever is applicable:

- A fee of U.S.\$0.05 or less per ADS for any cash distribution made pursuant to the Deposit Agreement;
- A fee for the distribution of securities (or the sale of securities in connection with a distribution), such fee being in an amount equal to the fee for the execution and delivery of ADSs which would have been charged as a result of the deposit of such securities (treating all such securities as if they were common shares) but which securities or the net cash proceeds from the sale thereof are instead distributed by the Depositary to those holders of ADRs entitled thereto;
- An aggregate fee of up to US\$0.05 per ADS per calendar year (or portion thereof) for services performed by the Depositary in administering the ADRs (which fee may be charged on a periodic basis during each calendar year and shall be assessed against holders of ADRs as of the record date or record dates set by the Depositary during each calendar year and shall be payable in the manner described in the next succeeding provision);
- A fee for the reimbursement of such fees, charges and expenses as are incurred by the Depositary and/or any of the Depositary's agents (including, without limitation, the custodian and expenses incurred on behalf of holders of ADRs in connection with compliance with foreign exchange control regulations or any law or regulation relating to foreign investment) in connection with the servicing of our common shares or other Deposited Securities, the sale of securities (including, without limitation, Deposited Securities) and the delivery of Deposited Securities or otherwise in connection with the Depositary's or its custodian's compliance with applicable law, rule or regulation (which fees and charges shall be assessed on a proportionate basis against registered holders of ADRs as of the record date or dates set by the Depositary and shall be payable at the sole discretion of the Depositary by billing such holders of ADRs or by deducting such charge from one or more cash dividends or other cash distributions);
- Stock transfer or other taxes and other governmental charges;
- SWIFT, cable, telex and facsimile transmission and delivery charges incurred at the request of a holder of ADRs;
- Transfer or registration fees for the registration of transfer of Deposited Securities on any applicable register in connection with the deposit or withdrawal of Deposited Securities; and
- In connection with the conversion of foreign currency into U.S. dollars, the Depositary shall deduct out of such foreign currency the fees, expenses and other charges charged by it or the Depositary's agent (which may be a division, branch or affiliate) so appointed in connection with such conversion. The Depositary and/or the Depositary's agent may act as principal for such conversion of foreign currency. Such charges may at any time and from time to time be changed by agreement between us and the Depositary.

We will pay all other charges and expenses of the Depositary and any agent of the Depositary (except the custodian) pursuant to agreements from time to time between us and the Depositary. The fees described above may be amended from time to time.

#### **Fees and Other Direct and Indirect Payments Made by the Depositary to Us**

Our Depositary has agreed to reimburse us for certain expenses we incur that are related to establishment and maintenance of the ADR program, including investor relations expenses and exchange application and listing fees. In 2016, reimbursements were made in the amount of approximately US\$2,366,395 for expenses related to investor relations activities. In 2017, reimbursements were made in the amount of approximately US\$2,220,290 for expenses related to investor relations activities. In 2018, reimbursements were made in the amount of approximately US\$2,062,050 for expenses related to investor relations activities.

## 6.5 Taxation

### 6.5.1 Colombian Tax Considerations

The following is a general description of the Colombian tax considerations for investments in common shares in Colombia or for the purchase of ADSs, in a foreign securities market. This description is based on applicable law in effect as of the date of this annual report is issued, which may be subject to changes.

Prospective purchasers of common shares or ADSs should consult their own tax advisors for a detailed analysis of the tax consequences in Colombia, resulting from the acquisition, ownership and disposition of common shares or ADSs.

#### *General Rules*

Colombian entities and individuals who are deemed to be residents within the Colombian national territory for Colombian tax purposes are subject to Colombian income tax on their worldwide income. Foreign entities and individuals who are not deemed to be residents in Colombia, are subject to income tax in Colombia only with respect to their Colombian-source income, which is generally defined as income obtained from (i) the rendering of services inside Colombian territory, (ii) the exploitation of tangible and intangible assets in Colombia, and (iii) the sale of tangible or intangible assets that are located inside Colombian territory at the time of the sale. Double taxation treaties signed by Colombia, if applicable, may provide for special regulations regarding income taxation. Until 2018, foreign residents deriving income through a permanent establishment were subject to Colombian income tax on the Colombian source income attributable to their permanent establishment only. As of 2019, foreign tax residents deriving income through a permanent establishment will be subject to Colombian income tax on their global source income attributable to their permanent establishment in Colombia.

Dividends paid by Colombian companies, as well as profits distributed by branches/permanent establishments of foreign entities, are deemed as a dividend and as Colombian income. However, the applicable tax depends on an imputation system set forth in articles 48 and 49 of the Colombian Tax Code (hereinafter “CTC”). For more information related to the Colombian dividends tax regime, see *Risk Factors—Risks Related to Colombia’s Political and Regional Information*.

As mentioned above, Law 1819 of 2016 created a new dividends tax that applies on all dividend distributions to Colombian individuals or to any type of non-resident shareholder, absent any specific treaty or exception, regardless that dividends are paid from taxed or non-taxed profits. According to the aforementioned law, dividend payments made to foreign shareholders out of profits accrued at the corporate level as of 2017 were subject to a 5% withholding. That rate was subsequently modified by Law 1943 of 2018, which increased it to 7.5% and extended dividend taxation to intercompany dividends between Colombian resident companies (with certain exceptions).

From fiscal year 2019 onwards, a withholding tax on dividends paid applies as follows:

- (i) For resident companies and non-resident shareholders (companies and individuals): (i) a 7.5% dividend tax on dividends distributed from profits taxed at the corporate level (except that dividends paid to non-resident shareholders out of profits taxed at the corporate level prior to and including December 31, 2016, are not subject to this tax); and (ii) 33% withholding tax rate on dividends distributed from profits not taxed at the corporate level (32% for 2020, 31% for 2021 and 30% as of 2022), plus an additional 7.5% dividend tax after applying the initial 33% withholding tax rate.
- (ii) For Colombian individuals: dividend income in excess of 300 UVT are taxed at a 15% rate.

Note that the dividend tax applies simultaneously with the aforementioned system. Accordingly, dividends paid from non-taxed profits were subject to a 35% withholding for income tax, plus an additional 5% dividend tax on the balance. This means that the overall burden in this scenario was 38.25% (e.g.  $\$100 * 35\% = \$35$ , plus  $\$65 * 5\% = \$3.25$ ). As for taxable year 2019, dividends paid from non-taxed profits are subject to a 33% withholding for income tax (32% for 2020, 31% for 2021 and 30% as of 2022), and an additional 7.5% dividend tax on the balance. In this case, the combined tax rate is approximately 38.025% (e.g.  $\$100 * 33\% = \$33$ , plus  $\$67 * 7.5\% = \$5.025$ ).

Relief or reduced tax rates may apply under an applicable treaty to avoid double taxation, but the application of any such rules must be analyzed on a case-by-case basis.

For Colombian tax purposes, an individual is considered to be a Colombian resident when he/she meets any of the following criteria:

- (i) He/she remains in Colombia continuously or discontinuously for more than 183 calendar days within any given 365-consecutive-day term;
- (ii) He/she is related to the Colombian government's foreign service or to individuals who are in the Colombian government's foreign service and who, by virtue of the Vienna Conventions on diplomatic and consular relations, are exempted from taxes during the time of their service; or
- (iii) He/she is a Colombian national and:
  - Has a spouse or permanent companion, or dependent children, who are tax residents in Colombia, or
  - 50% or more of his or her total income is Colombian source income, or
  - 50% or more of his or her assets are managed in Colombia, or
  - 50% or more of his or her assets are deemed to be located or possessed in Colombia, or
  - Has failed to provide proof of residency in another country (different from Colombia) upon previous official request by the Colombian tax office, or
  - He/she has a tax residency in a country considered by the Colombian government to be a low tax jurisdiction or a tax haven.

Law 1739 of 2014 clarifies that Colombian nationals who meet any of the following requirements will not be deemed as tax residents:

- (i) If more than 50% of his or her annual income has its source in the jurisdiction where he or she is domiciled and whose country of domicile is not Colombia.
- (ii) If more than 50% of his/her assets are located in the jurisdiction where he or she is domiciled and whose country of domicile is not Colombia.

For purposes of Colombian taxation, an entity is deemed to be a "national" or a "Colombian entity" and, therefore, subject to taxation in Colombia on its worldwide income, if it meets any of the following criteria:

- (i) It has its place of effective management, in Colombia during the corresponding year or taxable period;
- (ii) It has its main domicile in the Colombian territory; or
- (iii) It has been incorporated in Colombia, in accordance with Colombian laws.

Pursuant to the Colombian Tax Code, a foreign company or non-resident individual has a permanent establishment in Colombia when said company or individual performs activities in Colombia through: (1) a fixed place of business (*i.e.*, branches, factories or offices), or (2) an individual who is not an independent agent empowered to execute agreements on behalf of the foreign company. As noted above, until 2018 permanent establishments were considered Colombian taxpayers in connection with their Colombian source income. As of fiscal year 2019, foreign residents deriving income through a Colombian permanent establishment are subject to Colombian income tax on the worldwide income attributable to the Colombian permanent establishment. A foreign company or entity will not be deemed to have a permanent establishment by the sole fact that it acts through a broker or any other independent agent. In addition, passive-income generating activities, such as dividends, royalties and interests, typically do not qualify as entrepreneurial and are not deemed to create permanent establishments.

## ***Tax Treatment of a Non-Colombian Entity and a Non-Resident Individual of Colombia Who Purchases an ADS in a Foreign Securities Market***

### *Dividends*

As a general rule, dividends paid to foreign companies, foreign entities or non-resident individuals who are investing in ADSs which underlying assets are Colombian shares are treated as Colombian-source income and are thus subject to Colombian income tax.

To avoid double taxation, dividends paid by Colombian entities are not subject to income tax at the shareholder level when they are paid out of corporate profits that have been previously taxed at the corporate level. For fiscal years 2017 and 2018, a withholding tax on dividends was triggered for dividends paid to non-resident shareholders. Withholding tax rates on dividends were as follows: (i) a 5% dividend tax for dividends distributed out of profits already taxed at the company's level; (ii) 35% withholding tax rate for dividends distributed out of profits that were not taxed at the company's level, plus a 5% dividend tax rate after having applied and deducted the initial 35% withholding. Note that dividends paid to non-resident shareholders out of profits taxed at the corporate level until December 31, 2016, are not subject to the aforementioned 5% dividend tax or any other income tax. As of 2019, the withholding tax rates applicable to dividends paid to resident companies and non-resident shareholders (companies and individuals) are: (i) a 7.5% dividend tax on dividends distributed from profits taxed at the corporate level (except that dividends paid to non-resident shareholders out of profits taxed at the corporate level prior to and including December 31, 2016, are not subject to this tax); and (ii) 33% withholding tax rate on dividends distributed from profits not taxed at the corporate level (32% for 2020, 31% for 2021 and 30% as of 2022), plus an additional 7.5% dividend tax after applying the initial 33% withholding tax rate.

Furthermore to the above, non-resident entities or non-resident individuals whose investment qualifies as portfolio investments (*i.e.*, investing through a Foreign Funds Administration Account - FFAA) will be taxed upon distribution by means of a withholding tax mechanism. In this case, pursuant to Article 18-1 of the Colombian Tax Code, the applicable withholding tax rate on taxable dividends is 25%, assuming that the dividends cannot be attributed to a permanent establishment in Colombia belonging to the shareholder and were not subject to taxation at the corporate level. The abovementioned 5% dividend tax (7.5% from 2019 onwards) applies on the balance of dividends to be distributed to the shareholder investing through an FFAA, or on the gross amount in such cases the dividend is paid out of profits that were subject to taxation at the corporate level. These foreign shareholders subject to this withholding tax are not required to file an income tax return in Colombia.

### *Taxation of Capital Gains from the Sale of ADSs*

Capital gains obtained from the sale of ADSs by non-Colombian entities, Colombian individuals who are non-residents in Colombia and foreign non-resident individuals, are not subject to income tax in Colombia, as such sale does not generate Colombian-source income to the extent that the ADSs are not deemed to be sourced in Colombia.

If the holder of the ADSs who is a non-resident entity, a Colombian individual who is not a resident in Colombia or a foreign non-resident individual, decides to surrender the ADSs and withdraw the underlying common shares, it is arguable that such transaction does not generate a capital gain subject to income tax in Colombia. However, different interpretations may be adopted by the Colombian Tax Authorities on this matter.

## ***Tax Treatment in Colombia of a Non-Colombian Entity and a Non-Resident Individual of Colombia Who Purchases Ecopetrol's Shares in Colombia's Securities Market***

### ***Dividends***

As a general rule, dividends paid to foreign companies, foreign entities, or to non-resident individuals in Colombia, who are investing in Colombian shares directly or through a FFAA, are treated as national-source income; thus, they are subject to Colombian income tax.

To avoid double taxation, dividends are not subject to income tax at the shareholder level when they are paid out of corporate profits that have been previously taxed at the corporate level. However, for 2017 and 2018, a withholding tax on dividends was triggered for dividends paid to non-resident shareholders. Withholding tax rates on dividends varied as follows: (i) 5% dividend tax for dividends distributed out of profits already taxed at the company's level (except that dividends paid to non-resident shareholders out of profits taxed at the corporate level prior to and including December 31, 2016, are not subject to this tax); and (ii) 35% withholding tax for dividends distributed out of profits not taxed at the company's level. As of 2019, the withholding tax rates applicable to dividends paid resident companies and non-resident shareholders (companies and individuals) are: (i) a 7.5% dividend tax on dividends distributed from profits taxed at the corporate level (except that dividends paid to non-resident shareholders out of profits taxed at the corporate level prior to and including December 31, 2016, are not subject to this tax); and (ii) 33% withholding tax rate on dividends distributed from profits not taxed at the corporate level (32% for 2020, 31% for 2021 and 30% as of 2022), plus an additional 7.5% dividend tax after applying the initial 33% withholding tax rate.

Non-resident entities or non-resident individuals will be taxed upon distribution by means of the withholding tax mechanism, provided that their investments qualify as portfolio investments (*i.e.*, investing through a FFAA) and dividends that are distributed by the Colombian entity are not taxed at the corporate level. In this case, pursuant to Article 18-1 of the Colombian Tax Code, the applicable withholding tax rate is 25%, assuming that the dividends cannot be attributed to a permanent establishment in Colombia belonging to the shareholder. These foreign shareholders subject to this withholding tax are not required to file an income tax return in Colombia. This treatment was modified by Law 1943/2018. See section [Financial Review—Taxes](#).

In addition to the above, the new dividend tax will apply at a 5% rate. This treatment was modified by Law 1943 of 2018 (7.5% from 2019 onwards). See section [Financial Review—Taxes](#).

### ***Taxation of Capital Gains for the Sale of Shares***

Pursuant to Article 36-1 of the Colombian Tax Code, capital gains derived from the sale of shares listed on the BVC and owned by the same beneficial owner, are deemed as non-taxable income in Colombia, provided that the shares sold during the same taxable year do not represent more than 10% of the outstanding shares of the listed company. Pursuant to Section 1.6.1.13.2.19 of Regulatory Decree 1625 of 2016, sellers of shares are not required to file an income tax return for the transfer of securities that are listed in the National Registry of Securities and Issuers (*Registro Nacional de Valores y Emisores*) as long as the foreign investment is treated as a portfolio investment according to article 3 of Decree 2080 of 2000 (currently compiled in Article 2.17.2.2.1.2 of Decree 1068 of 2015) and the abovementioned 10% threshold is not surpassed.

If the abovementioned requirements are not met, the capital gain obtained in the sale of shares is subject to income tax or capital gains tax, under the following rules:

- The gain or loss arising therefrom will be the difference between the sale price and the tax basis of the shares. As a general rule, the tax basis of shares is equal to the price paid for such shares (*i.e.*, cost of acquisition).
- The applicable tax rate and the withholding tax rate have to be determined on a case-by-case basis. Generally, if the shares have been owned for at least two years, the profits from the sale will qualify as capital gains taxable at 10%; otherwise, profits will qualify as ordinary income, subject to a 33% income tax for fiscal years 2018 and 2019 (2020 – 32%; 2021 – 31%; 2022 onwards – 30%).

## ***Tax Treatment of Non-Residents Who Purchase Ecopetrol's Shares in the BVC Market and Exchange Them for ADSs***

### ***Dividends***

Payment of dividends by Colombian entities to foreign companies, foreign entities or to non-resident individuals who are investing in ADSs which underlying assets are Colombian shares or in Colombian shares directly are subject to the tax treatment described above.

### ***Taxation on Capital Gains for the Sale of Shares***

If the holder of the Colombian shares is a non-resident entity, a Colombian individual who is not a resident in Colombia or a foreign non-resident individual, and such holder decides to exchange such common shares for ADSs, it is arguable that such transaction should not generate a capital gain subject to income tax in Colombia. However, different interpretations may be adopted by the Colombian tax authorities on this matter. For instance, assuming that the exchange of securities is treated as a sale of Ecopetrol's shares, the seller would be subject to the tax treatment described above in connection with the taxation of capital gains for the sale of shares. Absent any specific rules or regulations addressing this specific situation, a case-by-case analysis would be necessary.

### **6.5.2 U.S. Federal Income Tax Consequences**

This summary describes the principal U.S. federal income tax consequences of the ownership and disposition of common shares or ADSs, but it does not purport to be a comprehensive description of all of the U.S. tax consequences that may be relevant to a decision to hold or dispose of common shares or ADSs. This summary applies only to purchasers of common shares or ADSs who will hold the common shares or ADSs as capital assets for U.S. federal income tax purposes and does not apply to special classes of holders such as dealers in securities or currencies, holders whose functional currency is not the U.S. dollar, holders of 10% or more of our shares (taking into account shares held directly or through depositary arrangements by vote or by value), tax-exempt organizations, financial institutions, holders liable for the alternative minimum tax, securities traders who elect to account for their investment in common shares or ADSs on a mark-to-market basis, partnerships or other pass-through entities or arrangements and investors therein, insurance companies, U.S. expatriates, persons that purchase or sell common shares or ADSs as part of a wash sale for tax purposes, and persons holding common shares or ADSs in a hedging transaction or as part of a straddle, conversion or other integrated transaction for U.S. federal income tax purposes. The statements regarding U.S. tax law set forth in this summary are based on the Internal Revenue Code of 1986, as amended, which we call the "Code," its legislative history, existing and proposed U.S. Treasury regulations, published rulings and court decisions, all as in force on the date of this annual report, and changes to such law subsequent to the date of this annual report may affect the tax consequences described herein (possibly with retroactive effect). This summary is also based in part on the representations of the Depositary and the assumption that each obligation in the Deposit Agreement and any related agreement will be performed in accordance with its terms.

Each holder is encouraged to consult such holder's tax advisor concerning the overall tax consequences to it, including the consequences under laws other than U.S. federal income tax laws, of an investment in common shares or ADSs.

In this discussion, references to a "U.S. Holder" are to a beneficial owner of a common share or an ADS that is for U.S. federal income tax purposes (1) an individual citizen or resident of the United States, (2) a corporation, or any other entity taxable as a corporation, organized under the laws of the United States, any state thereof or the District of Columbia, (3) an estate whose income is subject to U.S. federal income tax regardless of its source, or (4) a trust if (i) a United States court can exercise primary supervision over the trust's administration and one or more United States persons are authorized to control all substantial decisions of the trust or (ii) it has in effect a valid election under applicable U.S. Treasury regulations to be treated as a U.S. person.

For U.S. federal income tax purposes, holders of ADSs generally will be treated as owners of the common shares represented by such ADSs.

This discussion does not address any aspect of U.S. federal taxation other than U.S. federal income taxation (such as the estate and gift tax or the Medicare tax on net investment income). Holders of common shares or ADSs should consult their own tax advisor regarding the U.S. federal, state and local and other tax consequences of owning and disposing of common shares and ADSs in their particular circumstances.

### *Distributions on Common Shares or ADSs*

A distribution to U.S. Holders made by us of cash or property with respect to common shares or ADSs generally will be treated as a dividend for U.S. federal income tax purposes to the extent paid out of our current or accumulated earnings and profits (as determined under U.S. federal income tax principles). Distributions in excess of our current or accumulated earnings and profits, as determined for U.S. federal income tax purposes, will be treated first as a tax-free return of capital reducing such U.S. Holder's adjusted tax basis in the common shares or ADSs. Any distribution in excess of such adjusted tax basis will be treated as capital gain and will be either long-term or short-term capital gain depending upon whether the U.S. Holder held the common shares or ADSs for more than one year. Distributions of additional common shares or ADSs to U.S. Holders that are part of a pro rata distribution to all of our shareholders generally will not be subject to U.S. federal income tax. We do not maintain calculations of our earnings and profits under U.S. federal income tax principles, and, therefore, except as described in the previous sentence, U.S. Holders should expect that any distributions generally will be reported as dividends for U.S. federal income tax purposes. As used below, the term "dividend" means a distribution that constitutes a dividend for U.S. federal income tax purposes.

The amount of any distribution will include the amount of any Colombian tax withheld on the amount distributed, and the amount of a distribution paid in Colombian Pesos will be measured by reference to the exchange rate for converting Colombian Pesos into U.S. dollars in effect on the date the distribution is received by the Depository (or by a U.S. Holder in the case of a holder of common shares) regardless of whether the payment is in fact converted into U.S. dollars. If the Depository (or U.S. Holder in the case of a holder of common shares) does not convert such Colombian Pesos into U.S. dollars on the date it receives them, generally, any gain or loss resulting from currency exchange fluctuations during the period from the date the dividend payment is included in income to the date the payment is converted into U.S. dollars will be treated as ordinary income or loss and will not be eligible for the special tax rate applicable to qualified dividend income (as discussed below). The gain or loss generally will be income or loss from sources within the United States for foreign tax credit limitation purposes. Dividends paid by us will not be eligible for the dividends received deduction allowed to corporations under the Code.

If you are a non-corporate U.S. Holder, dividends that constitute qualified dividend income will be taxable to you at the preferential rates applicable to long-term capital gains, provided that you meet certain holding requirements. Dividends paid on the ADSs will be treated as qualified dividend income if (1) the ADSs are readily tradable on an established securities market in the United States and (2) we were not, in the year prior to the year in which the dividend was paid, and are not, in the year in which the dividend is paid, a passive foreign investment company (PFIC). The ADSs are listed on the New York Stock Exchange, and will qualify as readily tradable on an established securities market in the United States, as long as they are so listed. Based on our audited financial statements and relevant market and shareholder data, we believe that we were not treated as a PFIC for U.S. federal income tax purposes with respect to our 2018 taxable year. In addition, based on our audited financial statements and our current expectations regarding the value and nature of our assets, the sources and nature of our income, and relevant market and shareholder data, we do not anticipate becoming a PFIC for the 2019 taxable year. However, this conclusion is a factual determination that is made annually and thus may be subject to change. Based on existing guidance, it is not clear whether dividends received with respect to the common shares will be treated as qualified dividends. In addition, the U.S. Treasury has announced its intention to promulgate rules pursuant to which holders of ADSs or common shares and intermediaries through whom such securities are held will be permitted to rely on certifications from issuers to treat dividends as qualified for tax reporting purposes. Because such procedures have not yet been issued, it is not clear whether we will be able to comply with them. Holders of ADSs and common shares should consult their own tax advisers regarding the availability of the reduced dividend tax rate in the light of the considerations discussed above and their own particular circumstances.

A U.S. Holder will be entitled, subject to a number of complex limitations and conditions, to claim a U.S. foreign tax credit in respect of any Colombian income taxes withheld on dividends received on common shares or ADSs. U.S. Holders who do not elect to claim a credit for any foreign income taxes paid during the taxable year may instead claim a deduction in respect of such Colombian income taxes, provided the U.S. Holder elects to deduct (rather than credit) all foreign income taxes for that year. Dividends received with respect to the common shares or ADSs will be treated as foreign source income, subject to various classifications and other limitations. For the purposes of the U.S. foreign tax credit limitations, the dividends paid with respect to our common shares or ADSs generally will constitute "passive category income" for most U.S. Holders. The rules relating to computing foreign tax credits or deducting foreign income taxes are extremely complex, and U.S. Holders are urged to consult their own independent tax advisers regarding the availability of foreign tax credits with respect to any Colombian income taxes withheld.

### *Sale, Exchange or Other Taxable Dispositions of Common Shares or ADSs*

A U.S. Holder generally will recognize capital gain or loss upon the sale, exchange or other taxable disposition of common shares or ADSs in an amount equal to the difference between the U.S. dollar value of the amount realized on the sale, exchange or other taxable disposition of the common shares or ADSs and the U.S. Holder's adjusted tax basis, determined in U.S. dollars, in the common shares or ADSs. Any gain or loss will be long-term capital gain or loss if the common shares or ADSs have been held for more than one year. Certain non-corporate U.S. Holders (including individuals) may be eligible for preferential rates of U.S. federal income tax in respect of long-term capital gains. The deductibility of capital losses is subject to limitations under the Code.

If you are a U.S. Holder of common shares or ADSs, the initial tax basis of your common shares or ADSs will be the U.S. dollar value of the Colombian Peso-denominated purchase price determined on the date of purchase. If the common shares or ADSs are treated as traded on an "established securities market," a cash basis U.S. Holder, or, if it elects, an accrual basis U.S. Holder, will determine the dollar value of the cost of such common shares or ADSs by translating the amount paid at the spot rate of exchange on the settlement date of the purchase. Such an election by an accrual basis U.S. Holder must be applied consistently from year to year and cannot be revoked without the consent of the Internal Revenue Service ("IRS"). If you convert U.S. dollars to Colombian Pesos and immediately use that currency to purchase common shares or ADSs, such conversion generally will not result in taxable gain or loss to you.

With respect to the sale or exchange of common shares or ADSs, the amount realized generally will be the U.S. dollar value of the payment received determined on (1) the date of receipt of payment in the case of a cash basis U.S. Holder and (2) the date of disposition in the case of an accrual basis U.S. Holder. If the common shares or ADSs are treated as traded on an "established securities market," a cash basis taxpayer, or, if it elects, an accrual basis taxpayer, will determine the U.S. dollar value of the amount realized by translating the amount received at the spot rate of exchange on the settlement date of the sale.

Deposits and withdrawals of common shares in exchange for ADSs, and of ADSs for common shares, generally will not result in the realization of gain or loss for U.S. federal income tax purposes.

### *Backup Withholding and Information Reporting*

In general, dividends on common shares or ADSs, and payments of the proceeds of a sale, exchange or other taxable disposition of common shares or ADSs, paid within the United States, by a U.S. payor through certain U.S.-related financial intermediaries to a U.S. Holder are subject to information reporting and may be subject to backup withholding at a current rate of 24%, unless the holder (1) establishes that it is a corporation or other exempt recipient or (2) with respect to backup withholding, provides an accurate taxpayer identification number and certifies that it is a U.S. person and that no loss of exemption from backup withholding has occurred.

Backup withholding is not an additional tax. The amount of any backup withholding tax from a payment to a U.S. Holder will be allowed as a credit against the U.S. Holder's U.S. federal income tax liability, provided that the required information is timely furnished to the IRS. A U.S. Holder generally may obtain a refund of any amounts withheld under the backup withholding rules that exceed its U.S. federal income tax liability by timely filing a refund claim with the IRS.

### *U.S. Tax Considerations for Non-U.S. Holders*

A holder or beneficial owner of common shares or ADSs that is not a U.S. Holder for U.S. federal income tax purposes (a "non-U.S. Holder") generally will not be subject to U.S. federal income or withholding tax on dividends received on common shares or ADSs, unless the dividends are "effectively connected" with the non-U.S. Holder's conduct of a trade or business within the United States. In such a case, a non-U.S. Holder generally will be taxed in the same manner as a U.S. Holder. In the case of "effectively connected" dividends received by a corporate non-U.S. Holder, the corporate non-U.S. Holder may, under certain circumstances, be subject to an additional "branch profits tax" at a 30% rate.



A non-U.S. Holder of common shares or ADSs will not be subject to U.S. federal income or withholding tax on gain realized on the sale of common shares or ADSs, unless (i) the gain is “effectively connected” with the non-U.S. Holder’s conduct of a trade or business in the United States or (ii) in the case of gain realized by an individual non-U.S. Holder, the non-U.S. Holder is present in the United States for 183 days or more in the taxable year of the sale and certain other conditions are met. In the case of “effectively connected” gains realized by a corporate non-U.S. Holder, the corporate non-U.S. Holder may, under certain circumstances, be subject to an additional “branch profits tax” at a 30% rate.

Although non-U.S. Holders generally are exempt from backup withholding and information reporting requirements, a non-U.S. Holder may be required to comply with certification and identification procedures in order to establish its exemption from information reporting and backup withholding.

#### **6.6 Exchange Controls and Limitations**

Payments in foreign currency with respect to certain foreign exchange transactions including international investments between Colombian residents and non-Colombian residents must be conducted through the foreign exchange market. Therefore, any foreign currency income or expense under the ADRs must be completed through the appropriate channels of the foreign exchange market. Transactions conducted through the foreign exchange market are made at market rates freely negotiated with authorized foreign exchange intermediaries (local banks, financial corporations, administrators and others). Since September 25, 1999, the Colombian foreign exchange regime is structured under the system of free flotation of the exchange rate, whereby market forces determine the level of exchange rate from time to time.

Foreign portfolio investments must be made through authorized foreign exchange investment management companies. Only brokerage firms, trust companies and investment management companies, subject to the inspection and supervision of the Superintendence of Finance, are allowed to make investments in the local Colombian market on behalf of foreign investors. Such brokerage firms, trust companies and investment management companies also act as the foreign investors’ local representatives for tax and foreign exchange purposes.

Colombian law provides that the Colombian Central Bank may intervene in the foreign exchange market at its own discretion at any time (*i.e.*, it may limit the remittance of dividends whenever the international reserves fall below an amount equal to three months of imports). Additionally, from time to time, the Colombian government introduces amendments to the International Investment Statute. Hence, we cannot assure you that the Colombian Central Bank will not intervene in the future imposing restrictions to the free convertibility system currently applicable in Colombia. See section *Risk Review—Risk Factors—Risks Related to Colombia’s Political and Regional Environment*.

#### *Registration of Foreign Investment Represented in Underlying Shares*

Colombia’s International Investment Statute and the regulations issued by the Colombian Central Bank, which have been amended from time to time through related decrees and regulations, govern the manner in which non-Colombian resident entities and individuals can invest in Colombia and participate in the Colombian securities markets. Among other requirements, the International Investment Statute and Colombian Central Bank regulations mandate registration of foreign investment transactions with the Colombian Central Bank and specify procedures to authorize and administer such foreign investment transactions. Additionally, pertinent information related to foreign investment transactions must be updated on a regular basis (yearly or monthly, depending on the type of information).

Under the International Investment Statute and Colombian Central Bank regulations, the failure of a foreign investor to report or register with the Colombian Central Bank foreign exchange transactions relating to investments in Colombia on a timely basis may (i) prevent the investor from obtaining remittance rights, (ii) constitute an exchange control infraction and (iii) result in financial sanctions.

Notwithstanding the regulations described above, foreign investors who acquire ADRs are not required to directly register this investment with Colombian authorities. Holders of ADRs will benefit from the registration to be obtained by the local custodian for our common shares underlying the ADRs in Colombia. Such registration allows the custodian to convert dividends and other distributions with respect to the common shares into foreign currency and remit the proceeds abroad. If investors in ADRs choose to surrender their ADRs and withdraw common shares, they must retain an administrator, who will act as a local representative for the investments, and register their investments in common shares as a portfolio investment through said local representative. The local representative is the brokerage firm, trust company or investment management company that acts on behalf of the holders of the ADRs in Colombia, and the request for registration is made by them.

Colombian residents who acquire ADRs and either receive profits from this investment, surrender their ADRs or liquidate their investment in ADRs must register these operations with the Colombian authorities and comply with applicable regulations through its Colombian brokerage firm.

In obtaining its own foreign investment registration, an investor who surrenders its ADRs and sells common shares may incur expenses and/or suffer delays in the application process. Investors would only be allowed to transfer dividends abroad or transfer funds received as distributions relating to our common shares after their foreign investment registration procedure with the Colombian Central Bank has been completed. In addition, the Depositary's foreign investment registration may also be adversely affected by future legislative changes, but its rights to transfer dividends abroad or profits arising from distributions relating to our common shares must be maintained according to Colombian law and foreign investment treaties entered into by Colombia in force at the time of the registration of the investment, except when Colombia's international reserves fall below an amount equivalent to three months' worth of imports. Prospective purchasers of common shares or ADSs should consult their own foreign exchange advisors.

#### 6.7 Exchange Rates

On April 1, 2019, the Representative Market Exchange Rate was COP\$3,174,79 per US\$1.00. The Federal Reserve Bank of New York does not report a noon-buying rate for Colombian Pesos. The Superintendence of Finance, calculates the Representative Market Exchange Rate based on the weighted averages of the buy and sell foreign exchange rates quoted daily by foreign exchange rate market intermediaries including financial institutions for the purchase and sale of U.S. dollars. The Superintendence of Finance also calculates the Representative Market Exchange Rate for each month for purposes of preparing financial statements and converting amounts in foreign currency to Colombian Pesos.

#### 6.8 Major Shareholders

The following table sets forth the names of our major shareholders, and the number of shares and the percentage of outstanding shares owned by them at March 31, 2019:

**Table 56 – Major Shareholders**

<b>Shareholders</b>	<b>At March 31, 2019</b>	
	<b>Number of shares</b>	<b>% Ownership</b>
Nation <sup>(1)</sup> – Ministry of Finance and Public Credit	36,384,788,417	88.49
Public float	4,731,906,273	11.51
<b>Total</b>	<b>41,116,694,690</b>	<b>100.00</b>

(1) Includes 1,600 shares owned by other state entities.

All our common shares have identical voting rights.

As of February 25, 2019, the registration date of our annual general shareholders' meeting, 2.7% of our common shares were held of record in the form of American Depository Shares, we had 37 registered holders, and 20,749 beneficiaries of common shares, or ADSs representing common shares, in the United States.

## Changes in the Capital of the Company

There are no conditions in our bylaws governing changes in our capital stock that are more stringent than those required under Colombian law, with the exception that the Nation must hold a minimum of 80% in any stock issuance undertaken under Law 1118 of 2006.

### 6.9 Enforcement of Civil Liabilities

We are a Colombian company. Most of our Directors and executive officers and some of the experts named in this annual report reside outside the United States. All or a substantial portion of our assets and the assets of these persons are located outside of the United States. As a result, it may not be possible for you to affect service of process within the United States upon us or these persons who are residents in Colombia or to enforce against us or these persons who are residents in Colombia judgments in U.S. courts obtained in such courts predicated upon the civil liability provisions of the U.S. federal securities laws. Colombian courts will enforce a U.S. judgment predicated on the U.S. securities laws through a procedural system known under Colombian Law as “*exequatur*.” The Colombian Supreme Court will enforce a foreign judgment, without reconsideration of the merits only if the judgment satisfies the requirements set forth in Articles 605 through 607 of Law 1564 of 2012 (*Código General del Proceso*) which entered into force on January 1, 2016, pursuant to *Acuerdo* No. PSAA15-10392, of October 1, 2015, issued by the Colombian Superior Council of the Judiciary (*Consejo Superior de la Judicatura*), as follows:

- A treaty exists between Colombia and the country where the judgment was granted relating to the recognition and enforcement of foreign judgments or, in the absence of such treaty, there is reciprocity in the recognition of foreign judgments between the courts of the relevant jurisdiction and the courts of Colombia;
- The foreign judgment does not relate to “in rem rights” vested in assets that were located in Colombia at the time the suit was filed;
- The foreign judgment does not contravene or conflict with Colombian laws relating to public order other than those governing judicial procedures;
- The foreign judgment, in accordance with the laws of the country where it was rendered, is final and is not subject to appeal;
- A duly legalized copy of the judgment (together with an official translation into Spanish if the judgment is issued in a foreign language) has been presented to the Supreme Court of Colombia;
- The foreign judgment does not refer to any matter upon which Colombian courts have exclusive jurisdiction;
- No proceeding is pending in Colombia with respect to the same cause of action, and no final judgment has been awarded in any proceeding in Colombia on the same subject matter and between the same parties;
- In the proceeding commenced in the foreign court that issued the judgment, the defendant is served in accordance with the laws of such jurisdiction and in a manner reasonably designated to give the defendant an opportunity to defend against the action; and
- The legal requirements pertaining to the *exequatur* proceedings have been observed.

The United States and Colombia do not have a bilateral treaty providing for automatic reciprocal recognition and enforcement of judgments in civil and commercial matters. The Colombian Supreme Court has in the past accepted that reciprocity exists when it has been proven that either a U.S. court has enforced a Colombian judgment or that a U.S. court would enforce a foreign judgment, including a judgment issued by a Colombian court. However, such enforceability decisions are considered by Colombian courts on a case-by-case basis.

Proceedings for enforcement of a money judgment by attachment or execution against any assets or property located in Colombia are within the exclusive jurisdiction of Colombian courts, and such proceedings are conducted in Spanish. All parties affected by a foreign judgment in exequatur proceedings must be summoned to the exequatur proceedings in accordance with the rules that apply to the Colombian courts. In the course of such proceedings, both the plaintiff and the defendant are afforded the opportunity to request that evidence be collected in connection with the requirements listed above. In addition, before the judgment is rendered, each party may file final allegations in support of such party's position regarding the abovementioned requirements.

Assuming that a foreign judgment complies with the standards set forth in the preceding paragraphs and the absence of any condition referred to above that would render a foreign judgment not subject to recognition under Colombian law, such foreign judgment would be enforceable in Colombia in an enforcement proceeding under the laws of Colombia, provided that the Colombian Supreme Court has previously granted exequatur upon the foreign judgment.

## **7. Corporate Governance**

Since 2004, Ecopetrol S.A. has voluntarily adopted transparency, governance and control practices to facilitate corporate governance in order to generate confidence among stakeholders and ensure the sustainability of its business.

The corporate governance practices at Ecopetrol S.A.:

- promote and guarantee all stakeholders transparency, objectivity and competitiveness;
- add value to the company and attract investors;
- protect shareholders, investors and stakeholders rights;
- encourage financial markets confidence; and
- accomplish the highest corporate governance standards.

### **Updating the Corporate Governance Model**

At the beginning of 2018, at the request of the Board of Directors of Ecopetrol, we initiated an update of the corporate governance model of the Ecopetrol Group. The project, which is still underway, aims for a clearer and agile governing framework and decision-making process that underpins the Ecopetrol Group's strategy.

The project has been led by the Secretary General's Office of Ecopetrol, in accordance with a best practices benchmark approach and the strategic aspirations of the Ecopetrol Group. The Board of Directors of Ecopetrol, the Executive Team, and the CEO's of each Ecopetrol Group company have participated in its guidance and design. The updated governance model will come into effect during 2019.

### **Statement of the Nation as Majority Shareholder**

Ecopetrol's majority shareholder (the Nation, represented by the Ministry of Finance and Public Credit), is unilaterally committed to protect the interests of the minority shareholders in the following topics:

- *Composition of Board of Directors:* including in its list of candidates a Representative for hydrocarbon producing departments operated by Ecopetrol and a Representative for the minority shareholders, who will be chosen by the 10 shareholders with the largest stock participations.

According to corporate governance practices recommended by the OECD, an organization to which Colombia has been a member since 2018, the National Government implemented the practice of reducing the participation of Directors with a ministerial level in Ecopetrol's Board of Directors. Therefore, in 2018 the National Government nominated two (2) non-independent Directors and in 2019 will nominate one (1) non-independent Director, neither of which has a ministerial rank.

- *Dividend policy*: guaranteeing the right of each shareholder to receive his pro rata dividends in accordance with Colombian law.
- *Issues not included in the agenda of extraordinary meetings of the General Shareholders Assembly*: permitting a vote on those initiatives submitted by one or more shareholders representing at least 2% of the subscribed shares of the company.
- *Asset disposal*: ensuring that any asset disposal of an amount equal or higher than 15% of the stock exchange capitalization of Ecopetrol is discussed and decided by the General Shareholders' Assembly and that the Nation will only vote affirmatively if the vote of minority shareholders is equal to or exceeds 2% of the shares subscribed by shareholders other than the Nation.

## 7.1 **Bylaws**

The Bylaws of Ecopetrol S.A. are contained in Public Deed No. 5314 of December 14, 2007, issued by the Second Notary of Bogotá; amended by Public Deed No. 560 of May 23, 2011, issued by the Notary Forty-Six of Bogotá, Deed No. 666 of May 7, 2013, issued by the Notary Sixty-Five of Bogotá, Deed No. 1049 of May 19, 2015, issued by the Notary Second of Bogotá, and Deed No. 0685 of May 2, 2018, issued by the Notary Twenty of Bogotá. In addition, the bylaws were recently amended in the ordinary meeting of the General Shareholders Assembly held on March 29, 2019. The text of the amended bylaws is yet to be recorded in public deed and registered before the mercantile registry, which in Colombia is the Chamber of Commerce. An English translation of the amended bylaws is included as Exhibit 1.1 to this annual report.

This summary does not purport to be complete and is qualified by reference to our bylaws, which are filed as an exhibit to this annual report. For a description of the provisions of our bylaws relating to our Board of Directors and its committees, see the sections *Corporate Governance—Board of Directors—Board Practices* and *Corporate Governance—Board of Directors—Board Committees*.

### **General Shareholder's Meeting**

Shareholders' meetings may be ordinary or extraordinary. Ordinary meetings will take place in our legal domicile located in Bogotá, Colombia, within the first three months following the end of each fiscal year, on the day and at the time set forth in the notice for the General Shareholders Assembly. The call for the General Shareholders Assembly is published on the Ecopetrol S.A. website and in a newspaper of wide circulation 30 calendar days prior to the date on which the meeting will take place and on the Sunday previous to the meeting, must be published at Ecopetrol S.A.'s website [www.ecopetrol.com.co](http://www.ecopetrol.com.co).

In the General Shareholders Assembly, our Board of Directors and the external auditor are appointed and our annual financial statements, profit distribution, audit and management reports, including our corporate governance report and sustainability report, and any other matter provided under applicable law or our corporate bylaws are approved.

Extraordinary meetings of shareholders may be called by our Board of Directors, by our president or chief executive officer, by our external auditor, or by shareholders holding at least 5% of the shares outstanding, or when unforeseen or urgent needs of the Company require it. Calls to extraordinary meetings should be made at least 15 calendar days prior to the date of the meeting, with the exception of the case where the Law requires a greater time between the summons and the meeting. Such a call is published on the Ecopetrol S.A. website and in a newspaper of wide circulation. The meeting notice must specify the agenda for the meeting.

The required quorum for both ordinary and extraordinary meetings is a plural number of shareholders representing 50% plus one of the subscribed shareholders entitled to vote and decisions are approved with a majority of the members present. This quorum is exempted in the case of "second-call meetings," which may take place when a meeting fails to obtain the required quorum and is called within a period between 10 business days and 30 business days from the first date, in which case decisions may be adopted by a majority of the shares present regardless of the number represented.

Decisions made at ordinary and extraordinary shareholders' meeting must be approved by a plural number of shareholders representing the majority of the shares present. Colombian law requires supermajorities in the following cases:

- The vote of at least 70% of the shares present and entitled to vote at the ordinary shareholders' meeting is required to approve the issuance of stock not subject to preemptive rights;
- The vote of at least 78% of the shares represented entitled to vote is required to approve the distribution of the annual net profits. In the absence of this special majority, at least 50% of the net profits must be distributed. If the sum of all legal reserves (statutory, legal and optional) exceeds the amount of the outstanding capital, the Company must distribute at least 70% of the annual net profits;
- The vote of at least 80% of the shares represented is required to approve the payment of dividends in shares; and
- The vote of 100% of the outstanding and issued shares is required to replace a vacancy on the Board of Directors without applying the electoral quotient system.

Shareholders may be represented by proxies, provided that the proxy: (1) is in writing (faxes and electronic documents are valid), (2) specifies the name of the representative, (3) specifies the date or time of the meeting for which the proxy is given and (4) includes other information specified by the applicable law. Proxies granted abroad do not require legalization or an apostille.

During our ordinary annual shareholders' meeting, our employees and Directors are only allowed to represent their own shares, unless they act as legal representatives.

### **Preference Rights and Restrictions Attaching to Our Shares**

We have only one class of stock without special rights or restrictions (ordinary shares). Our shareholders do not have any type of preemptive rights.

Under Commercial Colombian law, our shareholders have the following economic privileges and voting rights:

- to participate and vote on the decisions of the General Shareholders Assembly;
- to receive dividends based on the financial performance of the Company in proportion to their share ownership;
- to transfer and sell shares according to our bylaws and Colombian law;
- to inspect corporate books and records with 15 business days prior to the ordinary shareholders' meeting where the year-end financial statements are to be approved;
- upon liquidation, to receive a proportional amount of the corporate assets after the payment of external liabilities; and
- to sell the shares, known as right of withdrawal (*derecho de retiro*), if a corporate restructuring affects the economic or voting rights of the shareholders in the terms and conditions established under Colombian law.

Our bylaws provide additional rights to our minority shareholders. These rights include:

- *Sale of Assets.* For a ten-year period counted from the date of subscription of the declaration of the Nation dated February 16, 2018 or until the Nation loses its status as majority shareholder, the Nation guarantees that any sale of 15% or more of our assets requires the approval of the General Shareholders Assembly and that the Nation would only be allowed to vote its shares in favor of the proposal if 2% or more of our minority shareholders accept the proposal.

- *Candidate List.* Pursuant to our bylaws and Law 1118 of 2006, the Nation will include in its candidate list for election of members of the Board of Directors one member selected by the departments that produce hydrocarbons. In addition, pursuant to the declaration of the Nation dated February 16, 2018, the Nation will include in its candidate list for election of members of the Board of Directors one member selected by the ten largest minority shareholders. The minority shareholders' right to select a candidate loses its effect when minority shareholders, according to their share participation, name a member to our Board of Directors.
- *Extraordinary Meetings.* Our bylaws provide that the entity exercising permanent control over Ecopetrol must instruct the Company's CEO or External Auditor to call an extraordinary meeting of the Company's shareholders when so requested by a plurality of shareholders holding at least 5% of the total number of outstanding shares. Such requests shall be made in writing and must clearly indicate the purpose of the meeting.
- *Investor Attention Office.* Ecopetrol has an investor attention office, a specialized unit responsible for receiving complaints from our shareholders. Pursuant to our bylaws, shareholders holding at least 5% of the total number of shares outstanding may request that the investor attention office conduct a special audit, provided that such audit does not hinder the day-to-day operations of the Company, of the following documents: the income statement; the proposal for the distribution of profits; the report of the Board of Directors as to the economic and financial status of our Company; the report from our general counsel as to the legal status of our Company; and the report from the independent auditors. Special audits cannot be made of documents that contain scientific, technological or statistical information of our Company, or agreement that gives us competitive and economic advantages over our competitors, or in respect of any document related to intellectual property. Shareholders also have the right to propose good corporate governance recommendations to the office for the protection of investors.
- *Others.* Pursuant to our bylaws, shareholders holding at least 5% of the total number of shares outstanding may propose recommendations to our Board of Directors pertaining to the management of our Company. Any shareholder may file a written petition to our Board of Directors to investigate corporate governance violations that the shareholder believes to have been committed.

#### **Amendments to Rights and Restrictions to Shares**

We have only one class of stock and it has no special rights or restrictions (ordinary shares). Our shareholders do not have any type of preemptive rights. The rights given to our shareholders by law are described in our bylaws and may only be modified through an amendment to the law.

The additional rights given to our minority shareholders in our bylaws and corporate governance code may only be modified through an amendment of those internal documents.

#### **Limitations on the Rights to Hold Securities**

There are no limitations in our bylaws or Colombian law on the rights of Colombian residents or foreign investors to own the shares of our Company, or on the right to hold or exercise voting rights with respect to those shares, except in cases of legal representation

#### **Restrictions on Change of Control Mergers, Spin-offs or Transformations of the Company**

Under Colombian law and our bylaws, the General Shareholders Assembly has full authority to approve any mergers, spin-offs or transformations, subject to compliance of applicable law. Corporate restructurings are subject to the requirement that the Nation must hold a minimum of 80% of our common stock in any issuance of stock pursuant to Law 1118 of 2006.

## Ownership Threshold Requiring Public Disclosure

The Corporate Governance Code, Title III, Chapter 1, Section 5, states: Identification of Major Shareholders. The shareholding composition of the Company, indicating at least the twenty (20) people with the greatest number of shares, is disclosed on Ecopetrol's website at [www.ecopetrol.com.co](http://www.ecopetrol.com.co). Colombian securities regulations set forth the obligation to disclose any material event or *hecho relevante*. Any transfer of shares equal or greater than 5% of our capital stock, or any legal entity or individual acquiring a percentage of shares that would make him the beneficial owner of 5% or more of our capital stock, is a material event, and therefore, must be disclosed to the Superintendencia of Finance. The regulation includes other criteria in order to identify when to report a material event other than the situations described in the previous sentence.

## External Auditor

Pursuant to our bylaws, the external auditor will be appointed for periods of two (2) years and may be reelected consecutively for two (2) periods, and it may once again be hired after one (1) period away from the position. At the General Shareholders Assembly on March 29, 2019, the shareholders appointed Ernst & Young as external auditor of Ecopetrol for the fiscal year 2019.

### 7.2 Code of Ethics and Conduct

We have recently updated our code of ethics and conduct, which considers, as ethical principles of the organization, the integrity, responsibility, respect and commitment to life. Our code of ethics and conduct also states that we must comply with the provisions contained in the applicable national and international laws in the countries where we have operations, including the U.S. and Colombia.

In our code, we define the guidelines for the following aspects: conflict of interest; ethical conflict; prohibition of bribery and violations of the FCPA; Integrity in accounting; prevention of money laundering and financing of terrorism; gifts, amenities and hospitalities; protection and use of resources; information management and security; social responsibility and respect for human rights; whistleblowing channel; and examples of ethical behaviors.

Our code of ethics and conduct applies to our Board of Directors, our Chief Executive Officer, our Chief Financial Officer, principal accounting officer, persons performing similar functions and in general to all of the other employees of the company and its affiliates.

All of our agreements with suppliers or third parties include a provision relating to compliance with applicable anti-bribery and anti-corruption regulations. These agreements also require our suppliers and third parties to accept our Code of Ethics and Conduct and our compliance manuals.

Our code of ethics is available on our website at: [https://www.ecopetrol.com.co/wps/portal/web\\_es/ecopetrol-web/corporate-responsibility/ethics-and-compliance/code-of-ethics](https://www.ecopetrol.com.co/wps/portal/web_es/ecopetrol-web/corporate-responsibility/ethics-and-compliance/code-of-ethics)

### 7.3 Board of Directors

The current Board of Directors, elected at the General Shareholders Ordinary Meeting held on March 23, 2018, will serve until the new members of the Board, elected on March 29, 2019 have been duly registered before the mercantile registry, which in Colombia is the Chamber of Commerce, on April 10, 2019.

The current Board of Directors is composed as follows:

#### Non-independent members:

- Director of State Shareholdings from the Ministry of Finance and Public Credit, Currently Camilo Barco
- Claudia González

#### Independent members:

- Mauricio Cabrera Galvis
- Jaime Ardila Gómez (as financial-accounting expert)



- Carlos Cure Cure
- Joaquín Moreno Uribe
- Jorge Londoño Saldarriaga
- Hernando Ramírez Plazas (postulated by the oil producing departments in which Ecopetrol operates)
- Carlos Gustavo Cano Sanz (postulated by ten (10) minority shareholders with major shareholding)

The business experience of each of the Directors named above can be found in our annual report on form 20-F for the year ended December 31, 2017, available at: <https://www.sec.gov/Archives/edgar/data/1444406/000114420418021353/0001144204-18-021353-index.htm>.

The information below sets forth the names and business experience of each of the Directors elected at the General Shareholders Ordinary Meeting held on March 29, 2019 for a two-year term beginning on April 10, 2019:

*Germán Eduardo Quintero Rojas (43)* has served as Managing Director of Fogafin, President of the National Hydrocarbons Agency, General Secretary and Advisor to the Ministry of Trade, Industry and Tourism, and General Secretary of the Ministry of Mines and Energy. He has been an advisor to the General Secretary of the Office of the President of the Republic of Colombia, General Secretary of the Ministry of Internal Affairs, General Director and General Secretary of Acción Fiduciaria S.A., and Head of the Legal Office of the Ministry of Finance and Public Credit. Mr. Quintero is a lawyer from Sergio Arboleda University, with studies in Administrative Law and a degree from Javeriana Pontifical University. He also carried out studies in a Doctorate in Administrative Law from San Pablo CEU University of Madrid, from where he was a doctorate candidate. To date, he is a member of the board of directors at Fiduciaria La Previsora S.A., Central de Inversiones S.A. and Gecelca S.A. E.S.P. Mr. Quintero has served as a non-independent member of Ecopetrol's Board of Directors since March 29, 2019. Currently, Mr. Quintero is a non-independent member of Ecopetrol's Board of Directors as the General Secretary of the Ministry of Finance and Public Credit.

*Orlando Ayala Lozano (62)* has 40 years of experience in the global technology industry, 25 years of which he spent working for Microsoft in Seattle, Washington, where he served in a number of managerial positions, including Vice President for the Intercontinental Region, covering all countries of the southern hemisphere region, Executive World Vice President for Sales, Marketing and Support, and World President for Emerging Markets. Before joining Microsoft, he worked for NCR Corp., where he held the position of Sales Director for NCR Mexico and Senior Product Manager in Dayton, Ohio. His studies include the Information Systems Administration program at Jorge Tadeo Lozano University in Bogotá in 1981, with a Doctorate Honoris Causa granted by the same university in 1998, where he is member of the Management Board. Mr. Ayala was honored by the Antioquia newspaper El Colombiano with its 18th annual "Exemplary Colombian Citizen Living Abroad" award in 2013. Mr. Ayala is currently an independent director of the Executive Council of Centene Corp. (CNC). Currently, Mr. Ayala serves as an independent member of Ecopetrol's Board of Directors and also serves as an international consultant and speaker on matters of leadership and technology trends.

*Luis Guillermo Echeverri Vélez (61)* has over 20 years of experience in the development, marketing, promotion and conducting of international business, imports and exports, the formulation and implementation of public and corporate policies, the development and implementation of conventional projects and information technology ventures, strategic planning, the financing of public and private projects and raising cooperation funds. He served as Executive Director of the Inter-American Development Bank, the Inter-American Investment Corporation and the Multilateral Investment Fund on behalf of the governments of Colombia, Peru and Ecuador. He was CEO of Trade Winds Network Inc., a company he also founded, and was Director and Founder of Amarilas.com. He served as Commercial Attaché in Colombia's diplomatic mission to the US and as Director of Proexport's Miami Regional Office. Mr. Echeverri is an attorney who graduated from the Bolivarian Pontifical University of Medellín, and earned a Master's degree in Agricultural Economics from Cornell University, New York. Mr. Echeverri is an advisor in international businesses and has successfully led business initiatives and processes involving change, and methodological and technological innovation and implementation in companies of various sizes and large organizations. He is currently a member of the Boards of Directors of the Chamber of Commerce of Bogota, Telefonica, Pragma, Colmedica and Aliansalud. Currently, Mr. Echeverri is an independent member of Ecopetrol's Board of Directors.

*Juan Emilio Posada Echeverri (60)* has been a director of the companies Puerto Brisa S.A., Grupo Fast S.A. and Fast Colombia S.A.S. – VivaAir (formerly VivaColombia); Founder and CEO of Stratis Ltda. and Corporate Director-in-Chief of Synergy Aerospace. He has served as Chairman of Avianca, Alianza Summa (Avianca-Aces-Sam) and Aces S.A. and is currently serving as Executive Chairman of the Board of Directors of Tájimo Ltd., President of the Board of Directors of Direkto S.A.S., member of the Board of Directors of Grupo Odinsa S.A. (infrastructure multi-latina affiliate of Grupo Argos), of Sociedad Hotelera Tequendama S.A. (7 hotels in Colombia) and Computec Outsourcing de Documentos S.A. He holds a degree in Business Administration from EAFIT University in Medellín, with an MBA from Pace University in New York and a degree in International Financial Law from the London School of Economics. He is also a member of the Advisory Councils of Grupo Empresarial del Sector Defensa (GESED), Disán S.A., C.I. Flores de la Campiña (producer and exporter of fresh flowers), of YPO Gold Colombia (global network of CEO's) and NT3 (developers of real estate projects). He is President of the Board of Directors of Fundación Plan, a member of the Board of Directors of Plan International Brazil, a member of the Nominations and Government Committee of the global assembly for Plan International Inc. and is a part of the International Advisory Board of Polimath Ventures. Currently, Mr. Posada serves as an independent member of Ecopetrol's Board of Directors.

*Sergio Restrepo Isaza (57)* served in the Bancolombia Group as Vice President for Capital Markets and Executive Vice President for Corporate Development. He initiated his professional career at Corporación Financiera Corfinsura, where he held the positions of Company President, Vice President for Investment Banking and Vice President for Investments and International. He also served in several boards including Cementos Argos, Compañía Nacional de Chocolates, Conavi, Asobancaria, Bolsa de Valores de Colombia, Conglomerado Financiero Internacional Banagrícola S.A., Suramericana Asset Management SUAM and several others in the community sector. Mr. Restrepo graduated with a degree in Business Administration from EAFIT University of Medellín, with a master's degree in Business Administration from Stanford University in California. He is currently a partner at Exponencial Banca de Inversión S.A.S., a member and chairman of the boards of directors of the BIOS SAS Group and Duratex S.A. Colombia, and a member of the boards of directors of Odinsa S.A., Consorcio Financiero and Coquecol. Currently, Mr. Restrepo serves as an independent member of Ecopetrol's Board of Directors.

*Santiago Perdomo Maldonado (61)* has over 30 years of senior management experience in the Colombian banking industry, including as President of Banco Colpatria, Scotiabank Group. He has been a member of various boards of directors at Colombian and Latin American companies in a range of economic sectors, such as finance and mining and agriculture, including Bladex, Deceval, CESA, the Asociación Nacional de Empresarios de Colombia (ANDI), and the Asociación Nacional de Instituciones Financieras (ANIF), and he was a founding member of the Colombian Institute of Corporate Governance. Mr. Perdomo holds a degree in Business Administration from the CESA School of Advanced Studies in Administration. He is currently Executive Director of the Colpatria Group and a member of the Boards of Directors of Scotiabank Perú, Colfondos and Mineros S.A. Currently, Mr. Perdomo serves as an independent member of Ecopetrol's Board of Directors.

*Esteban Piedrahita Uribe (47)* previously served as General Director of the National Planning Department, advisor for the President, Senior Specialist for the Inter-American Development Bank and as an economics editor of the magazine *Semana*, among other positions. He has served on the boards of directors of Banco Agrario, Metrocali, Amalfi S.A. Carvajal Educación and Alianza Valores. Mr. Piedrahita graduated with a degree in Economics from Harvard University and earned a master's degree in Philosophy and the History of Science from the London School of Economics and Political Science. Mr. Piedrahita currently serves as President of the Chamber of Commerce of Cali. He is currently a member of the Boards of Directors of Cementos Argos and Centro de Eventos Valle del Pacífico, as well as a member of the Executive Council of Fedesarrollo. Currently, Mr. Piedrahita serves as an independent member of Ecopetrol's Board of Directors.

*Hernando Ramírez Plazas (65)* has held positions at Universidad Surcolombiana as Dean of the Faculty of Engineering, Academic Vice-Principal, Principal, and Professor. He has worked at the National Institute of Health and at the Ministry of Health. He had a role as an external evaluator for Colciencias in technology development and innovation projects in the area of natural gas. Additionally, he has acted as a trainer in gas issues for production personnel at Canacol Energy Inc., and he currently provides professional services to Comfamiliar Huila. Mr. Ramírez is a chemical engineer who graduated from Universidad Nacional de Colombia, with a master's degree in Public Health from the same university, and a specialization in Gas Engineering from Universidad de Zulia (Venezuela). Mr. Ramírez has served as an independent Director in Ecopetrol's Board of Directors, since March 23, 2018. Currently, Mr. Ramírez serves as an independent member of Ecopetrol's Board of Directors.

*Carlos Gustavo Cano Sanz (72)* has been President of the Colombian Agriculture Association (SAC), Founder and Director of Corporación Colombia Internacional (CCI), President of the Agrarian Fund, and President of the newspaper El Espectador. He was Minister of Agriculture between August 7, 2002 and February 3, 2005 and Co-Director of Banco de la República between February 4, 2005 and January 31, 2017. He is an Economist from Universidad de los Andes in Bogotá with a master's degree in Economics from the University of Lancaster in England and a postgraduate degree in Government, Business and International Economics from Harvard University in Boston and undertook further postgraduate studies at the Instituto de Alta Dirección Empresarial (INALDE) of Bogotá. He currently teaches in the Master of Corporate Finance program at CESA University and in the Business School at Universidad de los Andes. He is a member of the Superior Council of the EAFIT University of Medellín, the Consultative Committee for Agriculture of Bancolombia, and the Group on Earth Observations Global Water Sustainability (GEOGLOWS) in the United States. Mr. Cano has served as an independent Director in Ecopetrol's Board of Directors, since March 31, 2017. Currently, Mr. Cano serves as an independent member of Ecopetrol's Board of Directors.

### 7.3.1 **Board Practices**

Our Board of Directors is composed of nine members and is responsible for, among other things, establishing our general business policies. The majority of the Board of Directors must be independent, and must be elected pursuant to the criteria set out in paragraph two, Article 44, Law 964, 2005, and in accordance with the procedure determined in Decree 3923, 2006, or any other provisions that regulate, amend, replace or add such regulations. In addition, pursuant to our bylaws and in accordance with the procedures described therein, our majority shareholder must include, in its list of candidates for the last two seats in the Board of Directors, the name of one individual jointly proposed by departments that produce hydrocarbons and one individual jointly proposed by the ten minority shareholders with the highest equity participation. According to Colombian law, the members of the Board of Directors must be elected by the General Shareholders Assembly in accordance with a proportional representation system similar to cumulative voting (through an electoral quota voting system). The number of votes required to fill each position is calculated by dividing the number of possible votes by the number of open board positions. The members of the Board of Directors may be elected without an electoral quota voting system when there is unanimity. Pursuant to our bylaws, (i) positions on our Board of Directors are filled either by person or by position, (ii) at least three members appointed for a specific period must be nominated for the following period, and (iii) beginning in 2019, Directors will be elected for a two-year term. Currently, we have one Director appointed by his position: The General Secretary of the Ministry of Finance and Public Credit. Our current Directors were elected at the General Shareholders Assembly held on March 29, 2019. Members of the Board may be reelected indefinitely.

Our CEO is appointed by the Board of Directors and will have at least two alternates. The CEO is elected for a two-year term, may be reelected indefinitely and freely removed prior to the expiration of his term. In accordance with our bylaws, the Board of Directors must evaluate the annual performance of the CEO, and such results must be published in Ecopetrol's web page or in an alternative media vehicle.

The compensation of our Directors is set exclusively by the shareholders at the General Shareholders Assembly. Directors are compensated for attending board meetings and committee meetings. A Board meeting requires a quorum of at least five members and decisions are approved with a majority of the Directors present. In the practice a consensus decision making operates in the Board.

Under Colombian law, a director or executive officer must abstain from participating in any transaction that may result in a conflict of interest or that involves competing with the company, unless authorized at a General Shareholders Assembly. The general shareholders may approve or reject the transaction giving rise to the conflict of interest with the vote of the majority of the shares present at the General Shareholders Assembly. If the director or executive officer who has the conflict is a shareholder, his or her vote must be excluded. We disclose the number of conflicts of interest of our employees, executive officers and Directors in our annual reports.

Neither our bylaws nor our corporate governance code provide a retirement age for our Directors. Under our bylaws, there is no requirement for a person to have a minimum number of shares to be elected as a Director. Colombian law provides that Directors willing to sell or purchase shares in our Company need prior authorization from the entire Board of Directors. Colombian law does not impose any limitation as to the number of shares that may be acquired by a Director.

### 7.3.2 Board Committees

Pursuant to our bylaws, our Board of Directors has the ability to constitute the committees it considers necessary. The Board of Directors currently has five committees (audit and risk committee, corporate governance and sustainability committee, compensation and nomination committee, business committee and HSE (health, security and environment) committee). These committees establish guidelines, set specific actions and evaluate and submit proposals designed to improve performance in the areas under their supervision and control. The committees are comprised of members of the Board of Directors who are also appointed by the same members. The chairman of each of the committees must be an independent Director. In addition to applicable regulations, the committees also have their own specific regulations that establish their purposes, duties and responsibilities.

**Table 57 – Composition of committees of the Board of Directors as of March 29, 2019**

<b>Audit and Risk Committee</b>	<b>Compensation and Nomination Committee***</b>
Jaime Ardila Gomez *	Mauricio Cabrera Galvis
Jorge Londoño*	Claudia González
Joaquin Moreno Uribe*	Carlos Cure Cure
Hernando Ramírez	Joaquín Moreno Uribe
Carlos Gustavo Cano Sanz	
<b>Corporate Governance and Sustainability Committee</b>	<b>Business Committee</b>
Claudia González **	Joaquín Moreno Uribe****
Director General of State Owned Enterprises of the Ministry of Finance and Public Credit **	Director General of State Owned Enterprises of the Ministry of Finance and Public Credit ****
Carlos Cure Cure**	Jaime Ardila Gómez ****
Jaime Ardila Gómez **	Carlos Cure Cure****
Mauricio Cabrera Galvis**	Mauricio Cabrera Galvis****
Jorge Londoño**	Claudia González ****
Carlos Gustavo Cano Sanz	Jorge Londoño****
Hernando Ramírez	Hernando Ramírez
Carlos Gustavo Cano Sanz	Carlos Gustavo Cano Sanz
<b>HSE Committee</b>	
Carlos Gustavo Cano Sanz	
Hernando Ramírez	
Joaquín Moreno Uribe*****	
Mauricio Cabrera Galvis*****	
Jaime Ardila Gómez*****	

\* Not elected to the Board of Directors at the General Shareholders Ordinary Meeting on March 29, 2019. Replacement will be elected to the Audit and Risk Committee after this annual report.

\*\* Not elected to the Board of Directors at the General Shareholders Ordinary Meeting on March 29, 2019. Replacement will be elected to the Corporate Governance and Sustainability Committee after this annual report.

\*\*\* None of the members of this Committee were elected to the Board of Directors at the General Shareholders Ordinary Meeting on March 29, 2019. Replacement will be elected to the Compensation and Nomination Committee after this annual report.

\*\*\*\* Not elected to the Board of Directors at the General Shareholders Ordinary Meeting on March 29, 2019. Replacement will be elected to the Business Committee after this annual report.

\*\*\*\*\*Not elected to the Board of Directors at the General Shareholders Ordinary Meeting on March 29, 2019. Replacement will be elected to the HSE Committee after this annual report.

## **Audit and Risk Committee**

Our audit and risk committee, which must be comprised of at least three members, all of them independent Directors, is our highest internal control body and provides support to our Board of Directors on risk, accounting and financial matters. It is in charge of guaranteeing the design, implementation and supervision of our internal control over financial reporting. It also ratifies the annual hydrocarbons reserves report and provides support for our Board on analyzing topics related to financial matters, risks, control environment and the assessment of the Company's internal and external auditors.

All committee members are required to be knowledgeable in accounting matters and at least one of them is required to be an expert in financial and accounting matters.

Our Board of Directors has determined that Jaime Ardila Gómez qualifies as an "audit committee financial expert" and he is independent under the definition of "independent" applicable to us under the rules of the NYSE.

The audit and risk committee approves on a case-by-case basis any engagement of our external independent auditors to provide services different than those related to auditing our financial statements. The audit and risk committee reviews that the additional services do not affect the external auditor's independence.

## **Compensation and Nomination Committee**

Our compensation and nomination committee, which must be comprised of at least three members, including at least one independent director, provides general guidelines for the selection and compensation of our executive officers and employees.

## **Corporate Governance and Sustainability Committee**

Our corporate governance and sustainability committee, which must be comprised of at least three members, including at least one independent director, makes proposals to our Board of Directors to ensure and supervise the fulfillment of our good corporate governance and sustainability practices in accordance with our corporate governance code.

## **Business Committee**

Our business committee, which must be comprised of at least five members, including at least one independent Director, assists our Board in analyzing potential business ventures. Based on its delegation of power, the committee studies and analyzes capital expenditure policies, major investment projects, strategy, new business and other matters that would help us move forward in our efforts toward the consolidation of our strategy. The primary criteria used in the committee's decision-making process are the optimization of our portfolio and the proper allocation of our resources.

## **HSE Committee (Health, Safety and Environment)**

Our HSE Committee, which must be comprised of at least three members, the majority of which must be independent, supports the management of the Board of Directors in respect of the monitoring and management of risks associated with the health and safety of our employees, contractors and partners, as well as the performance of the Ecopetrol Group's environmental management.

### **7.4 Compliance with NYSE Listing Rules**

The following is a summary of the significant differences between our corporate governance practices and those required for U.S. companies under the NYSE listing standards.

#### **NYSE Standards**

##### ***Director Independence***

The majority of the board of directors must be independent. §303A.01. "Controlled companies," which would include Ecopetrol if we were a U.S. issuer, are exempt from this requirement. A controlled company is one in which more than 50% of the voting power is held by an individual, group or another company, rather than the public. §303A.00.

#### **Our Corporate Governance Practices**

Pursuant to our bylaws, the majority of the Board of Directors must be independent. As of the date of this annual report, we have eight independent Directors and one non-independent Director.

***Executive Sessions***

The non-management directors of each listed company must meet at regularly scheduled executive sessions without management. §303A.03.

***Nominating/Corporate Governance and Sustainability Committee***

A nominating/corporate governance and sustainability committee composed entirely of independent directors is required. The committee must have a charter specifying the purpose, duties and evaluation procedures of the committee.

§303A.04. “Controlled companies” are exempt from these requirements. §303A.00.

***Compensation Committee***

A compensation committee composed entirely of independent directors is required, which must evaluate and approve executive officer compensation. The committee must have a charter specifying the purpose, duties and evaluation procedures of the committee. §303A.05. “Controlled companies” are exempt from this requirement. §303A.00.

***Audit and Risk Committee***

An audit committee with a minimum of three independent directors satisfying the independence and other requirements of Rule 10A-3 under the Exchange Act and the more stringent requirements under the NYSE standards is required.

§§303A.06 and 303A.07.

***Equity Compensation Plans***

Equity compensation plans and all material revisions thereto require shareholder approval, subject to limited exemptions. §§303A.08 and 312.03.

A comparable rule does not exist under Colombian law. Except for our audit and risk committee, our Board of Directors does not meet without management.

Colombian law does not require the establishment of a nominating and a corporate governance and sustainability committee composed entirely of independent directors. Pursuant to our board charter, these committees shall be composed of a majority of independent Directors.

Colombian law does not require the establishment of a compensation committee composed entirely of independent directors. Pursuant to our board charter, this committee shall be composed of a majority of independent Directors.

According to Law 964 of 2005, Colombian companies that are authorized to issue securities by the Superintendence of Finance must have an audit committee that satisfies the requirements of Law 964 of 2005, including its minimum number of members, independence criteria and audit related duties. Our audit and risk committee is composed entirely of independent Directors, and the committee meets the requirements of Law 964 of 2005 and Rule 10A-3 under the Exchange Act.

Under Colombian law, no similar right to vote on equity compensation plans and material revisions thereto is given to shareholders. We do not give our shareholders the right to vote on equity compensation plans and material revisions thereto.

## NYSE Standards

### *Corporate Governance Guidelines*

Listed companies must adopt and disclose corporate governance guidelines. §303A.09.

### *Code of Ethics for Directors, Officers and Employees*

Corporate governance guidelines and a code of business conduct and ethics is required, with disclosure of any waiver for directors or executive officers. The code must contain compliance standards and procedures that will facilitate the effective operation of the code. §303A.10.

## 7.5 Management

The following presents information concerning our executive officers and senior management. Unless otherwise noted, the majority of these individuals are Colombian citizens.

### *Executive Officers*

*Felipe Bayon Pardo (53)* has served as the Chief Executive Officer of Ecopetrol since September 2017. Prior to being appointed Chief Executive Officer, Mr. Bayón served as Chief Operating Officer of Ecopetrol from February 2016 to September 2017. Mr. Bayon holds a degree in Mechanical Engineering from the Universidad de Los Andes (Bogotá). He has over 27 years of experience in the oil and gas industry. For more than 20 years, he worked at BP plc, most recently as Senior Vice-President of BP America and Head of Global Deepwater Response. From 2005 to 2010, he was the Regional President of BP Southern Cone (South America), and prior to 2005 he worked in BP's headquarters as Chief of Staff to the Upstream CEO and Head of the Executive Office for Exploration and Production. He began his career in 1995 in BP Colombia, as a Project Engineer, where he held various positions until becoming Vice-President of Operations in Colombia. Prior to this, he worked for Shell.

*Alberto Consuegra Granger (58)* has served as Chief Operating Officer of Ecopetrol since March 1, 2019. Prior to being appointed as Chief Operating Officer, he was deputy CEO of Cenit S.A.S., Ecopetrol's midstream subsidiary, since February 2018 and Vice-President of Supply and Services of Ecopetrol S.A. since August 2016. Mr. Consuegra holds a degree in Civil Engineering from Universidad de Cartagena and a master's degree in Pavements and Construction Management from Texas A&M University. Before joining Ecopetrol, he was Vice-President of Exploration and Production at Equion Energia Limited, where he also served as the Vice-President for Projects and Production during the 2011 – 2016 period. Mr. Consuegra began his professional career in 1984 by working for Morrison Knudsen International as a contract coordinator during the construction of the Cerrejon project. In 1993 he joined Ecopetrol S.A., working in the Projects Group, and then went to BP Exploration, where he worked for 16 years, first as a contract coordinator, then as procurement and contract manager, then human resource manager for the Andean area, and finally as leader of the Colombian Performance Unit until end of 2010.

## Our Corporate Governance Practices

The Superintendence of Finance recommends the adoption of corporate governance guidelines to all Colombian issuers. According to Superintendence of Finance Circular No. 028, 2014, the adoption of corporate governance guidelines is voluntary. Listed companies must annually publish a corporate governance survey comparing their corporate governance standards with those recommended by the Superintendence of Finance. Our corporate governance code and our survey of the adoption of Colombian practices are available on our website at <http://www.ecopetrol.com.co>.

We have adopted a code of ethics which complies with applicable U.S. and Colombian law. Our code of ethics applies to our chief executive officer, chief financial officer, principal accounting officer, persons performing similar functions and to all of the employees, members of the Board of Directors, suppliers, and contractors of Ecopetrol S.A. and its corporate group. Our code of ethics is available on our website at <http://www.ecopetrol.com.co>

*Jaime Caballero Uribe (44)* has served as the Chief Financial Officer of Ecopetrol since August 2018. Mr. Caballero has over 20 years of international experience in the oil and gas sector. He joined the Ecopetrol Group in 2016 and was the Chief Financial Officer for the Downstream Segment prior to his appointment as the Ecopetrol Group CFO. Previously, his experience includes 17 years at BP, where he held leadership positions in North and South America, Africa and Europe, and most recently as Regional CFO for Brazil, Uruguay, Colombia and Venezuela. Mr. Caballero holds a law degree from Universidad de los Andes (Bogotá), an MBA in Energy Business from Fundação Getulio Vargas (Rio de Janeiro) and has completed executive programs in advanced financial management from Duke University and the Wharton School of Business.

#### *Management Team*

*Jorge Elman Osorio Franco (57)* has served as the Development and Production Vice-President of Ecopetrol since March 1, 2019. Prior to his appointment as Development and Production Vice-President, he served as Regional Development and Production Vice-President since June 2017. He holds a degree in Chemical Engineering from the National University of Colombia and has over 30 years of experience in engineering, projects and operations in the oil and gas industry. He spent 24 years of his career at BP, where he served as Operations Manager, Senior Operations Manager in Major Projects, Technical Director and Operations Excellence Director, among other leadership positions including managerial positions in Colombia, Trinidad & Tobago and Indonesia.

*Jorge Arturo Calvache Archila (59)* has served as Vice-President of Exploration since February 1, 2019. He has more than 30 years of experience. He has served in companies such as Shell and Hocol, where he led exploration projects in the Netherlands, the United States and Colombia. Mr. Calvache holds a degree in Geology from Universidad Nacional, a master's degree in Geophysics from the same university, and studied Management at Universidad de Los Andes.

*Rubén Darío Moreno Rojas (54)* has served as Vice-President of Transport Operations and Maintenance since March 1, 2019. Prior to his appointment as Vice-President of Transport Operations and Maintenance, he served as deputy Vice-President of Transport Operations and Maintenance since April 2018. He has a 30-year career at Ecopetrol S.A., where he has held several managerial positions in the Vice-Presidency of Transportation as Operations Manager, Technical Superintendent, Head of Maintenance and Head of Operations. Mr. Moreno holds a degree in Electronic Engineering from Universidad Antonio Nariño and an Executive MBA from Universidad la Sabana.

*Rodrigo Andres Dalle Fiore (40)* has served as Development Vice-President since March 2019. Prior to his appointment as Development Vice-President, he served as Development General Manager (A), Reservoir Development Strategy Manager (A) and Enhanced Oil Recovery Manager at Ecopetrol. He has over 14 years of international experience in the oil and gas sector. Prior to joining Ecopetrol, he was Operations Manager at Bidas Corp (Colombia) and Productions and Operations Manager at Pan American Energy (Argentina). Mr. Dalle Fiore holds a degree in Chemical Engineering from the National University of Córdoba – Argentina, a specialization in Oil & Gas Reservoirs from the U.N.P.S.J.B. Comodoro Rivadavia, Chubut Argentina and a specialization in Gas and Oil Technologies at the Technologic Institute of Buenos Aires (ITBA) - Buenos Aires, Argentina.

*Tomas Hernandez (64)* has served as Vice-President of Refining and Industrial Processes in Ecopetrol since February 2016. He has over 39 years of multinational experience in the field of oil and gas sector. He has worked as Business Manager at Chevron's Pascagoula refinery in the United States, General Manager for Marketing Operations for Chevron Texaco in Latin America and Africa-Europe-Pakistan Regions and has spent over 20 years in managerial positions in various refineries at Chevron. Prior to joining Ecopetrol, he was Deputy Upgrader Manager at Petropiar, a non-operated joint venture in which Chevron holds a 30% interest. Mr. Hernandez graduated from the University of Missouri – Rolla (University of Science and Technology Missouri) in 1978 with a Bachelor of Science degree in chemical engineering.

*Jurgen Gerardo Loeber Rojas (61)* has served as the Projects & Engineering Vice-President of Ecopetrol since May 2016. Mr. Loeber holds a degree in Business Administration from "Universidad del Norte" and a specialization in Project Management. He joined the Army Corps of Engineers as reserve officer and reached the rank of captain. He has over 30 years of experience in the oil and gas industry. He began his career in 1985 in Exxon as financial analyst. From 1992 to 2001, he worked for BP in various countries as project manager, construction manager and project control engineer. For the last 10 years, he worked at Equion Limited (formerly BP Exploration Colombia) as Project Director. From 2001 to 2006, he was Project Director for Wood Group Colombia.



*Pedro Fernando Manrique Gutierrez (54)* has served as Commercial and Marketing Vice-President since April 2017. Mr. Manrique holds a bachelor's degree in Electrical Engineering from the Universidad Industrial de Santander, Colombia. He has a master's degree in Industrial and Systems Engineering from the University of Florida and an MBA from the IE Business School in Madrid, Spain. Mr. Manrique has 27 years of experience in the oil and gas industry. He previously was the Commercial and Business Planning Manager for Chevron Latin America in Caracas, Venezuela. At Chevron, he also served as Commercial and Business Development Manager in Chevron Colombia in Bogotá, Colombia. During his career he also worked for Enron Energy Services as Risk Manager at their headquarters in Houston, Texas. He has also served as a member of the Leadership Team of Chevron Latin America and as a member of the national operations council of natural gas in Colombia, among many other responsibilities.

*Hector Manosalva Rojas (57)* has served as CEO of Cenit S.A.S., Ecopetrol's midstream subsidiary, since March 1, 2019. He joined Ecopetrol in 1986 and prior to his appointment as CEO of Cenit, he served as Vice-President for Development and Production since July 2014. Over the course of his career at Ecopetrol, Mr. Manosalva has held various positions, including Executive Vice-President for Production and Exploration, Vice-President of Production, Production Manager of the Central Region, President of Colombia's Advisor for Safety and Security of National Energy Infrastructure, Director of HSE and Corporate Social Responsibility, Production Manager of the Southern Region and Head of the Production Planning Division. Mr. Manosalva holds a degree in Petroleum Engineering from the Universidad de America (Bogotá) and postgraduate degrees in Finance at the Universidad EAFIT and Executive Management at the Universidad de los Andes.

*Juan Manuel Rojas Payán (47)* has served as Vice-President for Strategy and New Business since August 2018. Prior to his appointment as Vice-President for Strategy and New Business, he served as Corporate Manager for New Business since 2016. He graduated with a degree in Economics from Universidad de los Andes and holds two master's degrees in Public Policy from Harvard University and in Economics from Universidad de los Andes. He was previously Vice-Minister of Mines and Energy, Chief Executive Officer of Bidas Corporation, Manager of New Business at Pan American Energy, and Director of Energy at Sideco Americana/Socma, among other positions.

*Marly Aracelly Castillo Areiza (41)* has served as Vice-President of Transformation since January 2019. Ms. Castillo helped launch and develop the transformation program in Ecopetrol since joining in 2009. Ms. Castillo has 17 years of experience in the public and private sectors in strategy and performance measurement. Ms. Castillo holds a degree in Economics from the Universidad Santo Tomás, Bogotá, completed post-graduate studies in Finance at the Universidad Externado and an MBA at the Universidad de los Andes. Prior to joining Ecopetrol, she worked on academy and research at the School of Management at the Universidad de los Andes as a consultant and teacher. Ms. Castillo has published two books: "Valuation of projects through real options" and "Measurement Customer Value," in addition to other case studies that focus on a diversity of management dilemmas in the areas of leadership, organizational change and strategy. Ms. Castillo will be the Vice-President of Transformation until June 17, 2019, upon which Orlando Díaz Montoya will assume the position.

*Fernán Ignacio Bejarano Arias (63)* has served as Vice-President of Legal Affairs and General Counsel at Ecopetrol since March 2016. Mr. Bejarano Arias holds a bachelor's degree in Law from Universidad Javeriana in Bogotá and an LLM from American University in Washington D.C. In his more than thirty years of professional experience, he has been a partner at the law firms of Estudios Palacios Lleras S.A, Bejarano Cárdenas y Ospina y Asociados Ltda and OPEBSA Compañía de Abogados S.A.S. and has worked for several years in important positions in the public sector, such as the Vice-Minister of Foreign Affairs, Secretary of the Monetary Board, Secretary of the Board of Directors of the Banco de la República (Colombian Central Bank), Office of Legal Affairs Counselor at the Presidency of the Republic of Colombia, and Vice-President of Legal Affairs and General Counsel at Corporación Financiera Colombiana. Mr. Bejarano Arias has been a professor at the Faculty of Law of the Universidad Javeriana, and has been an arbitrator before the Center for Arbitration and Conciliation of the Bogotá Chamber of Commerce.

*Mónica Jiménez González (43)* has served as Secretary General of Ecopetrol S.A. since July 2016. Ms. Jiménez holds a law degree from University of the Andes (Bogotá) and has practiced as a foreign lawyer in Canada. She holds a post-graduate degree in Civil and State Responsibility from the Universidad Externado de Colombia and a Master of Science in Development Studies from the London School of Economics and Political Science. Ms. Jimenez has practiced in Colombia and Canada on matters related to corporate social responsibility, cross-border transactions, and corporate law, and has acted as counsel and tribunal secretary in complex international commercial and investment arbitrations. She lived in Canada for 13 years, during which time she worked as a lawyer in a boutique law firm that specialized in international law and then in a major Canadian law firm in Vancouver, BC. Ms. Jimenez is also a Member of the International Court of Arbitration of the International Chamber of Commerce (ICC).

*María Juliana Alban Durán (43)* has served as Compliance Vice-President and Compliance Officer since July 2015. Ms. Alban holds a law degree from Universidad Sergio Arboleda with a specialization in Commercial and Financial Law from the same institution. Beginning in 2007, Ms. Alban previously worked in the Attorney General's Office (Procuraduría General de la Nación) as Attorney General for State Contracts, General Secretary and Chief of Legal Office, among other positions within the institution.

*Alejandro Arango Lopez (59)* has served as Vice-President of Human Resources at Ecopetrol S.A. since October 2014. He has more than 20 years of professional experience around the world and has worked as Vice-President of Human Resources at Banco Santander in Colombia and as Human Resources Director of the Consumer Finance Division, Strategy Division and Cards Division at Banco Santander in Spain. Mr. Arango has also served as Human Resources Director for the Asia Pacific region at Banco Santander in Hong Kong and as Global Human Resources Division T&O, among others. Mr. Arango holds a degree in Strategic Marketing from CESA School of Business, a bachelor's degree in Theology from the Universidad Hochschule Sankt Georgen (Frankfurt) and a bachelor's degree in Philosophy from Javeriana University.

*Andres Eduardo Mantilla Zarate (48)* has served as the Director of the Colombian Petroleum Institute of Ecopetrol, the technology development center of the company, since September 2013. He holds a degree in Petroleum Engineering from Universidad Industrial de Santander, Colombia, a Master of Science degree in Petroleum Engineering from Stanford University, and a Ph.D. in Geophysics from Stanford University. His professional work includes the leadership and management of oil and gas technology development, demonstration and implementation teams. He had previously worked for Ecopetrol holding various positions between 1994 and 2006. Before rejoining Ecopetrol in 2013, he worked for BP Colombia, Marathon Oil Company and Maersk Oil. During his professional career, he has had exposure to exploration and production projects and the evaluation of new ventures in Colombia, the Gulf of Mexico, the North Sea, West Africa, South America and the Middle East.

*Anibal Fernández de Soto Camacho (40)* has served as Vice-President of Sustainable Development at Ecopetrol since September 2018. He is a lawyer who specializes in Economics from Los Andes University, and holds a master's degree in Political Action, Institution-Building and Citizen Participation from Francisco Vitoria University and Rey Juan Carlos I University, Madrid-Spain. Educated in government affairs and public policies, Mr. Fernández de Soto served as an advisor of the Government and Congress of the Republic, as well as for management of political projects and as a representative of the private sector in the trade field. He has served as Deputy Minister for Policy and International Affairs in the Ministry of Defense, Deputy Minister for Rural Development in the Ministry of Agriculture, Deputy Minister for Participation and Rights Equality in the Ministry of Internal Affairs, and Director of Security in the Ministry for Post-Conflict. In the private sector, he was executive director of the Chamber of Beverage Industry of ANDI, *Corporación Pensamiento Siglo XXI* and *Fundación Democracia y Libertad*.

*Carlos Andrés Santos Nieto (42)* has served as Vice-President of Supply and Services since August 7, 2018. Prior to his appointment as Vice-President of Supply and Services, he was Procurement and Supply Chain Manager at Ecopetrol. Mr. Santos is an Economist from Universidad Externado de Colombia and holds a postgraduate degree in International Economics from the same institution and a college diploma course in Advanced Negotiations from Universidad CESA, and has completed other negotiations training provided by BP in Colombia, Alaska and London. Prior to joining the Company, he served as Offshore Business Unit General Manager in Coremar Group and Procurement & Supply Chain Manager Drilling, Wells, Subsurface and Offshore in Equion Energia Limited (Former BP Exploration Colombia). He also served as Latin America Procurement Sourcing Manager for Merck Sharp & Dhome and Procurement & Supply Chain Manager Specialist for Quala Colombia S.A. He has held various positions within BP as PSCM Drilling & Wells Category Lead, Iraq SPU in London, PSCM Market Intelligence Lead & Deflation Project Lead in Alaska, PSCM Specialist D&W in Alaska, PSCM Specialist O&M in Colombia, PSCM Commercial Analyst in Colombia and PSCM Specialist Business Support in Colombia.

*Ernesto Gutiérrez de Piñeres (45)* has served as Digital Vice-President since October 2018. Mr. Gutierrez de Piñeres is a Systems Engineer and Information Systems Management Specialist from University of Norte de Barranquilla, and holds an Executive MBA from Los Andes University. He has more than 19 years of experience as Director and Manager (CIO) of information technology areas in different multinational companies on multiple industry sectors, leading and developing high performance teams in Colombia, USA, Central and South America. Mr. Gutierrez de Piñeres is an executive with experience in transforming technology areas into business partners and generators of value for the organizations through technology-based innovation, team development and technology strategies that leverage corporate strategy and competitive business.

None of our Directors, Executive Officers or members of senior management has any familial relationship with any Director, Executive Officer or member of senior management.

#### 7.6 Compensation of Directors and Management

Based on a resolution adopted at our annual shareholders' meeting in 2012, compensation for Directors' attendance in person at meetings of the Board of Directors and/or committee meetings increased from the equivalent of four to six minimum monthly wage salaries, which totals approximately COP\$4.9 million for 2019 and COP\$4.6 million for 2018. See Note 29.1 to our consolidated financial statements for more details.

The total compensation paid to our Directors, executive officers and senior management active as of December 31, 2018 during 2018 amounted to COP\$23.73 billion. This includes amounts paid to certain of our Directors, executive officers and senior management pursuant to a bonus plan under which such persons are entitled to receive contingent compensation based on our company results for each full year. The contingent compensation ranges from 0% to 150% of each person's base compensation based on our company performance.

Only one member of our management team is eligible to receive pension and retirement benefits from us. The total amount recorded as of December 31, 2018 to provide pension and retirement benefits amounted to COP\$5,491 million.

#### 7.7 Share Ownership of Directors and Executive Officers

No individual Director or executive officer beneficially owns more than 1% of our outstanding shares.

The following executive officers own shares of Ecopetrol:

**Table 58 – Executive Officers owning Ecopetrol's shares**

<b>Executive Officer</b>	<b>Shares <sup>(1)</sup></b>	<b>%</b>
Felipe Bayón Pardo	8,418	0.00002%
Jaime Eduardo Caballero Uribe	30,000	0.00007%

(1) As of March 28, 2019.

Under Colombian law, all of our shareholders have the same economic privileges and voting rights.

#### 7.8 Controls and Procedures

##### **Disclosure Controls and Procedures**

As required by Rules 13a-15(e) and 15d-15(e) under the Securities Exchange Act of 1934, as of December 31, 2018, we evaluated the design and effectiveness of our financial disclosure controls and procedures under the supervision and participation of our management, including our Chief Executive Officer and Chief Financial Officer. There are inherent limitations to the effectiveness of any system of disclosure controls and procedures, including the possibility of human error and the circumvention or overriding of the controls and procedures. Accordingly, even if effective, disclosure controls and procedures can only provide reasonable assurance of achieving their control objectives.

Based upon this evaluation, our Chief Executive Officer and Chief Financial Officer concluded that as of the end of the period covered by this annual report, our disclosure controls and procedures were effective to provide reasonable assurance that the information required to be disclosed in the reports that we file and submit under the Securities Exchange Act of 1934 is recorded, summarized and reported as and when required and is accumulated and communicated to our management, including our Chief Executive Officer and Chief Financial Officer, or persons performing similar functions, as appropriate to allow timely decisions regarding required disclosure.

## Management's Annual Report on Internal Control over Financial Reporting

Our management is responsible for establishing and maintaining adequate internal control over financial reporting as defined in Rules 13a-15(f) and 15(d)-15(f) under the Securities Exchange Act of 1934. Our internal control over financial reporting is a process designed under the supervision of our Chief Executive Officer and Chief Financial Officer, and monitored by our board of directors, management and other personnel, to provide reasonable assurance regarding the reliability of financial reporting and the preparation of our financial statements for external reporting purposes in accordance with generally accepted accounting principles, and it includes those policies and procedures that:

- pertain to the maintenance of records that, in reasonable detail, accurately and fairly reflect transactions and dispositions of our assets;
- provide reasonable assurance that transactions are recorded as necessary to permit preparation of financial statements in accordance with generally accepted accounting principles, and that receipts and expenditures are being made only in accordance with authorization of our management and directors; and
- provide reasonable assurance regarding prevention or timely detection of unauthorized acquisition, use or disposition of our assets that could have a material effect on our financial statements.

Because of its inherent limitations, internal control over financial reporting may not prevent or detect misstatements. Therefore, effective control over financial reporting cannot, and does not, provide absolute assurance of achieving our control objectives. Also, projection of any evaluation of the effectiveness of the internal controls to future periods is subject to the risk that controls may become inadequate because of changes in conditions or that the degree of compliance with the policies or procedures may deteriorate.

As of the year ended December 31, 2018, our management conducted an assessment of the effectiveness of our internal control over financial reporting in accordance with the criteria established in the publication "Internal Control – Integrated Framework (2013)," issued by the Committee of the Sponsoring Organizations of the Treadway Commission, as well as the rules set by the SEC in its Final Rule "Management's Report on Internal Control Over Financial Reporting and Certification of Disclosure in Exchange Act Periodic Reports."

Based on the assessment performed, management concluded that our internal control over financial reporting was effective as of the end of the period covered by this annual report.

The effectiveness of our internal control over financial reporting has been audited by Ernst & Young Audit S.A.S., an independent registered public accounting firm, as stated in their audit report accompanying our consolidated financial statements.

### Audit and Non-Audit Fees

Our consolidated financial statements for the fiscal years ended December 31, 2018, 2017 and 2016 were audited by Ernst & Young Audit S.A.S. The following table sets forth the fees billed to us by Ernst & Young Audit S.A.S. during the fiscal years ended December 31, 2018 and December 31, 2017.

**Table 59 – Fees Billed to us by Ernst & Young Audit S.A.S.**

	As of December 31,	
	2018	2017
	(in millions of Colombian Pesos, excluding 19% value added tax)	
Audit fees	11,742	10,946
Audit-related fees	19	167
Tax fees	71	135
All other fees	–	–
<b>Total</b>	<b>11,832</b>	<b>11,248</b>

*Audit Fees.* The audit fees listed in the table above are the aggregated fees billed by Ernst & Young Audit S.A.S. in connection with their audits of our annual consolidated financial statements (IFRS), interim consolidated financial statements (under IFRS), statutory audits of Ecopetrol S.A. and its consolidated subsidiaries and some of its associate entities (under local GAAP) and review of periodic documents filed with the SEC. In addition, these audit fees include fees related to our independent auditors' audits of our internal controls over financial reporting.

*Audit-related Fees.* The audit-related fees listed in the table above are the fees billed by Ernst & Young Audit S.A.S. in connection with their agreed-upon procedures of our variable compensation bonus system and its review procedures in connection with the offering document related to the SEC-registered bonds we reopened in 2016.

*Tax Fees.* For 2018 the tax fees listed in the table above correspond to a conceptual analysis for a subsidiary about the tax consequences associated with new or proposed legislation based on the economic models prepared by the subsidiary.

#### **Changes in Internal Control over Financial Reporting**

There were no changes made in our internal control over financial reporting during the year ended December 31, 2018 that have materially affected or are reasonably likely to materially affect the Company's internal controls over financial reporting.

#### **Attestation Report of the Registered Public Accounting Firm**

Ernst & Young Audit S.A.S.'s attestation report on our internal control over financial reporting is included in their audit report accompanying our consolidated financial statements. See [Report of Independent Registered Public Accounting Firm](#) to the consolidated financial statements.

#### **Significant Changes**

For a description of significant events since December 31, 2018, please see Note 32 to our consolidated financial statements.

#### **8. Financial Statements**

##### **Ecopetrol S.A.**

##### Consolidated Financial Statements

At December 31, 2018 and 2017 and for three years ended December 31, 2018, 2017 and 2016

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## Report of Independent Registered Public Accounting Firm

To the Shareholders and the Board of Directors of Ecopetrol S.A.

### Opinion on the Financial Statements

We have audited the accompanying consolidated statements of financial position of Ecopetrol S.A. (the Company) as of December 31, 2018 and 2017, the related consolidated statements of profit or loss, comprehensive income, changes in equity, and cash flows, for each of the three years in the period ended December 31, 2018, and the related notes and financial statement schedules listed in exhibits 1 and 2 (collectively referred to as the consolidated financial statements). In our opinion, the consolidated financial statements present fairly, in all material respects, the financial position of the Company at December 31, 2018 and 2017, and the results of its operations and its cash flows for each of the three years in the period ended December 31, 2018, in conformity with International Financial Reporting Standards as issued by the International Accounting Standards Board.

We also have audited, in accordance with the standards of the Public Company Accounting Oversight Board (United States) (PCAOB), the Company's internal control over financial reporting as of December 31, 2018, based on criteria established in Internal Control-Integrated Framework issued by the Committee of Sponsoring Organizations of the Treadway Commission (2013 framework) and our report dated April 5, 2019 expressed an unqualified opinion thereon.

### Basis for Opinion

These financial statements are the responsibility of the Company's management. Our responsibility is to express an opinion on the Company's financial statements based on our audits. We are a public accounting firm registered with the PCAOB and are required to be independent with respect to the Company in accordance with the U.S. federal securities laws and the applicable rules and regulations of the Securities and Exchange Commission and the PCAOB.

We conducted our audits in accordance with the standards of the PCAOB. Those standards require that we plan and perform the audit to obtain reasonable assurance about whether the financial statements are free of material misstatement, whether due to error or fraud. Our audits included performing procedures to assess the risks of material misstatement of the financial statements, whether due to error or fraud, and performing procedures that respond to those risks. Such procedures included examining, on a test basis, evidence regarding the amounts and disclosures in the financial statements. Our audits also included evaluating the accounting principles used and significant estimates made by management, as well as evaluating the overall presentation of the financial statements. We believe that our audits provide a reasonable basis for our opinion.

/s/ Ernst & Young Audit S.A.S.

\_\_\_\_\_  
We have served as the Company's auditor since 2016.

Bogota, Colombia

April 5, 2019



## Report of Independent Registered Public Accounting Firm

To the Shareholders and the Board of Directors of Ecopetrol S.A.

### Opinion on Internal Control over Financial Reporting

We have audited Ecopetrol S.A.' internal control over financial reporting as of December 31, 2018, based on criteria established in Internal Control—Integrated Framework issued by the Committee of Sponsoring Organizations of the Treadway Commission (2013 framework) (the COSO criteria). In our opinion, Ecopetrol, S.A. (the Company) maintained, in all material respects, effective internal control over financial reporting as of December 31, 2018, based on the COSO criteria.

We also have audited, in accordance with the standards of the Public Company Accounting Oversight Board (United States) (PCAOB), the consolidated statements of financial position of the Company as of December 31, 2018 and 2017, the related consolidated statements of profit or loss, comprehensive income, changes in equity and cash flows for each of the three years in the period ended December 31, 2018, and the related notes and financial statement schedules listed in exhibits 1 and 2, and our report dated April 5, 2019 expressed an unqualified opinion thereon.

### Basis for Opinion

The Company's management is responsible for maintaining effective internal control over financial reporting and for its assessment of the effectiveness of internal control over financial reporting included in the accompanying Management's Annual Report on Internal Control over Financial Reporting. Our responsibility is to express an opinion on the Company's internal control over financial reporting based on our audit. We are a public accounting firm registered with the PCAOB and are required to be independent with respect to the Company in accordance with the U.S. federal securities laws and the applicable rules and regulations of the Securities and Exchange Commission and the PCAOB.

We conducted our audit in accordance with the standards of the PCAOB. Those standards require that we plan and perform the audit to obtain reasonable assurance about whether effective internal control over financial reporting was maintained in all material respects.

Our audit included obtaining an understanding of internal control over financial reporting, assessing the risk that a material weakness exists, testing and evaluating the design and operating effectiveness of internal control based on the assessed risk, and performing such other procedures as we considered necessary in the circumstances. We believe that our audit provides a reasonable basis for our opinion.

### Definition and Limitations of Internal Control Over Financial Reporting

A company's internal control over financial reporting is a process designed to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles. A company's internal control over financial reporting includes those policies and procedures that (1) pertain to the maintenance of records that, in reasonable detail, accurately and fairly reflect the transactions and dispositions of the assets of the company; (2) provide reasonable assurance that transactions are recorded as necessary to permit preparation of financial statements in accordance with generally accepted accounting principles, and that receipts and expenditures of the company are being made only in accordance with authorizations of management and directors of the company; and (3) provide reasonable assurance regarding prevention or timely detection of unauthorized acquisition, use, or disposition of the company's assets that could have a material effect on the financial statements.

Because of its inherent limitations, internal control over financial reporting may not prevent or detect misstatements. Also, projections of any evaluation of effectiveness to future periods are subject to the risk that controls may become inadequate because of changes in conditions, or that the degree of compliance with the policies or procedures may deteriorate.

/s/ Ernst & Young Audit S.A.S.

Bogota, Colombia

April 5, 2019

**Ecopetrol S.A.**  
**Consolidated statement of financial position**

(In millions of Colombian pesos)

	Note	As of December 31,	
		2018	2017
<b>Assets</b>			
<b>Current assets</b>			
Cash and cash equivalents	6	6,311,744	7,945,885
Trade and other receivables, net	7	8,194,243	6,098,918
Inventories, net	8	5,100,407	4,601,396
Other financial assets	9	5,321,098	2,967,878
Current tax assets	10	1,031,307	625,374
Other assets	11	1,020,428	880,425
		<u>26,979,227</u>	<u>23,119,876</u>
Assets held for sale		51,385	104,140
<b>Total current assets</b>		<b><u>27,030,612</u></b>	<b><u>23,224,016</u></b>
<b>Non-current assets</b>			
Investment in associates and joint ventures	12	1,844,336	1,330,460
Trade and other receivables, net	7	755,574	777,132
Property, plant and equipment	13	62,799,983	61,404,374
Natural and environmental resources	14	23,075,450	21,308,265
Intangible assets	15	410,747	380,226
Deferred tax assets	10	3,879,427	4,016,161
Other financial assets	9	2,826,717	3,565,847
Goodwill	17	1,159,922	1,159,922
Other assets	11	860,730	681,009
<b>Total non-current assets</b>		<b><u>97,612,886</u></b>	<b><u>94,623,396</u></b>
<b>Total assets</b>		<b><u>124,643,498</u></b>	<b><u>117,847,412</u></b>
<b>Liabilities</b>			
<b>Current liabilities</b>			
Loans and borrowings	18	4,019,927	5,144,504
Trade and other payables	19	8,945,790	6,968,207
Provisions for employee benefits	20	1,816,882	1,829,819
Current tax liabilities	10	1,751,300	2,005,688
Accrued liabilities and provisions	21	814,409	558,828
Other liabilities		476,314	339,565
<b>Total current liabilities</b>		<b><u>17,824,622</u></b>	<b><u>16,846,611</u></b>
<b>Non-current liabilities</b>			
Loans and borrowings	18	34,042,718	38,403,331
Trade and other payables	19	30,522	29,469
Provisions for employee benefits	20	6,789,669	6,502,475
Deferred tax liabilities	10	1,337,943	1,333,280
Accrued liabilities and provisions	21	6,939,603	5,978,621
Other liabilities		570,641	537,926
<b>Total non-current liabilities</b>		<b><u>49,711,096</u></b>	<b><u>52,785,102</u></b>
<b>Total liabilities</b>		<b><u>67,535,718</u></b>	<b><u>69,631,713</u></b>
<b>Equity</b>			
	22		
Subscribed and paid in capital		25,040,067	25,040,067
Additional paid in capital		6,607,699	6,607,700
Reserves		5,138,895	2,177,869
Other comprehensive income		8,380,761	7,399,015
Retained earnings		9,970,492	5,210,302
Equity attributable to owners of parent		55,137,914	46,434,953
Non-controlling interest		1,969,866	1,780,746
<b>Total equity</b>		<b><u>57,107,780</u></b>	<b><u>48,215,699</u></b>
<b>Total liabilities and equity</b>		<b><u>124,643,498</u></b>	<b><u>117,847,412</u></b>

Ecopetrol S.A.

**Consolidated statement of profit or loss**

(In millions of Colombian pesos, except for the earnings per share, which are expressed in Colombian pesos)

	Note	For the years ended December 31,		
		2018	2017	2016
Sales revenue	23	68,603,872	55,954,228	48,485,561
Cost of sales	24	(41,184,379)	(36,908,325)	(34,251,423)
<b>Gross profit</b>		<b>27,419,493</b>	<b>19,045,903</b>	<b>14,234,138</b>
Administrative expenses	25	(1,653,858)	(1,764,524)	(1,923,268)
Operations and project expenses	25	(2,903,132)	(2,926,065)	(2,751,687)
(Impairment loss) impairment reversal of long-lived assets, net	16	(368,634)	1,311,138	(928,747)
Other operating (expenses) income, net	26	(35,455)	505,403	274,112
<b>Operating income</b>		<b>22,458,414</b>	<b>16,171,855</b>	<b>8,904,548</b>
Financial results, net	27			
Finance income		1,129,563	1,159,356	1,311,743
Finance expenses		(3,512,161)	(3,660,601)	(3,463,540)
Foreign exchange gain		372,223	5,514	976,430
		<b>(2,010,375)</b>	<b>(2,495,731)</b>	<b>(1,175,367)</b>
Share of profits of associates and joint ventures	12	165,836	93,538	61,345
<b>Profit before income tax expense</b>		<b>20,613,875</b>	<b>13,769,662</b>	<b>7,790,526</b>
Income tax expense	10	(8,258,485)	(5,800,268)	(4,543,046)
<b>Net profit for the year</b>		<b>12,355,390</b>	<b>7,969,394</b>	<b>3,247,480</b>
Net profit attributable to:				
Owners of parent		11,381,386	7,178,539	2,447,881
Non-controlling interest		974,004	790,855	799,599
		<b>12,355,390</b>	<b>7,969,394</b>	<b>3,247,480</b>
<b>Basic and diluted earnings per share</b>		<b>COPS 276.8</b>	<b>COPS 174.6</b>	<b>COPS 59.5</b>

**Ecopetrol S.A.****Consolidated statement of other comprehensive income**

(In millions of Colombian pesos)

	<b>For the years ended December 31,</b>		
	<b>2018</b>	<b>2017</b>	<b>2016</b>
<b>Net profit for the year</b>	<b>12,355,390</b>	<b>7,969,394</b>	<b>3,247,480</b>
<b>Other comprehensive income</b>			
Other comprehensive income that may be reclassified to profit or loss in subsequent periods (net of taxes):			
Unrealized gain (loss) on hedges:			
Cash flow hedge for future exports (Note 28.1.2)	(533,374)	(84,837)	461,424
Hedge of a net investment in a foreign operation (Note 28.1.3)	(971,954)	57,997	(155,359)
Cash flow hedge with derivative instruments (Note 28.1.4)	(52,174)	35,768	33,869
Equity instruments measured at fair value:			
Unrealized (loss) gain	-	(7,828)	126,205
Realized loss	-	-	(68,497)
Foreign currency translation	2,599,242	(257,147)	(925,981)
	<b>1,041,740</b>	<b>(256,047)</b>	<b>(528,339)</b>
Other comprehensive income that will not to be reclassified to profit or loss in subsequent periods (net of taxes):			
Remeasurement loss on defined benefit plans (Note 20.1)	(4,290)	(1,548,043)	(1,153,442)
Other losses	-	(11,817)	(46,826)
	<b>(4,290)</b>	<b>(1,559,860)</b>	<b>(1,200,268)</b>
<b>Other comprehensive income (loss) for the year, net of tax</b>	<b>1,037,450</b>	<b>(1,815,907)</b>	<b>(1,728,607)</b>
<b>Total comprehensive income for the year, net of tax</b>	<b>13,392,840</b>	<b>6,153,487</b>	<b>1,518,873</b>
Comprehensive income attributable to:			
Owners of parent	12,363,132	5,353,778	784,658
Non-controlling interest	1,029,708	799,709	734,215
	<b>13,392,840</b>	<b>6,153,487</b>	<b>1,518,873</b>

**Ecopetrol S.A.**  
**Consolidated statement of changes in equity**

(In millions of Colombian pesos)

	Note	Attributable to owners of parent					Total	Non-controlling interest	Total equity
		Subscribed and paid-in capital	Additional paid-in capital	Reserves	Other comprehensive income	Retained earnings			
<b>Balance as of December 31, 2017</b>		<b>25,040,067</b>	<b>6,607,700</b>	<b>2,177,869</b>	<b>7,399,015</b>	<b>5,210,302</b>	<b>46,434,953</b>	<b>1,780,746</b>	<b>48,215,699</b>
Net profit		-	-	-	-	11,381,386	11,381,386	974,004	12,355,390
Dividends declared	22.4	-	-	-	-	(3,659,386)	(3,659,386)	(840,626)	(4,500,012)
Appropriation of reserves, net		-	-	2,961,026	-	(2,961,026)	-	-	-
Other movements		-	(1)	-	-	(784)	(785)	38	(747)
<b>Other comprehensive income:</b>									
Gain (loss) on hedging instruments:									
Cash flow hedge for future exports		-	-	-	(533,374)	-	(533,374)	-	(533,374)
Hedge of a net investment in a foreign operation		-	-	-	(971,954)	-	(971,954)	-	(971,954)
Cash flow hedge with derivative instruments		-	-	-	(37,904)	-	(37,904)	(14,270)	(52,174)
Foreign currency translation		-	-	-	2,529,268	-	2,529,268	69,974	2,599,242
Remeasurement loss on defined benefit plans		-	-	-	(4,290)	-	(4,290)	-	(4,290)
<b>Balance as of December 31, 2018</b>		<b>25,040,067</b>	<b>6,607,699</b>	<b>5,138,895</b>	<b>8,380,761</b>	<b>9,970,492</b>	<b>55,137,914</b>	<b>1,969,866</b>	<b>57,107,780</b>

	Note	Attributable to owners of parent					Total	Non-controlling interest	Total equity
		Subscribed and paid-in capital	Additional paid-in capital	Reserves	Other comprehensive income	Retained earnings			
<b>Balance as of December 31, 2016</b>		<b>25,040,067</b>	<b>6,607,699</b>	<b>1,558,844</b>	<b>9,222,710</b>	<b>(402,462)</b>	<b>42,026,858</b>	<b>1,533,643</b>	<b>43,560,501</b>
Net profit		-	-	-	-	7,178,539	7,178,539	790,855	7,969,394
Dividends declared	22.4	-	-	-	-	(945,684)	(945,684)	(551,494)	(1,497,178)
Appropriation of reserves, net		-	-	619,025	-	(619,025)	-	-	-
Other movements		-	1	-	2	(1,066)	(1,063)	(48)	(1,111)
<b>Other comprehensive income:</b>									
Gain (loss) on hedging instruments:									
Cash flow hedge for future exports		-	-	-	(84,837)	-	(84,837)	-	(84,837)
Hedge of a net investment in a foreign operation		-	-	-	57,997	-	57,997	-	57,997
Cash flow hedge with derivative instruments		-	-	-	25,984	-	25,984	9,784	35,768
Loss on equity instruments measured at fair value		-	-	-	(7,828)	-	(7,828)	-	(7,828)
Foreign currency translation		-	-	-	(255,153)	-	(255,153)	(1,994)	(257,147)
Remeasurement loss on defined benefit plans		-	-	-	(1,548,043)	-	(1,548,043)	-	(1,548,043)
Other movements		-	-	-	(11,817)	-	(11,817)	-	(11,817)
<b>Balance as of December 31, 2017</b>		<b>25,040,067</b>	<b>6,607,700</b>	<b>2,177,869</b>	<b>7,399,015</b>	<b>5,210,302</b>	<b>46,434,953</b>	<b>1,780,746</b>	<b>48,215,699</b>

**Ecopetrol S.A.**  
**Consolidated statement of changes in equity**

(In millions of Colombian pesos)

	Note	Attributable to owners of parent							Non-controlling interest	Total equity
		Subscribed and paid-in capital	Additional paid-in capital	Reserves	Other comprehensive income	Retained earnings	Total			
<b>Balance as of December 31, 2015</b>		<b>25,040,067</b>	<b>6,607,699</b>	<b>5,546,570</b>	<b>10,846,004</b>	<b>(6,814,432)</b>	<b>41,225,908</b>	<b>1,875,055</b>	<b>43,100,963</b>	
Net profit		-	-	-	-	2,447,881	2,447,881	799,599	3,247,480	
Dividends declared		-	-	-	-	-	-	(1,029,612)	(1,029,612)	
Legal reserve used to offset previous year loss		-	-	(3,869,907)	-	3,869,907	-	-	-	
Appropriation of reserves, net		-	-	(117,819)	-	117,819	-	-	-	
Other movements		-	-	-	-	(23,637)	(23,637)	(6,086)	(29,723)	
<b>Other comprehensive income</b>										
Gain (loss) on hedging instruments:										
Cash flow hedge for future exports		-	-	-	461,424	-	461,424	-	461,424	
Hedge of a net investment in a foreign operation		-	-	-	(155,359)	-	(155,359)	-	(155,359)	
Cash flow hedge with derivative instruments		-	-	-	24,546	-	24,546	9,323	33,869	
Net fair value gain on equity instruments measured at fair value		-	-	-	57,708	-	57,708	-	57,708	
Foreign currency translation		-	-	-	(811,345)	-	(811,345)	(114,636)	(925,981)	
Remeasurement loss on defined benefit plans		-	-	-	(1,153,442)	-	(1,153,442)	-	(1,153,442)	
Other movements		-	-	-	(46,826)	-	(46,826)	-	(46,826)	
<b>Balance as of December 31, 2016</b>		<b>25,040,067</b>	<b>6,607,699</b>	<b>1,558,844</b>	<b>9,222,710</b>	<b>(402,462)</b>	<b>42,026,858</b>	<b>1,533,643</b>	<b>43,560,501</b>	

**Ecopetrol S.A.**  
**Consolidated statement of cash flows**

(In millions of Colombian pesos)

	Note	For the years ended December 31,		
		2018	2017	2016
<b>Cash flow provided by operating activities:</b>				
Net profit for the period		12,355,390	7,969,394	3,247,480
Adjustments to reconcile the net profit to net cash provided by operating activities:				
Income tax expense	10	8,258,485	5,800,268	4,543,046
Depreciation, depletion and amortization	13,14,15	7,704,850	8,281,347	7,607,000
Foreign exchange loss	27	(372,223)	(5,514)	(976,430)
Finance cost of loans and borrowings	27	2,399,414	2,385,994	2,765,024
Finance cost of post-employment benefits and abandonment costs	27	668,782	753,047	580,491
Dry wells	14	898,924	898,264	342,691
(Gain) loss on disposal of non-current assets		75,835	26,686	78,990
Loss (gain) on acquisition of interests in joint operations	30.3	12,065	(451,095)	–
Loss on impairment of short-term assets		136,044	30,600	74,393
Impairment loss (impairment reversal) of long-lived assets	16	368,634	(1,311,138)	928,747
Gain on fair value adjustment of financial assets		(92,906)	(104,706)	(59,593)
Share of profit of associates and joint ventures	12	(165,836)	(93,538)	(61,345)
Net gain on the sale of assets held for sale		–	(166,389)	–
Gain on sale of equity instruments measured at fair value		–	(13,236)	(47,129)
Hedge ineffectiveness		35,239	8,918	–
Realized foreign exchange cash flow hedges	23	(128,404)	(160,772)	(33,074)
Income tax paid		(6,650,116)	(4,217,303)	(4,347,364)
<b>Net change in operational assets and liabilities:</b>				
Trade and other receivables		(2,039,161)	(2,189,473)	(1,400,583)
Inventories		(448,135)	(323,626)	(217,198)
Trade and other payables		1,355,175	21,417	(619,131)
Tax assets and liabilities		(1,413,915)	(493,533)	2,547,232
Provisions for employee benefits		(181,060)	(227,384)	(11,677)
Provisions and contingencies		(89,345)	104,135	(827,153)
Other assets and liabilities		(218,542)	451,263	118,523
<b>Net cash generated by operating activities</b>		<b>22,469,194</b>	<b>16,973,626</b>	<b>14,232,940</b>
<b>Cash flow from investing activities:</b>				
Investment in property, plant and equipment	13	(3,302,929)	(2,363,283)	(3,646,929)
Investment in natural and environmental resources	14	(5,051,828)	(3,426,405)	(2,121,295)
Acquisition of interests in joint operations		–	(141,950)	–
Acquisitions of intangibles	15	(105,669)	(175,868)	(69,253)
(Purchases) sales of other financial asset		(843,612)	564,754	(5,446,507)
Interests received		383,624	405,562	386,001
Dividends received		108,991	270,136	437,803
Proceeds from sales of assets held for sale		–	159,041	–
Proceeds from sales of equity instruments measured at fair value		–	56,930	966,715
Proceeds from sales of property, plant and equipment		92,620	267,324	109,896
<b>Net cash used in investment activities</b>		<b>(8,718,803)</b>	<b>(4,383,759)</b>	<b>(9,383,569)</b>
<b>Cash flow used in financing activities:</b>				
Proceeds from borrowings		517,747	444,827	4,594,640
Repayment of borrowings		(9,270,262)	(9,007,340)	(3,149,917)
Interest payments		(2,610,562)	(2,696,979)	(2,495,446)
Dividends paid		(4,427,701)	(1,504,647)	(1,712,298)
<b>Net cash used in financing activities</b>		<b>(15,790,778)</b>	<b>(12,764,139)</b>	<b>(2,763,021)</b>
Exchange difference in cash and cash equivalents		406,246	(290,310)	(226,333)
Net (decrease) increase in cash and cash equivalents		(1,634,141)	(464,582)	1,860,017
<b>Cash and cash equivalents at the beginning of the year</b>		<b>7,945,885</b>	<b>8,410,467</b>	<b>6,550,450</b>
<b>Cash and cash equivalent at the end of the year</b>	6	<b>6,311,744</b>	<b>7,945,885</b>	<b>8,410,467</b>
<b>Non-cash transactions</b>				
Offsetting of income tax through the use of balances in favor		–	–	656,121

Ecopetrol S.A.  
Notes to the consolidated financial statements  
(Figures expressed in millions of Colombian pesos, unless otherwise stated)

**1. Reporting entity**

Ecopetrol S.A. (“Ecopetrol”) is a mixed economy company, of a commercial nature, incorporated in 1948 in Bogotá – Colombia, parent company of the Ecopetrol Business Group. Its corporate purpose is to conduct commercial or industrial activities related to the exploration, exploitation, production, refining, transportation, storage, distribution and commercialization of hydrocarbons and their derivatives and products, directly or through its subsidiaries (collectively referred to as “Ecopetrol Business Group”).

11.51% of Ecopetrol shares are publicly traded on the Stock Exchanges of Colombia and New York. The remaining shares (88.49% of the total outstanding shares) are owned by the Colombian Ministry of Finance and Public Credit.

The address of the main office of Ecopetrol is Bogotá – Colombia, Carrera 13 No. 36 – 24.

**2. Basis for presentation**

**2.1 Statement of compliance and authorization of financial statements**

The consolidated financial statements of Ecopetrol and its subsidiaries as of December 31, 2018 and 2017 and for the years ended December 31, 2018, 2017 and 2016 have been prepared in accordance with International Financial Reporting Standards (IFRS), as issued by the International Accounting Standards Board (IASB).

Accounting policies described in Note 4 have been applied consistently in all years presented.

These consolidated financial statements were approved and authorized for issuance by the Board of Directors of Ecopetrol on April 5, 2019.

**2.2 Basis for consolidation**

The consolidated financial statements were prepared by consolidating all companies set out in Exhibit 1, which are those over which Ecopetrol exercises direct or indirect control. Control is achieved when the Ecopetrol Business Group:

- has power over the investee (including rights to manage relevant activities);
- is exposed, or has the rights, to variable returns from its involvement with the investee; and
- has the ability to use its power to affect its operational returns. This instance occurs when the Ecopetrol Business Group has less than a majority of the voting rights of an investee, and it still has the power over the investee to provide it with the practical ability to direct the relevant activities of the investee unilaterally. The Ecopetrol Business Group considers all relevant facts and circumstances in assessing whether or not the Company’s voting rights in an investee are sufficient or not to give it power, including:
  - a) the percentage of the Ecopetrol Business Group’s voting rights relative to the size and apportionment of the shares of other vote holders;
  - b) potential voting rights held by the Ecopetrol Business Group, other vote holders or other parties;
  - c) rights arising from other contractual arrangements; and
  - d) any additional facts and circumstances that indicate that the Ecopetrol Business Group has, or does not have, the current ability to direct the relevant activities, at the time that decisions need to be made, including voting patterns at previous shareholders’ meetings.

Subsidiaries are consolidated from the date on which control is obtained until the date that such control ceases.

All inter-company assets and liabilities, equity, income, expenses and cash flows relating to transactions between entities of the Ecopetrol Business Group were eliminated on consolidation. Unrealized losses are also eliminated. Non-controlling interest represents the proportion of profit, other comprehensive income and net assets in subsidiaries that are not attributable to Ecopetrol shareholders.



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The following subsidiaries were incorporated in the years indicated:

**2018**

- **Ecopetrol Energía S.A.S. E.S.P.**: whose corporate purpose is the commercialization of electric power for the Ecopetrol Business Group. Ecopetrol holds a 99% direct interest in the subsidiary, and indirect interest of the remaining 1% through Andean Chemicals Ltd.

**2017**

- **Esenttia Resinas del Perú SAC**: wholly-owned subsidiary whose corporate purpose is the commercialization of polypropylene resins and master batches in Peru.
- **ECP Hidrocarburos México S.A. de CV**: wholly-owned subsidiary, engaged in operating oil contracts in Mexico, starting with blocks 6 and 8 of Round 2.1 in shallow waters.

**2.3 Measurement basis**

The consolidated financial statements have been prepared on a historical cost basis, except for financial assets and liabilities that are measured at fair value through profit or loss and/or changes in other comprehensive income at the end of each reporting period, as explained in the accounting policies included below.

Historical cost is generally based on fair value of the consideration given in exchange for goods and services.

The fair value is the price that would be received from selling an asset or that would be paid for transferring a liability among market participants, in an orderly transaction, on the date of measurement. When estimating the fair value, the Ecopetrol Business Group uses assumptions that market participants would use for pricing an asset or liability at current market conditions, including risk assumptions.

**2.4 Functional and presentation currency**

The consolidated financial statements are presented in Colombian Pesos, which is the Ecopetrol's functional currency. For each Ecopetrol Business Group entity its functional currency is determined based of the main economic environment where it operates.

The statements of profit or loss and cash flows of subsidiaries with functional currencies different from Ecopetrol S.A.'s functional currency are translated at the exchange rates on the dates of the transaction or based on the monthly average exchange rate. Assets and liabilities are translated at the closing rate, and other equity items are translated at exchange rates at the time of the transaction. All resulting exchange differences are recognized in other comprehensive income. On disposal of all or significant part of a foreign operation, the cumulative translation adjustment related to the particular foreign operation is reclassified to profit or loss.

The financial statements are presented in Colombian pesos rounded up to the closest million unit (COP 000,000) except when otherwise indicated.

**2.5 Foreign currency**

Transactions in foreign currencies are initially recorded by the Ecopetrol Business Group's entities at their respective functional currency spot rates at the transactions date. Monetary items denominated in foreign currencies are translated at the functional currency spot rates prevailing at the reporting date. Differences arising on settlement or translation of monetary items are recognized in profit or loss, in financial results, net, except those resulting from the conversion of loans and borrowings designated as cash flow hedges or net investment in a foreign operation hedge, which are recognized in other comprehensive income within equity. When the hedged item affects the financial results, exchange differences accumulated in equity are reclassified to profit or loss as part of operating results.

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Non-monetary items measured at fair value that are denominated in a foreign currency are translated using the exchange rates prevailing on the date when the fair value is determined. The gain or loss arising on translation of non-monetary items measured at fair value is treated in line with the recognition of the gain or loss on the change in fair value of the item.

## 2.6 Classification of assets and liabilities as current and non-current

The Ecopetrol Business Group presents assets and liabilities in the consolidated statement of financial position based on whether assets are classified as current or non-current.

An asset or liability is classified as current when:

- It is expected to be realized or intended to be sold or consumed (or expected to be settled, in the case of liabilities) in the ordinary course of business;
- Held mainly for the purpose of trading;
- Expected to be realised (or to be settled, in the case of liabilities) within twelve months after the reporting period; or
- In the case of the assets, it is cash or a cash equivalent, unless restricted from being exchanged or used to settle a liability for at least twelve months after the reporting period ; or
- In the case of a liabilities, there is no unconditional right to defer settlement of the liability for at least twelve months after the reporting period.

Other assets and liabilities are classified as non-current.

Deferred tax assets and liabilities are classified as non-current assets and liabilities.

## 2.7 Earnings per share (basic and diluted)

Basic earnings per share is calculated by dividing the profit for the year attributable to equity holders of Ecopetrol S.A., the parent company, by the weighted average number of ordinary shares outstanding during the year. There is no potential dilution of shares.

## 3. Significant estimates and accounting judgments

The preparation of the consolidated financial statements requires management to make judgements, estimates and assumptions that affect the reported amounts of assets, liabilities, sales revenues, costs and commitments recognized in the financial statements and the accompanying disclosures. The Ecopetrol Business Group based its assumptions and estimates on parameters available when these consolidated financial statements were prepared. Uncertainty about these assumptions and estimates could result in outcomes that required a material adjustment to the carrying amount of assets or liabilities affected in future periods. Changes in estimates are adjusted prospectively in the period in which the estimate is revised.

In the process of applying the Ecopetrol Business Group's accounting policies, management has made the following judgments and estimates which have the most significant impact on the amounts recognized in the consolidated financial statements:

### 3.1 Oil and gas reserves

Hydrocarbon reserves are estimates of the amount of hydrocarbons that can be economically and legally extracted from the Ecopetrol Business Group's oil and gas properties.

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The reserves estimation is performed annually as of December 31 in accordance with the United States Securities and Exchange Commission (SEC) definitions and rules set forth in Rule 4–10(a) of SEC Regulation S–X and the disclosure guidelines contained in the SEC final rule – Modernization of Oil and Gas Reporting.

As required by current regulations, the future estimated date on which a field will no longer produce for economic reasons, is based on actual costs and average of crude prices (calculated as the arithmetical average of prices on the first day of the past 12 months). The estimated date for end of production will affect the amount of reserves, unless the prices have been defined by contractual agreements; therefore, if the prices and costs change from one year to the next, the proved reserves estimate also changes. Generally, our proved reserves decrease as prices go down and increase when prices go up.

Reserves estimation is an inherently complex process and it involves professional judgments. Reserves estimations are prepared using geological, technical and economic factors, including projections of future production rates, oil prices, engineering data and duration and amount of future investments, and they imply a certain degree of uncertainty. These estimations reflect the regulatory and market conditions existing on the date of reporting, which could significantly differ from other conditions during the year or in future periods. Any changes in regulatory and/or market conditions and assumptions could materially affect the reserves estimation.

Impact of oil reserves and natural gas in depreciation and depletion

Changes to estimations for proven developed reserves may affect the carrying amounts of exploration and production assets, natural resources and environment, goodwill, liabilities for dismantling and depreciation, depletion and amortization. With all other variables remaining unchanged, a decrease in estimated proven reserves would increase, prospectively, depreciation, depletion and amortization costs, while an increase in reserves would reduce depreciation and amortization expenses, as depreciation, depletion and amortization charges are calculated using the units of production method.

Information about the carrying amounts of exploration and production assets and the amounts charged to income, including depreciation, depletion and amortization, is presented in Notes 13 and 14.

**3.2 Assets impairment**

Management uses its professional judgment in assessing the existence of evidence of an impairment loss or reversal, based on internal and external factors.

When an indicator of impairment or reversal of a prior periods impairment exists, the Ecopetrol Business Group estimates the recoverable amount of the cash generating units (CGU), which is considered the greater of fair value less costs of disposal and the value in use.

The assessments require the use of estimates and assumptions, such as, among other factors: (1) estimation of the volumes and market value of oil and natural gas reserves; (2) production profiles for oilfields and the future production of refined and petrochemical products; (3) investments, taxes and future costs; (4) useful life of assets; (5) long-term prices; (6) the discount rate, which is revised annually and determined as the weighted average cost of capital (WACC); and (7) changes in environmental regulation. The recoverable amount is compared to the carrying amount of the asset, thus determining whether the asset is impaired or if the impairment recognized in prior periods should be reversed.

A previously recognized impairment loss is reversed only if there has been a change in the assumptions used to determine the assets or in the CGU's recoverable amount since the last impairment loss was recognized. The reversal is limited so that the carrying amount of an asset or CGU, other than goodwill, does not exceed either its recoverable amount, or the carrying amount that would have been determined (net of amortization or depreciation) had no impairment loss been recognized for the asset or CGU in prior periods.

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Future oil price assumptions are estimated at current market conditions. Expected production volumes, which comprise proven unproved, probable and possible reserves are used for impairment testing because management believes this to be the most appropriate indicator of expected future cash flows, which would also be considered by market participants. Reserves estimates are inherently imprecise and subject to risk and uncertainty. Furthermore, projections about unproved volumes are based on information that is necessarily less robust than what is available for mature reservoirs.

These estimates and assumptions are subject to risk and uncertainty. Therefore, there is a possibility that changes in circumstances will impact these projections, which may also impact the recoverable amount of assets and/or CGUs, hence, may also affect the recognition of an impairment loss or the reversal of prior period impairment amounts.

### 3.3 Exploration and evaluation costs

The application of the Ecopetrol Business Group's accounting policy for exploration and evaluation costs requires judgment in order to determine whether future economic benefits are likely, either from future exploitation or sale, or whether activities have not reached a stage which permits a reasonable assessment of the existence of reserves. Certain exploration and evaluation costs are initially capitalized when it is expected that commercially viable reserves will result. The Ecopetrol Business Group uses its professional judgment of future events and circumstances and makes estimates in order to annually assess the generation of future economic benefits for extracting oil resources, as well as technical and commercial analyses to confirm its intention of continuing their development. Changes regarding available information, such as drilling success level or changes in the project's economics, production costs, and investment levels, as well as other factors, may result in capitalized exploration drilling costs being recognized in profit or loss for the period. The expenses for dry wells is included in operating activities in the consolidated statement of cash flows.

### 3.4 Determination of cash generating units (CGU)

The allocation of assets in cash generating units requires significant judgment, as well as assessments regarding integration among assets, the existence of active markets, and similar exposure to market risk, shared infrastructure, and the way in which management monitors the operations. See Note 4.12 – *impairment of non-financial assets* for more information.

### 3.5 Abandonment and dismantling costs of fields and other facilities

According to environmental and oil regulations, the Ecopetrol Business Group is required to bear the costs for the abandonment of oil extraction and transportation facilities, which include the cost of plugging and abandoning wells, dismantling facilities, and environmental remediation in the affected areas.

Estimated abandonment and dismantling costs are recorded at the time of the installation of the assets and are reviewed annually.

The calculations for these estimations are complex and involve significant judgments by Management. The ultimate decommissioning costs are uncertain and cost estimates can vary in response to many factors, including changes to relevant legal requirements, the emergence of new restoration techniques or experience at other production sites. The expected timing, extent and amount of expenditure may also change, for example, in response to changes in internal cost projections, changes in reserve estimates, future inflation rates and discount rates. The Ecopetrol Business Group considers that the abandonment and dismantling costs are reasonable, based on the experience of the Ecopetrol Business Group and market conditions; nevertheless, significant variations in external factors used for the calculation of the estimation could significantly impact the amounts recorded in the financial statements.

### 3.6 Pension plan and other benefits

The determination of expenses, liabilities and adjustments relating to pension plans and other defined retirement benefits makes it necessary for management to use its judgment in the application of actuarial assumptions made in the actuarial calculation. The actuarial assumptions include estimates regarding future mortality, retirement, changes in compensation and discount rate in order to reflect the time value of money, in addition to the rate of return on the plan's assets. Due to the complexity in the valuation of these variables, as well as their long-term nature, the estimated amounts are quite sensitive to any change in these assumptions.

These assumptions are reviewed on an annual basis and may differ materially from actual results due to changes in economic and market conditions, regulatory changes, judicial rulings, higher or lower retirement rates, or longer or shorter life expectancies among employees.

### 3.7 Goodwill impairment

In December of each year, the Ecopetrol Business Group performs an annual impairment test on goodwill to assess if its carrying amount may be impaired.

The determination of the recoverable amount is described in Note 4.12, and its calculation requires assumptions and estimates. The Ecopetrol Business Group considers that the assumptions and estimations used are reasonable and supportable based on the current market conditions and are aligned to the risk profile of the related assets. However, if different assumptions and estimations are used, they could lead to different results. Valuation models used to determine fair value are sensitive to changes in the underlying assumptions. For example, sales volumes and prices that will be paid for the purchase of raw materials are assumptions that may vary in the future. Adverse changes in any of these assumptions could lead to the recognition of goodwill impairment.

### 3.8 Litigation

The Ecopetrol Business Group is subject to claims relating to regulatory and arbitration proceedings, tax assessments and other claims arising in the normal course of business. Management evaluates these claims based on their nature, the likelihood that they materialize and the amounts involved, to decide on the amounts recognized and/or disclosed in the financial statements.

This analysis, which may require considerable judgment, includes the assessment of current legal proceedings brought against the Ecopetrol Business Group and claims not yet initiated. A provision is recognized when the Ecopetrol Business Group has a present obligation derived from a past event, it is likely that an outflow of resources of economic benefits will be required to settle the obligation, and a reliable estimate of the amount of such obligation can be made.

### 3.9 Taxes

Calculation of the income tax provision requires interpretation of tax law in the jurisdictions where the Ecopetrol Business Group operates. Significant judgment is required to determine estimates for income tax on taxable profits and to evaluate the recoverability of deferred tax assets, which are based on the ability to generate sufficient taxable income during the periods in which such deferred taxes could be used or deduct.

To the extent that future cash flows and taxable income differ significantly from the estimates, the Ecopetrol Business Group's ability to realize the deferred tax assets recorded could be affected.

Furthermore, changes in tax rules could limit the capacity of the Ecopetrol Business Group to obtain tax deductions in future years, as well as the recognition of new tax liabilities resulting from auditing conducted by the tax authorities.

Tax positions taken involve a thorough assessment by Management, and are reviewed and adjusted in response to situations such as expiration in the applicability of laws, closing of tax audits, additional disclosures caused by any legal issue or a court decision relevant to a particular tax issue. The Ecopetrol Business Group records provisions based on estimated potential liabilities that could be derived from a tax audit. The amount of these provisions depends on factors such as previous experience in tax audits and different interpretations of tax legislation. The actual results may differ from the estimates recorded.

### 3.10 Hedge accounting

The process of identifying hedging relationships between hedged items and the underlying instruments (derivative and non-derivative, such as long-term, foreign currency-denominated debt), and their corresponding effectiveness, requires the use of judgment by management. The Ecopetrol Business Group periodically monitors the alignment between its hedge instruments and its risk management policy.

#### 4. Accounting policies

The accounting policies indicated below have been applied consistently for all the periods presented.

##### 4.1 **Financial instruments**

A financial instrument is any contract that gives rise to a financial asset of one entity and a financial liability or equity instrument of another entity.

The classification of financial instruments depends on the nature and purpose for which the financial assets or liabilities were acquired and is determined at the time of initial recognition. Financial assets and financial liabilities are initially measured at their fair value.

Transaction costs that are directly attributable to the acquisition or issue of financial assets and financial liabilities (other than financial assets and financial liabilities at fair value through profit or loss) are added to or deducted from the fair value of the financial assets or financial liabilities, as appropriate, on initial recognition. Transaction costs directly attributable to the acquisition of financial assets or financial liabilities at fair value through profit or loss are recognized immediately in profit or loss.

All financial assets are initially recorded at fair value. Loans and trade receivables, other receivables and financial assets held-to-maturity are measured subsequently measured at amortized cost using the effective interest method.

Equity investments available for sale that do not have a market quotation price and for which fair value cannot be reliably measured are measured at cost less any impairment identified at the end of each reporting period.

##### Measurements at fair value

Fair value is the price that would be received to sell an asset or paid to transfer a liability in an orderly transaction between market participants at the measurement date. The fair value measurement is based on the presumption that the transaction to sell the asset or transfer the liability takes place in the principal market of the asset or liability or in the absence of a principal market in the most advantageous market for the asset or liability.

The fair value of an asset or a liability is measured using the assumptions that market participants would use when pricing the asset or liability, assuming that market participants act in their economic best interest.

A fair value measurement of a non-financial asset takes into account a market participant's ability to generate economic benefits by using the asset in its highest and best use or by selling it to another market participant that would use the asset in its highest and best use.

The Group uses valuation techniques that are appropriate in the circumstances and for which sufficient data are available to measure fair value, maximizing the use of relevant observable inputs and minimizing the use of unobservable inputs.

All assets and liabilities for which fair value is measured or disclosed in the financial statements are classified within the following scale, based on the lowest level input that is significant to the fair value measurement as a whole, as follows:

- Level 1: Quoted (unadjusted) market prices in active markets for identical assets or liabilities. The fair value of the Ecopetrol Business Group's marketable securities with a quoted market price is based on Level 1 inputs.
- Level 2: Valuation techniques for which the lowest level input that is significant to the fair value measurement is directly or indirectly observed. Level 2 inputs include prices of similar assets, prices obtained through quotations made by stockbrokers, and prices that can be substantially corroborated with other observable data with the same contractual terms.

For derivative contracts for which a quoted market price is not available, fair value estimations are generally determined using models and other valuation methods, the key inputs for which include future prices, volatility estimates, price correlation, counterparty credit risk and market liquidity, as appropriate. For other assets and liabilities, fair value estimations are generally based on the net present value of expected future cash.

- Level 3: Valuation techniques for which the lowest level input that is significant to the fair value measurement is unobservable. The Ecopetrol Business Group does not use Level-3 inputs for the measurement of financial assets and liabilities. The Ecopetrol Business Group may use Level-3 inputs for the calculation the recoverable amount of certain non-financial assets for the purpose of impairment testing.

##### Effective interest rate method

The effective interest rate method is a method of calculating the amortized cost of a financial instrument and accounting of income or financial cost over the relevant period. The effective interest rate is the discount rate that exactly discounts estimated future cash receipts or payments (including all fees, transaction costs and other premiums or discounts) through the expected life of the financial instrument (or, when appropriate, at a shorter period), to the net carrying amount on initial recognition.

### Impairment

The Ecopetrol Business Group evaluates if there is objective evidence that a financial asset or group of financial assets are impaired. Financial assets are evaluated for the impairment indicators at the end of each reporting period. Financial assets are considered to be impaired when there is objective evidence that, as a result of one or more events that occurred after initial recognition, the estimated future cash flows of the asset have been affected. For financial assets measured at amortized cost, the amount of the impairment loss recognized is the difference between the asset's carrying amount and the present value of estimated future cash flows, discounted at the financial asset's original effective interest rate.

#### **4.1.1 Cash and cash equivalents**

Cash and cash equivalents include cash on hand, financial investments that are highly liquid, bank deposits and special funds with original maturity dates of ninety days or less which are subject to an insignificant risk of changes in value.

#### **4.1.2 Financial assets**

The classification of financial assets at initial recognition depends on the financial asset's contractual cash flow characteristics and the Group's business model for managing them. With the exception of trade receivables that do not contain a significant financing component or for which the Ecopetrol Business Group has applied the practical expedient, the Ecopetrol Business Group initially measures a financial asset at its fair value plus, in the case of a financial asset not at fair value through profit or loss, transaction costs. Trade receivables that do not contain a significant financing component or for which the Ecopetrol Business Group has applied the practical expedient are measured at the transaction price determined under IFRS 15.

The Ecopetrol Business Group classifies its financial assets in the following categories:

- a) Financial assets measured at fair value through profit or loss

Financial assets at fair value through profit or loss are financial assets held for trading and financial assets designated at the time of the initial recognition at fair value through profit or loss. Financial assets are classified as held for trading if they are acquired to be sold or repurchased in the short term. They are recognized at their fair value and losses or profits arising at the time of re-measurement are recognized in the statement of profit or loss.

- b) Financial assets measured at fair value with changes in other comprehensive income

These are equity instruments of other non-controlled and non-strategic companies not allowing for any type of control or significant influence thereon and where the Ecopetrol Business Group's management does not intend to negotiate with them in the short term. These investments are recorded at their fair value and unrealized gains or losses are recognized in other comprehensive income and credited to the available for sale reserve until the investment is derecognized, at which time, the cumulative gain or loss is recognized in other operating income, or the investment is determined to be impaired, when the cumulative loss is reclassified from the available to sale reserve to the statement of profit or loss.

- c) Financial assets at amortized cost

Loans and receivables are non-derivative financial assets with fixed or determinable payments that are not quoted in an active market. Loans and receivables, including trade and other receivables, are measured initially at fair value and then at amortized cost using the effective interest rate method, less impairment.



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Loans to employees are initially recorded using the present value of the future cash flows, discounted at the current market rate for similar loans. If the interest rate is less than the current market rate, fair value will be less than the amount of the loan. This difference is recorded as a benefit to employees.

This category is the most relevant to the Group. The Group measures financial assets at amortized cost if both of the following conditions are met:

- The financial asset is held within a business model with the objective to hold financial assets in order to collect contractual cash flows
- The contractual terms of the financial asset give rise on specified dates to cash flows that are solely payments of principal and interest on the principal amount outstanding

Financial assets at amortized cost are subsequently measured using the effective interest (EIR) method and are subject to impairment. Gains and losses are recognized in profit or loss when the asset is derecognized, modified or impaired.

The Group's financial assets at amortized cost includes trade receivables, other receivables, loan to an associate, and loan to employees. For loan to employees if the interest rate is less than the current market rate, fair value will be less than the amount of the loan. This difference is recorded as a benefit to employees.

#### De-recognition of financial assets

The Ecopetrol Business Group derecognizes a financial asset only upon the expiration of the contractual rights to the cash flows of the asset or, when it has transferred its rights to receive such cash flows or has assumed the obligation to pay the cash flows received in full without material delay to a third party and (a) it has transferred substantially all the risks and benefits inherent in the ownership of the financial asset or (b) it has neither transferred nor retained substantially all the risks and benefits of the asset, but has transferred control of the asset.

When the Ecopetrol Business Group does neither transfer nor retain substantially all the risks and benefits of the asset or transfer control of the asset, the Ecopetrol Business Group continues to recognize the transferred asset, to the extent of its continuing participation, and it also recognizes the associated liability.

#### **4.1.3 Financial liabilities**

Financial liabilities correspond to the financing obtained by the Ecopetrol Business Group through bank credit facilities and bonds, accounts payable to suppliers and creditors.

Bank credit facilities and bonds (this is the category most relevant to the Group) are initially recognized at their fair value, net of directly attributable transactions cost. After initial recognition, interest-bearing credit facilities and bonds are subsequently measured at amortized cost, using the effective interest rate (EIR) method. The effective interest method amortization is included as a financial expense in the statement of profit or loss. Gains and losses are recognized in profit or loss when the liabilities are derecognized as well as through the EIR amortization process. Amortized cost is calculated by taking into account any discount or premium on acquisition and fees or costs that are an integral part of the EIR. The EIR amortization is included as finance costs in the statement of profit or loss.

Accounts payable to suppliers and creditors are short-term financial liabilities recorded at nominal value, since it does not significantly differ from fair value.

#### Derecognition

A financial liability is derecognized when the obligation specified in the contract is discharged or cancelled or expires. When an existing financial liability has been replaced by another from the same lender, under substantially different terms, or the terms of an existing liability are substantially modified, such an exchange or modification is treated as the de-recognition of the original liability and recognized as a new liability. The difference between the respective carrying amounts is recognized in the statement of profit or loss.

#### **4.1.4 Derivative financial instruments and hedging activities**

Financial instruments are initially recognized at fair value on the date on which a derivative contract is entered into and are subsequently remeasured at fair value. Changes in the fair value of derivatives are recognized as gains or losses in the statement of profit or loss, except for the effective portion of cash flow hedges, which is recognized in other comprehensive income and later reclassified to profit or loss when the hedge item affects profit or loss.

Changes in fair value of derivative contracts, which do not qualify or are not designated as hedges, including forward contracts for the purchase and sale of commodities under negotiation for physical delivery or receipt of the commodity are recorded in profit or loss.

Derivatives embedded in the host contract are accounted for as separate derivatives at fair value if their economic characteristics and risks are not closely related to those of the host contracts and the host contracts are not held for trading or designated at fair value through profit or loss. These embedded derivatives are measured at fair value with changes in fair value recognized in profit or loss.

#### **4.1.5 Hedging operations**

For purposes of hedge accounting, hedges are classified as:

- Derivatives not designated as hedging instruments, when hedging the exposure to changes in the fair value of a recognized asset or liability or an unrecognized firm commitment
- Derivatives are designated as hedging instruments, when hedging the exposure to variability in cash flows that is either attributable to a particular risk associated with a recognized asset or liability or a highly probable forecast transaction.

At the inception of a hedge relationship, the Group formally designates and documents the hedge relationship to which it wishes to apply hedge accounting and the risk management objective and strategy for undertaking the hedge. Such hedges are expected to be highly effective in achieving offsetting changes in fair value or cash flows and are assessed on an ongoing basis to determine whether they have been highly effective throughout the financial reporting periods for which they were designated.



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**4.1.5.1 Cash flow hedge**

The effective portion of the gain or loss on the hedging instrument is recognized in Other Comprehensive Income (OCI) in the cash flow hedge reserve, while any ineffective portion is recognized immediately in the statement of profit or loss.

The amounts accumulated in OCI are accounted for, depending on the nature of the underlying hedged transaction. If the hedged transaction subsequently results in the recognition of a non-financial item, the amount accumulated in equity is removed from the separate component of equity and included in the initial cost or other carrying amount of the hedged asset or liability.

If the hedging instrument expires or is sold, terminated or exercised without replacement or rollover, or if its designation as a hedge is revoked or when the hedge no longer meets the criteria for hedge accounting, any cumulative gain or loss previously recognized in other comprehensive income remains separately in equity until the forecast transaction occurs is recognized in the consolidated statement of profit or loss. When it is no longer expected that the initially hedged transaction will occur.

Ecopetrol designates long-term loans as hedging instruments for its exposure to the exchange risk in future oil exports. See Note 28 for further information.

**4.1.5.2 Hedge of net investment in a foreign operation**

Hedges of a net investment in a foreign operation, including a hedge of a monetary item that is accounted for as part of the net investment, are accounted for in a way similar to cash flow hedges.

Gains or losses on the hedging instrument relating to the effective portion of the hedge are recognized as OCI while any gains or losses relating to the ineffective portion are recognized in the statement of profit or loss. On disposal of the foreign operation, the cumulative value of any such gains or losses recorded in equity is transferred to the statement of profit or loss.

Ecopetrol allocates long-term loans as hedging instruments for its exposure to foreign exchange risk on its investment in subsidiaries whose functional currency is the U.S. dollar. See Note 28 for further information.

**4.2 Inventories**

Inventories are stated at the lower of cost and net realizable value.

Inventories mainly comprise crude oil, fuels and petrochemicals and consumable inventories (spares and supplies).

The cost of crude oil is the production costs, including transportation costs.

The cost required to bring a pipeline into working order, is treated as part of the related pipeline.

The cost of other inventories is determined based on the weighted average cost method, which includes acquisition costs (deducting commercial discounts, rebates and other similar items), transformation, and other costs incurred to bring inventory to their current location and condition, such as transportation costs.

Consumable inventories (spares and supplies) are recognized as inventory and then charged to expense, maintenance or project to the extent that such items are consumed.

Ecopetrol estimates the net realizable value of inventories at the end of the period. When the circumstances that previously caused inventories to be written down below cost no longer exist, or when there is clear evidence of an increase in the net realizable value because of a change in economic circumstances, the amount of the write-down is reversed. The reversal cannot be greater than the amount of the original write-down, so that the new carrying amount will always be the lower of the cost and the revised net realizable value.

### 4.3 Related parties

Related parties are considered those in which one party has the ability to control, or has joint control of the other, or exercises significant influence over the other party in making financial or operational decisions, or is a member of key management personnel (or close relative of a member). The Ecopetrol Business Group considers related parties to be associates, joint ventures, key management executives, entities managing resources for payment of employee post-employment benefit plans and Colombian government entities for the purposes of certain relevant transactions, such as the purchase of hydrocarbons and the fuel price stabilization fund (see Note 29 – Related parties).

#### 4.3.1 Investments in associates

An associate is an entity over which the Ecopetrol Business Group has significant influence but not control. Significant influence is the power to participate in the financial and operational policy decisions of the investee, but it is not control or joint control over those policies. Generally, these entities are those in which the Ecopetrol Business Group holds an equity interest with voting rights of 20% to 50%. See Exhibit I – *Consolidated companies, associates and joint ventures for further details*.

Investments in associates are accounted for using the equity method. Under this method, the investment in an associate is initially recognized at cost. The carrying amount of the investment is adjusted to recognize changes in the Ecopetrol Business Group's share of net assets of the associate since the acquisition date. Goodwill related to the associate is included in the carrying amount of the investment and it is not tested for impairment separately.

The Ecopetrol Business Group's share of the results of operations of the associate is recognized in the consolidated statement of profit or loss. Any change in other comprehensive income is recognized in other comprehensive income of the Ecopetrol Business Group.

After application of the equity method, the Ecopetrol Business Group determines if it is necessary to recognize an impairment on its investment in its associate. The Ecopetrol Business Group determines whether there is objective evidence that the investment is impaired. If there is such evidence, the amount of the impairment is calculated as the difference between the recoverable amount and its carrying value, and then the impairment is recognized in the consolidated statement of profit or loss.

When necessary, the Ecopetrol Business Group makes adjustments to the accounting policies of associates to ensure consistency with the policies adopted by the Ecopetrol Business Group. Additionally, the equity method of these companies is measured on their most recent financial statements.

#### 4.3.2 Joint ventures

A joint venture is a type of joint arrangement whereby the parties that have joint control of the arrangement have rights to the net assets of the joint arrangement. Joint control exists only when decisions about the relevant activities require unanimous consent of the parties sharing such control. The accounting treatment for the recognition of joint ventures is the same as investments in associates.

### 4.4 Joint operations

A joint operation is a type of joint arrangement whereby the parties that have joint control of the arrangement have rights to the assets and obligations for the liabilities, relating to the arrangement.

Joint operation contracts are entered into between Ecopetrol and third parties to share risk, secure capital, maximize operating efficiency and optimize the recovery of reserves. In these joint operations, one party is designated as the operator to execute the operations and report to partners according to their participating interests. Likewise, each party takes its share of the produced hydrocarbons (crude oil or gas), according to their share in production.

When Ecopetrol participates as a non-operator partner, it records the assets, liabilities, sales revenues, cost of sales and expenses based on the operator's report. When Ecopetrol is the direct operator of joint venture contracts, it records its percentage of assets, liabilities, sales revenues, costs and expenses, based on the participation of each partner in the items corresponding to assets, liabilities, sales revenues, costs and expenses.

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When the Ecopetrol Business Group acquires or increases its participation in a joint operation in which the activity constitutes a business combination, such transaction is recorded applying the acquisition method in accordance with IFRS 3 – Business combination. The acquisition cost is the sum of the consideration transferred, which corresponds to the fair value, on the date of acquisition of the assets transferred and the liabilities incurred. Any transaction cost related to the acquisition or increased share in the joint operation that constitutes a business combination is recognized in the consolidated statement of profit or loss.

The excess of the sum of the consideration transferred and the amount paid in the operation is recognized as goodwill. If the result is in an excess value of the net assets acquired over the amount paid in the operation, the difference is recognized as income in the consolidated statement of profit or loss on the date of recognition of the transaction.

#### **4.5 Non-current assets held for sale**

Non-current assets are classified as held for sale if their carrying values will be recovered principally through a sale transaction rather than through continued use. Non-current assets are classified as held for sale only when the sale is highly probable within one year from the classification date and the asset (or group of assets) is available for immediate sale in its present condition. These assets are measured at the lower of their carrying amount and fair value less related costs of disposal.

#### **4.6 Property, plant and equipment**

##### Recognition and measurement

Property, plant and equipment are stated at cost less accumulated depreciation and accumulated impairment losses. Tangible components related to natural and environmental resources are part of property, plant and equipment.

The initial cost of an assets comprises its purchase price or construction cost, including import duties and non-refundable purchase taxes, any costs directly attributable to bringing the asset into operation, costs of employee benefits arising directly from the construction or acquisition, borrowing costs incurred that are attributable to the acquisition and construction of qualifying assets and the initial estimate of the costs of dismantling and abandonment of the item.

Spare parts and servicing equipment are recorded as inventories and recognized as an expense as they are used. Major spare parts and stand-by equipment that the entity expects to use during more than one period are recognized as property, plant and equipment.

Any gain or loss arising from the disposal of a property, plant and equipment is recognized in profit or loss of the period.

##### Subsequent disbursements

Subsequent disbursements correspond to all payments to be made on existing assets in order to increase or extend the initial expected useful life, increase productivity or productive efficiency, allow for significant reduction of operating costs, increase the level of reserves in exploration or production areas or replace a part or component of an asset that is considered critical for the operation.

The costs of repair, conservation and maintenance of a day to day nature are expensed as incurred. However, disbursements related to major maintenance are capitalized.

##### Depreciation

Property, plant and equipment is depreciated using the straight-line method, except for those associated with exploration and production activities which are depreciated using the units-of-production method. Technical useful lives are updated annually considering factors such as: additions or improvements (due to parts replacement or critical components for the asset's operation), technological advances, obsolescence and other factors; the effect of this change is recognized from the period in which it was executed. Depreciation of an asset starts when it is ready to be used.

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Useful lives are determined based on the period over which an asset is expected to be available for use, physical exhaustion, technical or commercial obsolescence and legal limits or restrictions over the use of the asset.

The estimated useful life of assets fluctuates in the following ranges:

Plant and equipment	11 – 60 years
Pipelines, networks and lines	11 – 50 years
Buildings	11 – 50 years
Other	6 – 40 years

Land is recorded separately from buildings and facilities and it is not subject to depreciation.

Depreciation methods and useful lives are reviewed annually and adjusted if appropriate.

#### 4.7 Natural and environmental resources

##### Recognition and measurement

Ecopetrol uses the successful efforts method to account for exploration and production of crude oil and gas activities, following the provisions of IFRS 6 – Exploration for the evaluation of mineral resources.

##### *Exploration costs*

Acquisition and exploration costs are recorded as exploration and evaluation assets until the determination of whether the exploration drilling is successful or not; if determined to be unsuccessful, all costs incurred are recognized as expenses in the consolidated statement of profit or loss.

Exploration costs are those incurred with the objective of identifying areas that are considered to have prospects of containing oil and gas reserves, including geological and geophysical, seismic costs, viability, and others, which are recognized as expenses when incurred. Furthermore, disbursements associated with the drilling of exploratory wells and those related to stratigraphic wells of an exploratory nature are charged as assets until it is determined if they are commercially viable; otherwise, they are expensed in the consolidated statement of profit or loss as dry wells expense. Other expenditures are recognized as expenses when incurred.

An exploration and evaluation asset is no longer classified as such when the technical feasibility and commercial viability of extracting a mineral resource are demonstrable. Exploration and evaluation assets are reclassified to the natural and environmental resources account after being assessed for impairment.

All capitalized costs are subjected to technical and commercial revisions at least once a year to confirm the evaluation and exploration efforts continue on the fields; otherwise, these costs are written off through to profit or loss.

Exploration costs are net of the revenues obtained from the sale of crude oil during the extensive testing period, net of cost of sales, since they are considered necessary to complete the asset.

##### *Development costs*

Development costs correspond to those costs incurred to obtain access to proved reserves and to provide facilities for extracting, treating, gathering and storing. When a project is approved for development, the corresponding capitalized acquisition and exploration costs are classified as natural and environmental resources and costs subsequent to the exploration phase are capitalized as development costs of the properties that contain such natural resources. All development costs are capitalized, including drilling costs of unsuccessful development wells.

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*Production costs*

Production costs are those incurred to operate and maintain productive wells, and are part of the corresponding equipment and facilities. Production activity includes extraction of oil and gas to the surface, its gathering, treatment and processing as well as storage in the field. Production costs are expenses recorded in the consolidated statement of profit or loss as incurred unless they add oil and gas reserves, in which case they are capitalized.

Production and support equipment is recognized at cost and is part of property, plant and equipment subject to depreciation.

Capitalized costs also include decommissioning, dismantling, retiring and restoration costs, as well as the estimated cost of future environmental obligations. The estimation includes plugging and abandonment costs, facility dismantling and environmental recovery of areas and wells. Changes arising in new abandonment liability estimations and environmental remediation are capitalized in the carrying amount of the related asset.

Depletion

Depletion of natural and environmental resources is determined using the unit-of-production method per field, using proved developed reserves as a base, except in limited exceptional cases that require greater judgment by Management to determine a better amortization factor of future economic benefits over the useful life of the asset. Depreciation rates are reviewed annually, based on reserves reports and the impact of any changes is recognized prospectively in the financial statements.

Reserves are independently estimated by internationally recognized external consultants and approved by Ecopetrol's Board of Directors. Proved reserves consist of the estimated quantities of crude oil and natural gas demonstrated with reasonable certainty by geological and engineering data to be recoverable in future years from known reserves under existing economic and operating conditions, that is, at the prices and costs that apply at the date of the estimation.

Impairment

Assets associated to exploration, evaluation and production are subject to review for possible impairment in their carrying amount. See Notes 3.2 — *Asset impairment (recovery)* and 4.12 — *Impairment of non-financial assets*.

**4.8 Capitalization of borrowing costs**

Borrowing costs related to the acquisition, construction or production of a qualifying asset that requires a substantial period of time to get ready for its intended use are capitalized as part of the cost of such asset when it is probable that future economic benefits associated with the item will flow to the Ecopetrol Business Group and costs can be measured reliably. Other borrowing costs are recognized as finance costs. Projects that have been suspended but that the Ecopetrol Business Group intends to continue to pursue their development in the future, are not considered qualifying assets for the purpose of capitalization of borrowing costs.

**4.9 Intangible assets**

Intangible assets with a defined useful life, are stated at cost less accumulated amortization and any impairment loss. Intangible assets are amortized under the straight-line method, over their estimated useful lives. The estimated useful lives and amortization method are revised at the end of each reporting period; any change in estimates is recognized on a prospective basis.

The disbursements in relation to research activities are expensed as incurred.

**4.10 Goodwill**

Goodwill is initially measured at cost (being the excess of the aggregate of the consideration transferred and the amount recognized for non-controlling interest and any previous interest held over the net identifiable assets acquired and liabilities assumed). After initial recognition goodwill is measured at cost less any accumulated impairment loss. Goodwill is not amortized but tested for impairment annually.

#### 4.11 Leases

Leases are classified as finance leases whenever the terms of the lease transfer substantially all the risks and rewards of ownership. All other leases are classified as operating leases.

Assets held under finance leases, when Ecopetrol is the lessee, are recognized in the consolidated statement of financial position at an amount equal to the fair value of the leased asset or, if lower, the present value of the minimum lease payment. These assets are depreciated over the asset's useful life. When there is no reasonable certainty that the company will obtain ownership of the asset at the end of the contract, the leased assets are depreciated in the shortest period between the asset estimated useful life and the lease term.

The corresponding liability to the lessor is included in the consolidated statement of financial position as a finance lease obligation, in the loans and financing line item.

Lease payments are apportioned between financial charges and reduction of lease liabilities in order to achieve a constant rate of interest on the liability remaining balance. Interest expense is recognized in profit or loss.

Operating lease payments are recognized as an expense on a straight-line basis over the lease term, except where another systematic prorating basis is more representative of the time pattern of economic benefits from the lease. Contingent rentals arising under operating leases are recognized as an expense in the period in which they are incurred.

#### 4.12 Impairment of non-financial assets

In order to evaluate if any tangible or intangible assets are impaired, Ecopetrol compares its carrying amount with its recoverable amount at the end of each reporting period or earlier, if there is any indicator that an asset may be impaired.

For purposes of impairment testing, the assets are grouped into cash generating units (CGU), provided that those assets individually considered do not generate cash inflows that, to a greater extent, are independent from those generated by other assets or CGUs. The grouping of assets in different CGUs requires the exercise of professional judgment and the consideration, among other parameters, of the business segments. In this sense, in the Exploration and Production segment, each CGU corresponds to each one of the different contractual areas commonly called "fields;" by exception, in those cases where the cash inflows generated by several fields are interdependent from each other, those fields are grouped into a single CGU. In the case of the Refining and Petrochemicals, each CGUs corresponds to each one of the refineries and companies in this segment of the Ecopetrol Business Group and for the Transportation segment; each pipeline system is considered an independent CGU.

The recoverable amount of the asset is the higher amount of the fair value less costs of disposal or its value in use. If the recoverable amount of an asset (or of a CGU) is lower than its net carrying amount, such amount (or that of the CGU) is reduced to its recoverable amount, recognizing an impairment loss in profit or loss.

Fair value less costs of disposal is usually higher than the value in use for the asset's in the production segment due to some significant restrictions in the estimation of future cash flows, such as: a) future capital expenses that improve the CGU performance, which could result in expected increase of net cash flows, and b) items before taxes that reflect specific business risks, resulting in a higher discount rate.

Fair value less costs of disposal is determined as the sum of the future discounted cash flows adjusted to the estimated risk. The estimations of expected future cash flows used in the assessment of impairment of the assets include estimates of futures commodity prices, supply and demand estimations, and the margins of the products.

Fair value less costs of disposal, as described above, is compared to valuation multiples and quoted prices of shares in companies comparable to Ecopetrol, in order to determine if it is reasonable.

When an impairment loss is recorded, future amortization expenses are calculated on the basis of the adjusted recoverable amount. Impairment losses may be recovered only if the recovery is related to a change in estimations used after impairment loss was recognized. These recoveries do not exceed the carrying amount of the assets net of depreciation or amortization that would have been determined if such impairment had not been recognized.

The carrying amount of non-current assets reclassified as assets held-for-sale is compared to its fair value less costs of disposal. No other provision for depreciation, depletion or amortization is recorded if the fair value less costs of sale is lower than the carrying amount.



#### 4.13 Provisions and contingent liabilities

Provisions are recognized when the Ecopetrol Business Group has a current obligation (legal or constructive) as a result of a past event, it is probable that Ecopetrol will be required to settle the obligation, and a reliable estimation can be made of the amount of the obligation. Where applicable, they are recorded at present value, using a rate reflecting the risk specific to the liability.

Future environmental decommissioning costs related to current or future operations, are accounted for as expenses or assets, as the case may be. Expenditures related to past operations that do not contribute to the obtaining of current or future benefits, are expensed as incurred.

The recognition of these provisions coincides with the identification of an obligation related to environmental remediation and Ecopetrol uses available information to determine a reasonable estimation of the related cost.

Provisions for which a negative outcome is assessed as possible are not recognized but are disclosed in the explanatory notes; including those for which the amount cannot be estimated.

If there is an expectation that the provision will be reimbursed, either in whole or in part, for example by virtue of an insurance contract, the amounts expected to be reimbursed are recognized as a separate asset only when such reimbursement is almost certain.

If the effect of the time value of money is significant, the provisions are discounted using the current market rate before taxes reflecting, as applicable, the liability specific risks. When recognizing the discount, the increase of the provision resulting from time elapsed is recognized as financial cost in the profit or loss statement.

##### Asset retirement obligation

Liabilities associated with the retirement of assets are recognized when there are current obligations, either legal or constructive, related to the abandonment and dismantling of wells, facilities, pipelines, buildings and equipment.

The obligation is usually recorded when the assets are installed or when the surface or the environment are altered at the operating sites. These liabilities are calculated using the discounted cash flow method, using a pre-tax rate reflecting current market conditions similar liabilities and considering the economic limits of the field or the useful life of the respective asset. When it is not possible to determine a reliable estimation in the period in which the obligation originates, a provision is recognized when there is enough information available to make the best estimation.

The carrying amount of the provision is reviewed and adjusted annually considering changes in the assumptions used for its estimation, using a rate that reflects the risk specific to the liability. Any change in the present value of the estimated expenditure is reflected as an adjustment to the provision and the corresponding property, plant and equipment and natural and environmental resources. When a decrease in the asset retirement obligation related to a producing asset exceeds the carrying amount of the asset, the excess is recognized in the consolidated statement of profit or loss. The increase in the provision due to the passage of time is recognized in results for the period as a financial expense.

#### 4.14 Income tax and other taxes

Income tax expense is comprised of income tax payable for the period (including, income tax and income tax for equality – CREE, as appropriate) and the effect of deferred taxes in each period.

Current income taxes are recognized in income except when they relate to items recognized in other comprehensive income, in which case the corresponding tax effect is also recognized in other comprehensive income. Income tax assets and liabilities are presented separately in the consolidated statement of financial position, except where there is a right of setoff within fiscal jurisdictions and an intention to settle such balances on a net basis.

Income tax is paid by each legal entity and not on a consolidated basis.

##### 4.14.1 Current income tax

The Ecopetrol Business Group determines the provision for income tax based on the highest amount between taxable income and presumptive income (the minimum estimated amount of taxable profit on which the law expects to quantify and collect income taxes). Taxable income differs from profit before tax as reported in the consolidated statement of profit or loss, because of: items of income or expense that are taxable or deductible in other periods, special taxable deductions, tax losses and income and line items measured that, according to applicable tax laws in each jurisdiction, are considered nontaxable or nondeductible.

#### 4.14.2 Deferred income tax

Deferred tax is provided using the liability method for temporary differences between the carrying amounts of existing assets and liabilities in the consolidated financial statements and their respective tax bases. A deferred tax liability is recognized for all taxable temporary differences. A deferred tax asset is recognized for all deductible temporary differences and for all accumulated tax losses, if there is a reasonable expectation that the Ecopetrol Business Group will generate future tax profits against which they will be used.

Deferred taxes on assets and liabilities are calculated based on the tax rates that are expected to apply during the years in which temporary differences between the carrying amounts and tax bases are expected to be reversed.

The carrying amount of a deferred tax asset is subject to review at the end of each reporting period, and it is reduced to the extent it is no longer probable that the corresponding legal entity will generate enough future taxable profit to realize such deferred tax asset.

In the statement of financial position, deferred tax assets are reflected net and as an offset against deferred tax liabilities, depending on the overall tax position in a particular jurisdiction and on the same taxable entity.

Deferred taxes are not recognized when they arise in the initial recognition of an asset or liability in a transaction (except in a business combination) and at the time of the transaction, do not affect the accounting or tax profit, or in respect of the taxes on the possible future distribution of accumulated profits of subsidiaries or investments accounted for by the equity method, if at the time of the distribution it may be controlled by Ecopetrol and it is probable that the retained earnings will be reinvested by the Ecopetrol Business Group companies and, therefore, will not be distributed to Ecopetrol.

#### 4.14.3 Other taxes

The Ecopetrol Business Group recognizes in profit or loss the costs and expenses related to other taxes than the income tax, such as the wealth tax, which is determined based on the tax equity, the industry and commerce tax on income obtained in the municipalities for performance of commercial, industrial and service activities, and the transport tax on volumes loaded in the transport systems. Taxes are calculated in accordance with current tax regulations. For more details, see Note 10.

#### 4.15 Employee benefits

Salaries and benefits of the Ecopetrol's employees are governed by the Colombian Collective Labor (Agreement 01 of 1977), and, by the Colombian Substantive Labor Code. In addition to the benefits determined by labour laws, employees are entitled to fringe benefits which are subject to the place of work, type of work, length of service, and basic salary. An annual interest of 12% is recognized on accumulated severance amounts for each employee, and the payment of compensation is provided for when special circumstances arise resulting in the non-voluntary termination of the contract, without justified cause, and in periods other than the probationary period.

Ecopetrol belonged to the special pension regime under which pension liabilities are Ecopetrol's responsibility and not pension fund's responsibility. However, Law 797 of January 29, 2003 and Legislative Act 001 of 2005 determined that Ecopetrol will no longer belong to the said regime and that from that point on employees would be part of the General Pension Regime. Consequently, pension obligations related to employees pensioned until July 31, 2010 are still Ecopetrol's responsibility. Employees are entitled to such pension bonus if they worked with Ecopetrol prior to January 29, 2003, but whose labor agreement expired without renewal before that date.

All labor benefits of employees who joined Ecopetrol before 1990 are Ecopetrol's responsibility, without the involvement of any social security entity or institution. Service cost for the employee and his/her relatives registered with Ecopetrol is determined by means of a mortality table, prepared based on facts occurring during the year.

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For employees who joined Ecopetrol after the Act 50 of 1990 went in effect, Ecopetrol makes periodic contributions for severance payments, pensions and labor risks to the respective funds.

In 2008, Ecopetrol partially settled the value corresponding to monthly pension payments from its pension liabilities, transferring such liabilities and their underlying amounts to autonomous pension funds (PAP, for its acronym in Spanish). The funds transferred, and returns on those funds, cannot be redirected, nor can they be returned to the Ecopetrol Business Group, until all of the pension obligations have been fulfilled. The settled obligation covers allowances and pension bonds payments; while health and education remained under responsibility of Ecopetrol.

Employee benefits are divided into four groups comprised as follows:

a) Short-term employee benefits and post-employment defined benefits:

Benefits to employees in the short term mainly correspond to those which payment will be made in the term of twelve months following the closing of the period in which the employees have rendered their services. These mainly include salaries, severance payments, vacation, bonuses and other benefits.

Post-employment benefits of defined contributions plans correspond to the periodic payments for severance, pensions and labor risk payments that the Ecopetrol Business Group makes to the respective funds that assume these obligations in their entirety.

The above benefits are recognized as an expense with an associated liability after deducting any already paid amounts.

b) Post-employment defined benefit plans:

In the defined benefits plan, the Ecopetrol Business Group provides the benefits agreed to current and former employees and assumes the actuarial and investment risks.

The following benefits are classified as long-term defined benefit plans recognized in the financial statements according to the calculations of an independent actuary:

- Pensions
- Pension bonds
- Health
- Educational plan
- Retroactive severances

Liabilities recognized in the statement of financial position with respect to these benefit plans are determined base on the present value of the defined benefit obligation at the date of the statement of financial position less the fair value of plan assets.

The defined benefit obligation is calculated annually by independent actuaries using the projected credit unit method, which takes into account employees' years of service and, for pensions, average or final pensionable remuneration. This obligation is discounted at its present value using interest rates of high-quality government bonds denominated in the currency in which the benefits will be paid and of a duration consistent with the plan obligations.

These actuarial calculations involve several assumptions that could differ from the events that will effectively take place in the future. Said assumptions include the determination of a discount rate, future salary increases, mortality rates and future pension increases. Because of the complexity of the calculation, the underlying assumptions and long-term nature of these plans, the obligations for defined benefits are extremely sensitive to changes in assumptions. All key assumptions are revised at the end of the reported period.

In determining the appropriate discount rate, in absence of a broad high quality bond market, Management considers interest rates corresponding to the class B TES bonds issued by the Colombian Government as its best reference, at an appropriate discount rate with maturities extrapolated in line with the term expected for each benefit plan. The mortality rate is based on the particular country's rate, the latest version of which is the RV08 mortality table published in resolution 1555 of October 2010. The future salary and pension increases are linked to the country's future inflation rates. Note 22 – *Provisions for employee benefits* provides further details on key assumptions used.

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The amounts recognized in the consolidated statement of profit or loss related to employees defined benefit plans are comprised mainly by service cost and the net financial expense. Service cost includes mainly the increase in present value of the benefit obligation during the period (current service cost) and the amount resulting from a new benefit plan. Plan amendments corresponds to changes in benefits and are usually recognized when all legal and regulatory approvals have been obtained and the effects have been conveyed to the employees involved. The net financial expense is calculated using the net liability for defined benefits as compared with the yield curve of the discount rate at the beginning of each year for each plan. The net defined benefit obligation or asset resulting from actuarial profits and losses, the asset ceiling effect and the asset profitability, excluding the value of recognized in the consolidated statement of profit or loss, are recognized in other comprehensive income.

When the plan assets exceed the gross obligation, the recognized asset is limited to the lower of the surplus in the defined benefits plan and the ceiling of assets determined using a discount rate based on Colombian Government bonds.

(a) Others long-term benefits

Others long-term benefits include the five-year term bonus which also considered in the actuarial calculation. This benefit is a cash bond that accumulates annually and is paid every five years to employees. The Ecopetrol Business Group recognizes in the consolidated statement of profit or loss the service cost, the net financial cost and the adjustment to the obligation of the defined benefit plan.

(b) Termination benefits

Termination benefits are recognized only when a detailed plan exists and there is no possibility to withdraw the offer. The Ecopetrol Business Group recognizes a liability and an expense for termination benefits at the earliest date between the date when the offer of such benefits cannot be withdrawn and the date when the restructuring costs are recognized.

#### 4.16 Revenue from contracts with customers

The Ecopetrol Business Group's business is based on three principal sources of revenue from contracts with customers: 1) sales of crude oil and natural gas, 2) services associated with the transport of hydrocarbons, and 3) sales of refined products, petrochemicals and biofuels. Revenue from contracts with customers is recognized when control of the goods or services are transferred to the customer at amount that reflects the consideration that the Ecopetrol Business Group expects to be entitled in exchange for those goods or services.

##### Sales of crude oil and natural gas

Revenue from sales of crude oil and natural gas is recognized upon transfer of control to the buyer, this generally occurs when the product is physically transferred into a vessel, pipe or other delivery methods.

For some natural gas supply contracts with a replacement period, a distinction is made between quantities of gas consumed and not consumed in order to recognize the respective revenue or liability relating to quantities that will be requested in the future. Once the customer claims such natural gas, the revenue is recognized.

##### Services associated with hydrocarbons transport

Revenue from transport services is recognized when the service is provided to the customer and there are no contractual conditions that prevent recognition of the revenue. Ecopetrol Business Group companies is the principal in providing these services.

Ship/ Take-or-Pay contracts for the sale of refined products, storage and transport specify minimum quantities of products or services for which a customer will pay, even if the latter does not receive them or use them ("deficient quantities"). Although the Ecopetrol Business Group expects customers to recover all deficient quantities to which they are contractually entitled, any load revenue received related to temporary shortfalls that will be offset in a future period will be deferred and that amount recognized as revenue in the event any of the following scenarios occurs:

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- a) The customer exercises its right to deficient volumes or services, or
- b) The possibility is remote that the customer will exercise its right to deficient volumes or services.

Refined products and biofuels

In the case of refined products, petrochemicals and biofuels, such as fuel oil, asphalt, polyethylene, LPG and propane and gasoline, etc., revenue is recognized when the products are shipped and delivered by the refinery; subsequently, they are adjusted for price changes, in the case of products with regulated prices.

In other cases, Ecopetrol Business Group recognize revenue when satisfies the performance obligation, giving rise to the certain, probable and quantifiable right to demand payment.

Under current local regulation, Ecopetrol sells regular gasoline and ACPM in Colombia at a regulated price.

In accordance with Decree 1068 of 2015, the Ministry of Mines and Energy calculates semiannually and settles Ecopetrol's net position to be stabilized for each fuel by the Fuel Price Stabilization Fund (FEPC, for its acronym in Spanish). The net position corresponds to the sum of the spreads throughout the semester, the result of which will be the amount in pesos in favor of the Company charged to the resources of the FEPC. The differential corresponds to the product between the volume reported by the Company at the time of sale and the difference between the parity price and the reference price, the parity price being that which corresponds to the daily prices of the motor and diesel gasoline observed during the month, expressed in pesos, referenced to the Gulf of the United States market, calculated by applying Resolution 18 0522 of 2010, and the reference price is the Producer Income defined by the Ministry of Mines and Energy for these purposes. Therefore, this differential constitutes a greater or lesser value of sales revenue for Ecopetrol.

According to the risk profiles, the Ecopetrol Business Group manages advance payment systems for some of its contracts with customers.

Significant financing component

Generally payments received from customers are short term. Using the practical expedient in IFRS 15, the Group does not adjust the promised amount of consideration for the effects of a significant financing component if it expects, at contract inception, that the period between the transfer of the promised good or service to the customer and when the customer pays for that good or service will be one year or less.

Variable considerations

Upon fulfillment of the obligations set forth in agreements with customers, via delivery of the product or provision of the service, variable components of the transaction price may exist, such as the exchange rate for crude exports or international price fluctuations. In these cases, the Ecopetrol Business Group will make its best estimate of the transaction price that reflects the goods and services transferred to customers.

Agreements signed with customers do not include variable considerations like rebates, refunds or discounts.

Non-cash considerations

Agreements signed in the Ecopetrol Business Group does not consider non-cash transactions.

Customer advances

These correspond to contractual obligations in which the Ecopetrol Business Group receives advances from customers. These advances by customers form part of the policies and risk assessment defined by the Business Group.

**4.17 Costs and expenses**

Costs and expenses are presented according to their nature; they are detailed in the related disclosures in cost of sales, and administrative, operating, projects and other associated expenses.

**4.18 Finance income (expenses)**

Finance income and expenses include mainly: a) borrowings costs on loans and financing, except for those that are capitalized on qualifying asset, b) gains and losses on changes in fair value of financial instruments measured at fair value through profit or loss, c) currency exchange differences of financial assets and liabilities, except for debt instruments designated as hedging instruments, d) interest expenses as a result of discounting long-term liabilities (abandonment costs and pension liabilities), e) dividends derived from equity instruments measured at fair value with changes in other comprehensive income.

#### 4.19 Information by business segment

Ecopetrol presents the information related to its business segments in its consolidated financial statements in accordance with paragraph 4 of IFRS 8 – Operation segments.

The operations of the Ecopetrol Business Group are performed through three business segments: 1) Exploration and Production, 2) Transport and Logistics and 3) Refining, Petrochemical and Biofuels. Segments are determined based on management objectives and corporate strategic plans, considering that these businesses: (a) are engaged in different commercial activities, which generate sales revenue and incur costs and expenses; (b) the operational results are revised regularly by the Ecopetrol Business Group's Governance that makes operational decisions to allocate resources to the various segments and assess their performance; and (c) there is differentiated financial information available. Internal transfers represent sales to inter-company segments and are recorded and presented at market prices.

- a) **Exploration and production:** This segment includes activities related to the exploration and production of oil and gas. Revenues are derived from sales of oil and natural gas at market prices to other segments and to third parties (domestic and foreign distributors). Costs include costs incurred in production. Expenses include all exploration costs that are not capitalized.
- b) **Transport and logistics:** This segment includes sales revenue and costs associated with the transport and distribution of hydrocarbons, derivatives and products operation.
- c) **Refining, petrochemicals and biofuels:** This segment mainly includes activities performed at the Barrancabermeja and Cartagena refineries, where crude oil from production fields is refined or processed. Revenue are derived from the sale of products to other segments and to domestic and foreign customers and include refined and petrochemical products at market prices and some fuels at regulated price. This segment also includes industrial service sales to customers.

See information by segments in Note 31.

**5. Standards issued but not yet effective**

The new and amended standards and interpretations that are issued, but not yet effective, up to the date of issuance of the Ecopetrol Business Group's financial statements are disclosed below. The Ecopetrol Business Group intends to adopt these new and amended standards and interpretations, if applicable, when they become effective.

- IFRS 16 "Leases: was issued in January 2016 and replaces IAS 17 "Leases", IFRIC 4 "Determining whether an Agreement contains a lease" SIC-15 "Operational leases – Incentives" and SIC-27, "Evaluating the Substance of Transactions involving the Legal Form of a Lease". IFRS 16 sets out the principles for the recognition, measurement, presentation and disclosure of leases and requires lessees to account for all leases under a single on-balance sheet model similar to the accounting for finance leases under IAS 17. The standard includes two recognition exemptions for lessees - leases of "low value" assets (e.g., personal computers) and short-term leases (i.e., lease with a lease term of 12 months or less). At the commencement date of a lease, a lessee will recognize a liability to make lease payments (i.e., lease liability) and an asset representing the right to use the underlying asset during the lease term (i.e., the right-to-use asset). Lessees will be required to separately recognize interest expense on the lease liability and the depreciation expense on the right-of-use asset.

Lessees will be also required to remeasure the lease liability upon the occurrence of certain events (e.g., a change in lease term, a change in future lease payments resulting from a change in an index or rate used to determine those payments). The lessee will generally recognize the amount of the remeasurement of the lease liability as an adjustment to the right-of-use asset.

Lessor accounting under IFRS 16 is substantially unchanged from today's accounting under IAS 17. Lessors shall continue to classify all leases using the same classification principle as in IAS 17 and distinguish between two types of leases: operating and financial leases.

IFRS 16, which is effective for annual periods beginning on or after January 1, 2019, requires lessees and lessors to make more extensive disclosures than under IAS 17.

**Transition to IFRS 16**

Ecopetrol Business Group will adopt IFRS 16 as of January 1, 2019, using a modified retrospective approach on contracts previously identified as leases under IAS 17 and IFRIC 4.

The Ecopetrol Business Group will elect to use the exemptions proposed by the standard on lease contracts for which the lease terms ends within 12 months as of the date of initial application, and lease contracts for which the underlying asset is of low value (e.g., computers, mobile telephones, printers, photocopiers, etc.).

During 2018 the Ecopetrol Business Group has performed an assessment of the impact IFRS 16 upon initial application and concluded that it will not have a significant impact in its consolidated financial statements.

**Leases in which Ecopetrol Business Group is a lessee**

Ecopetrol Business Group will recognize right-of-use assets and a lease liability, currently accounted for as operating leases, primarily on the following leased assets:

- Lands
- Vehicles
- Power plants
- Water treatment plants
- Helicopters



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Prior to the adoption of IFRS 16, Ecopetrol Business Group, recognized operating lease expenses on a straight-line basis during the lease term. Upon application of IFRS 16, Ecopetrol Business Group will instead recognize a depreciation charge on the right-of-use asset and a financial expense related to the lease liability.

Based on currently available information, upon application of IFRS 16, the Ecopetrol Business Group estimates it will recognize a right-to-use asset for approximately COP\$430,000 as of January 1, 2019, and a lease liability for the same amount, which are not considered material. The actual impact upon adoption could be different.

- IAS 40 “Investment Properties: Transfers of investment properties” modifies paragraph 57 of IAS 40 to reflect the principle that a change of use involves: (a) an assessment as to whether a property complies or has ceased to comply with the definition of investment property; and (b) requires evidence that supports the change of use that has occurred. By applying this principle, an entity will transfer properties under construction or development to or from investment properties if and only if there is a change of use of this property supported by evidence.
- IFRS 4 “Insurance Policies: Application of IFRS 9 (Financial Instruments) with IFRS 4 (Insurance Policies)” addresses concerns as to the various validity dates of IFRS 9 and the next standard on insurance policies. Changes include a temporary exemption from IFRS 9 for insurers who meet specific criteria and an option for them to apply the focus of the overlap to designated financial assets.
- IFRIC 23 “Uncertainty with regard to treatment of the capital gains tax” clarifies how to apply the recognition and measurement requirements of IAS 12 when there is uncertainty regarding treatment of the capital gains tax.

When there is uncertainty regarding treatment of the capital gains tax, the Company must determine whether it considers each uncertain tax treatment separately or in combination with one or more other uncertain tax treatments based on the focus that best predicts resolution of the uncertainty. Ecopetrol will re-assess a decision or estimate required by this interpretation if the facts and circumstances on which the decision or estimate was based change, or as a result of new information affecting the decision or estimate.

Additionally, upon assessing whether and how an uncertain tax treatment affects determination of the tax gain (tax loss), tax bases, unused tax losses, unused tax credits and tax rates, an entity will assume that a tax authority will inspect the amounts it is entitled to examine and have complete knowledge of all related information when those reviews are carried out.

This interpretation must be applied for years starting January 1, 2019.

- Annual Improvements to the IFRS Regulations, 2014 – 2016 Cycle:
  - IFRS 1 - First-time adoption of International Financial Reporting Standards: Elimination of short-term exemptions for entities that adopt IFRS Standards for the first time.
  - IFRS 12 - Information to be disclosed on stakes in other entities. Clarification of the scope of the regulation.
  - IAS 28 - Investments in related companies and joint ventures: Measurement at reasonable value of a related company or joint venture.
- Amendments to IAS 28 - Long-term interests in associates and joint ventures. The changes clarify that companies recognize long-term interests in an associate or joint venture to which the equity method does not apply, using IFRS 9. The IASB also provides an example that illustrates how companies apply the IFRS 9 and IAS 28 requirements to long-term interests in an associate or joint venture.

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- Amendments to IFRS 9 - Prepayment Features with Negative Compensation. Changes to IFRS 9 allow companies to measure financial assets canceled in advance with negative offset to amortized cost or reasonable value, through another comprehensive result if a specific condition is met, instead of doing so at reasonable value with gain or loss.
- Annual Improvements to IFRS Standards 2015–2017 Cycle:
  - Amendments to IAS 12 – Capital Gains Tax: Consequences to the capital gains tax of payments for financial instruments classified as net equity.
  - Amendments to IAS 23 - Loan costs. Loan costs subject to compounding.
  - Amendments to IFRS 3 – Business combinations and changes to IFRS 11 – Joint agreements. Stakes previously held in a joint venture.

**5.2 Impact of the adoption of new regulations (IFRS 16)**

IFRS 16 “Leases” was issued in January 2016 and replaces IAS 17 “Leases,” IFRIC 4 “Determination as to whether an agreement contains a lease contract,” SIC-15 “Operational leases – Incentives” and SIC-27 “Assessment of the share of transactions that legally involve a lease.”

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The new accounting policies are subject to change until the Ecopetrol Business Group presents its first financial statements under IFRS 16 in 2019.

**6. Cash and cash equivalents**

Cash and cash equivalents details as of December 31, 2018 and 2017 is as follows:

	<b>2018</b>	<b>2017</b>
Banks	4,511,078	5,484,981
Short-term investments	1,799,597	2,459,438
Cash	1,069	1,466
	<b>6,311,744</b>	<b>7,945,885</b>

As of December 31, 2018, cash and cash equivalents balance included COP\$92,331 and COP\$96,758 as of December 31, 2017, of restricted cash to be used exclusively for the payment of loans principal and interest obtained by Oleoducto Bicentenario and Oleoducto de los Llanos. The use of short-term financial investments depends on the liquidity needs of the Ecopetrol Business Group.

The fair value of cash and cash equivalents approximates their book value due to their short-term nature.

The return on cash and cash equivalents for the year ended December 31, 2018 was approximately 3% (2017 – 4.2%).

The following table reflects the credit quality of issuers of investments included in cash and cash equivalents:

<b>Rating</b>	<b>2018</b>	<b>2017</b>
AAA	3,092,236	2,807,170
BBB	1,305,037	-
A1	907,453	2,922,714
BRC1+	470,623	1,152,593
F1+	222,454	-
A-2	147,186	27,350
AA	107,520	-
F1	48,566	896,231
Aa3	-	99,029
Aa2	-	27,868
F2	-	180
Other	10,669	12,750
	<b>6,311,744</b>	<b>7,945,885</b>

See credit risk policy in Note 28.2.2

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**7. Trade and other receivables, net**

The balance of trade and other receivables, net of provision allowance for doubtful accounts, is comprised as follows as of December 31, 2018 and 2017:

	2018	2017
<b>Current</b>		
Customers		
Foreign	2,404,531	2,052,829
Domestic	1,512,821	1,533,058
Fuel price stabilization fund <sup>(1)</sup>	3,828,691	2,256,312
Industrial services	154,152	26,223
Accounts receivable from employees	78,459	34,461
Related parties (Note 29)	23,480	23,013
Other	192,109	173,022
	<b>8,194,243</b>	<b>6,098,918</b>
<b>Non-current</b>		
Accounts receivable from employees	470,609	484,504
Related parties (Note 29)	117,824	154,810
Other	167,141	137,818
	<b>755,574</b>	<b>777,132</b>

(1) Accounts receivable from the Ministry of Finance and Public Credit, arising from the differences between the international parity price of regular motor gasoline and diesel and the prices charged by the Ecopetrol Business Group, in accordance with Resolution 180522 issued on March 29, 2010, as amended. The Ministry of Finance and Public Credit actually settles the payments.

The following shows the changes in the allowance for doubtful accounts for the year ended December 31, 2018 and 2017:

	2018	2017	2016
<b>Opening balance</b>	<b>170,016</b>	<b>144,329</b>	<b>160,406</b>
Additions, net	107,725	35,229	19,438
Accounts receivable write-off and uses	(9,087)	(9,542)	(35,515)
<b>Closing balance</b>	<b>268,654</b>	<b>170,016</b>	<b>144,329</b>

**8. Inventories, net**

The balance of inventories, net allowances for losses, as of December 31, 2018 and 2017 is as follows:

	2018	2017
Crude oil	1,958,572	1,836,363
Fuels and petrochemicals	1,524,548	1,481,777
Materials for the production of goods	1,617,287	1,283,256
	<b>5,100,407</b>	<b>4,601,396</b>

The following is the changes of the allowances for losses for the years ended December 31, 2018 and 2017:

	2018	2017	2016
<b>Opening balance</b>	<b>194,507</b>	<b>265,435</b>	<b>198,539</b>
(Reversals) additions, net	(115,778)	9,134	41,957
Foreign currency translation	9,717	(4,266)	50,053
Uses	(1,508)	(75,796)	(25,114)
<b>Closing balance</b>	<b>86,938</b>	<b>194,507</b>	<b>265,435</b>

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**9. Other financial assets**

The balance of other financial assets as of December 31, 2018 and 2017 is as follows:

	2018	2017
<b>Assets measured at fair value through profit or loss</b>		
Investment Portfolio – Local currency	3,389,869	3,310,338
Investment Portfolio – Foreign currency	4,754,369	3,194,287
	<b>8,144,238</b>	<b>6,504,625</b>
<b>Assets measured at amortized cost</b>	<b>3,577</b>	<b>3,636</b>
<b>Hedging instruments</b>	<b>-</b>	<b>25,464</b>
	<b>8,147,815</b>	<b>6,533,725</b>
Current	5,321,098	2,967,878
Non-current	2,826,717	3,565,847
	<b>8,147,815</b>	<b>6,533,725</b>

The average return of the investment portfolio in Colombian pesos and U.S. dollars was approximately 5.4% (2017 – 7.4%) and approximately 2.1% (2017 – 1.1%), respectively.

Changes in fair value are recognized in financial results (Note 27).

**9.1 Restrictions**

As of December 31, 2018 and 2017, there were no investments with restricted use.

**9.2 Maturity**

The following are the maturities of other financial assets as of December 31, 2018 and 2017:

	2018	2017
Up to 1 year	5,321,098	2,967,878
1 – 2 years	1,847,241	1,588,145
2 – 5 years	823,425	1,817,558
> 5 years	156,051	160,144
	<b>8,147,815</b>	<b>6,533,725</b>

**9.3 Fair value**

The following is the balance of other financial assets by fair value hierarchy level as of December 31, 2018 and 2017:

	2018	2017
Level 1	372,636	317,912
Level 2	7,771,602	6,186,713
	<b>8,144,238</b>	<b>6,504,625</b>

There were no transfers between hierarchy levels for the years ended December 31, 2018 and 2017.

The securities comprising Ecopetrol's portfolio are valued on a daily basis according to the instructions issued by the Financial Superintendence of Colombia. To this end, the information provided by authorized entities is used, which includes data from active markets. For cases in which market data is not available, other directly or indirectly observable data is used.

For U.S. dollar-denominated investments, fair value is based on information released by Bloomberg, while for investments denominated in Colombian pesos, fair value is provided by Infovalmer, an entity authorized by the Financial Superintendence of Colombia to provide this service.

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Within the investment valuation hierarchy process, other relevant aspects are taken into account, such as the issuer's rating, investment rating and the risk analysis of the issuer performed by the Ecopetrol Business Group.

#### 9.4 Credit rating

The following table reflects the credit quality of the issuers of other financial assets measured at fair value through profit or loss:

	2018	2017
A1	3,148,043	1,149,606
AAA	3,105,894	3,175,727
BRC1+	611,905	-
F1+	353,175	-
AA-	455,584	233,668
AA+	193,747	1,067,989
A+	161,160	175,767
A	80,334	300,179
AA	15,430	-
BBB+	18,731	-
BBB	-	21,835
BBB-	-	378,939
No rating available	235	915
	<b>8,144,238</b>	<b>6,504,625</b>

See credit risk policy in Note 28.2.2

#### 10. Taxes

##### 10.1 Current tax assets and liabilities

The balance of current tax assets and tax liabilities as of December 31, 2018 and 2017 is as follows:

	2018	2017
<b>Current tax assets</b>		
Income tax <sup>(1)</sup>	765,399	165,437
Credit tax balance <sup>(2)</sup>	54,350	234,410
Other taxes	211,558	225,527
	<b>1,031,307</b>	<b>625,374</b>
<b>Current tax liabilities</b>		
Income tax <sup>(1)</sup>	1,065,688	1,305,011
National tax and surcharge on gasoline	141,408	136,706
Carbon tax	48,520	51,383
Other taxes <sup>(3)</sup>	495,684	512,588
	<b>1,751,300</b>	<b>2,005,688</b>

(1) The main variation compared to the previous period corresponds to the favorable balance of the income tax that was generated by the anticipated voluntary payment made in November and December 2018 by Ecopetrol S.A., in accordance with the Decree 2146 of November 22, 2018 and the decrease in non-deductible expenses.

(2) Includes mainly the value added tax (VAT) receivable balance.

(3) Mainly includes VAT payable balances, industry and commerce tax and royalties and monetary compensations.

## 10.2 Income tax

In December 2016, the Colombian Congress adopted Law 1819, which introduced more changes to the Colombian tax system, applicable beginning in 2017 including the following aspects:

- a) A unified income tax rate was set, which will be 34% for 2017 and 33% for 2018 and subsequently.
- b) An income tax surtax for profits above COP\$800 million is set which will be 6% for 2017 and 4% for 2018.
- c) The income tax for tax free trade zone users will increase from 15% to 20% in 2017. The tax rate of companies located in a free trade zone with the legal stability agreement is 15% during term of the said agreement.
- d) The presumptive income rate will increase from 3% to 3.5% from 2017. Tax losses accumulated until December 31, 2016 that have not been compensated, are subject to may be carried forward in accordance to the formula provided in the article 290 of Law 1819/2016.
- e) For fiscal year 2018, the Ecopetrol Business Group has subsidiaries that are subject to a 37% income tax rate, subsidiaries in free trade zones that are subject to a 15% or 20% income tax rate depending upon whether or not they comply with the CEJ rules, and other subsidiaries that are subject to statutory income tax rates in the country where they are incorporated in.
- f) Depreciation and amortization methods and annual percentages are limited to the established in the tax rule and depends on the type of asset. For example, machinery and equipment depreciate at 10%, infrastructure (including pipelines) at 2.22% and vehicles and computers at 20%, among others.
- g) The cost of acquisition of exploration rights, geology and geophysics (G&G), exploratory drilling, etc., is capitalized for tax purposes until the technical and commercial feasibility of extracting the resource is achieved.
- h) Tax losses may be offset against ordinary net income obtained in the following 12 taxable years.
- i) Refinería de Cartagena, Bioenergy, Ecopetrol Costa Afuera and Andean Chemicals Ltd have tax losses generated between 2009 and 2017 to carry forward, for a net value of COP\$4,292,418 as of December 2018 and COP\$4,288,957 as of December 2017.

In 2018, tax losses without a deferred tax base expiration date amount to COP\$4,078,439 with a deferred tax of COP\$792,452, attributable to the Refinería de Cartagena, and COP\$47,803 attributable to Bioenergy.

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**Statute of limitations on review of tax returns**

Tax returns may be reviewed by the tax authorities for 6 years following the filing date and/or amendment, if the returns reflected tax losses.

Starting 2017, the statute of limitations covering tax returns is 3 years as of the date of expiration or as of the filing date, when these have been filed extemporaneously. With respect to transfer pricing, the statute of limitations is 6 years.

With respect to tax returns with favorable balances, the statute of limitations will be 3 years as of the filing date of the request for refunds or offsetting.

With regard to tax returns in which tax losses are carried forward, these will be considered determined after 6 years counted as of their filing date. With respect to tax returns where tax losses are calculated, the statute of limitations will be 12 years and if the losses are carried forward within the last 2 years of the 12-year period, the statute of limitations will be extended up to 3 additional years from the year of offsetting.

**Income tax expense**

The following is a detail of the income tax recognized in profit or loss for the years ended December 31, 2018, 2017 and 2016:

	<b>2018</b>	<b>2017</b>	<b>2016</b>
Current income tax	7,539,093	5,108,549	4,376,706
Deferred income tax	783,136	472,772	25,710
Adjustments to prior years' current and deferred tax	(63,744)	218,947	140,630
<b>Income tax expenses</b>	<b>8,258,485</b>	<b>5,800,268</b>	<b>4,543,046</b>

**Reconciliation of the income tax expenses**

The reconciliation between the income tax expenses and the tax determined based on the statutory tax rate applicable to the Ecopetrol Business Group in Colombia is as follows:

	<b>2018</b>	<b>2017</b>	<b>2016</b>
Net income before income tax	20,613,875	13,769,662	7,790,526
Statutory rate	37%	40%	40%
<b>Income tax at statutory rate</b>	<b>7,627,134</b>	<b>5,507,865</b>	<b>3,116,210</b>
ETR reconciliation items:			
Foreign currency translation and exchange difference	751,210	(186,787)	(234,316)
Effect Leon well (Ecopetrol America Inc.)	281,912	-	-
Effect in changes in tax rates and tax base	172,352	186,588	807,989
Non-deductible expenses	56,061	211,042	486,300
Non-deductible wealth tax	-	85,872	229,375
Prior years' current and deferred tax	(63,744)	218,947	140,630
Non-taxable income	(78,303)	(47,509)	(3,142)
Impairment of long-term assets	(128,461)	(175,750)	-
Effect of tax reform	(359,676)	-	-
<b>Income tax calculated</b>	<b>8,258,485</b>	<b>5,800,268</b>	<b>4,543,046</b>
Current	7,416,038	5,076,692	4,517,336
Deferred	842,447	723,576	25,710
	<b>8,258,485</b>	<b>5,800,268</b>	<b>4,543,046</b>

The effective tax rate as of December 31, 2018 is 40.1% (2017 - 42.1% and 2016 - 58.3%). The decrease compared to the previous year is mostly due to the following concepts: a) Decrease in the nominal rate 40% in 2017 to 37% in 2018; b) improvement of the results before taxes of the Ecopetrol Business Group; c) Effect for tax reform d) Adjustment for differential taxable bases; e) adjustment for differential tax rates of the Ecopetrol Business Group different from the nominal 37%, with a rate lower than the nominal rate; f) application of a lower rate for the long-term amortizable deferred tax asset; and g) elimination of wealth tax.



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Income and supplementary tax returns for taxable years 2011, 2012, 2014, 2015, 2016 and 2017 and CREE of the taxable years 2014, 2015 and 2016 of Ecopetrol Business Group companies are subject to acceptance and review by the tax authorities. Management of the Ecopetrol Business Group companies considers that the amounts recognized as liability for taxes payable are supported by the regulations, doctrine and case law applicable to any claim that could be eventually filed with respect to such years. The Ecopetrol Business Group's strategy is not making tax decisions based on aggressive or less-assured positions that could put into question its tax returns.

**Deferred income tax**

The following is the detail of the deferred tax balance as of December 31, 2018 and 2017:

	2018	2017
Deferred tax assets	3,879,427	4,016,161
Deferred tax liabilities	(1,337,943)	(1,333,280)
<b>Net deferred income tax</b>	<b>2,541,484</b>	<b>2,682,881</b>

The deferred income tax assets and liabilities as of December 31, 2018 and 2017, is as follows:

	2018	2017
<b>Deferred tax assets (liabilities)</b>		
Provisions <sup>(1)</sup>	1,994,762	1,840,988
Employee benefits <sup>(2)</sup>	1,161,860	1,373,561
Loss carry forwards <sup>(3)</sup>	1,002,062	611,766
Accounts payable	1,193,098	208,618
Accounts receivable	79,591	94,864
Property plant and equipment and Natural and environmental resources <sup>(4)</sup>	(2,304,140)	(1,006,299)
Goodwill	(404,394)	(408,932)
Investments and derivative instruments	(170,960)	(49,258)
Others	(10,395)	17,573
	<b>2,541,484</b>	<b>2,682,881</b>
Deferred tax assets	3,879,427	4,016,161
Deferred tax liabilities	(1,337,943)	(1,333,280)
	<b>2,541,484</b>	<b>2,682,881</b>

(1) The most representative item corresponds to the asset retirement obligation (ARO).

(2) Actuarial calculations for health, retirement pensions, education, pension bonds and other benefits to long-term employees.

(3) The increase is because of the tax reform that allows a greater recognition of deferred tax on tax losses and excess presumptive income in Refinería de Cartagena mainly.

(4) For tax purposes, natural and environmental resources and property, plant and equipment have a useful life and a depreciation and amortization calculation methodology different from those determined as per international accounting standards, within this item occasional gains of 10% is included, corresponding to lands. The main variation corresponds to the tax rate reduction from 33% to 30%.

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The following is the detail of the deferred tax assets (liabilities), net for the years ended December 31, 2018 and 2017:

	<b>Property plant and equipment and Natural resources</b>	<b>Provisions</b>	<b>Employee benefits</b>	<b>Loss carry forwards</b>	<b>Accounts payable</b>
<b>As of December 31, 2016</b>	<b>(220,315)</b>	<b>1,875,965</b>	<b>656,997</b>	<b>477,808</b>	<b>311,607</b>
Recognized in profit or loss	(785,984)	(34,977)	(22,818)	133,958	(102,989)
Recognized in OCI	-	-	739,382	-	-
<b>As of December 31, 2017</b>	<b>(1,006,299)</b>	<b>1,840,988</b>	<b>1,373,561</b>	<b>611,766</b>	<b>208,618</b>
Recognized in profit or loss	(1,297,841)	153,774	(178,160)	390,296	984,480
Recognized in OCI	-	-	(33,541)	-	-
<b>As of December 31, 2018</b>	<b>(2,304,140)</b>	<b>1,994,762</b>	<b>1,161,860</b>	<b>1,002,062</b>	<b>1,193,098</b>

	<b>Goodwill</b>	<b>Borrowings and other financial liabilities</b>	<b>Accounts receivable</b>	<b>Investments and derivative instruments and Others</b>	<b>Total</b>
<b>As of December 31, 2016</b>	<b>(345,288)</b>	<b>(113,497)</b>	<b>133,840</b>	<b>(168,806)</b>	<b>2,608,311</b>
Recognized in profit or loss	(63,644)	113,497	(38,976)	78,357	(723,576)
Recognized in OCI	-	-	-	58,764	798,146
<b>As of December 31, 2017</b>	<b>(408,932)</b>	<b>-</b>	<b>94,864</b>	<b>(31,685)</b>	<b>2,682,881</b>
Recognized in profit or loss	4,538	-	(15,273)	(884,261)	(842,447)
Recognized in OCI	-	-	-	734,591	701,050
<b>As of December 31, 2018</b>	<b>(404,394)</b>	<b>-</b>	<b>79,591</b>	<b>(181,355)</b>	<b>2,541,484</b>

The Ecopetrol Business Group offsets assets and liabilities for deferred taxes only if it has a legally enforceable right to offset current tax liabilities and assets; and in the case of deferred tax on assets and liabilities, to the extent that they also correspond to income taxes required by the same tax jurisdiction and the same tax authority.

Deferred tax assets related to the tax losses generated by the subsidiaries Bioenergy S.A. Ecopetrol Costa Afuera and Andean Chemicals Ltd for an amount of COP\$70,393, and excess presumptive income of Bioenergy SA, Ecopetrol Costa Afuera, Hocol Petroleum Company, Andean for an amount of COP\$31,863 were not recognized, as Management believes it is not likely that these deferred tax assets would be recoverable in the short term.

Deferred tax assets have been recognized for an amount of COP\$1,002,063 related to excesses of presumptive income and the accumulated tax losses of Refinería de Cartagena amount to COP\$948,671 and Bioenergy Zona Franca S.A.S. amount to COP\$53,392, as management expects these amounts will be realized in future periods.

The recognition of this deferred tax asset is supported with the tax projections and the elimination of presumptive income from the year 2021, contemplated in Law 1943/2018.

In accordance with the tax regulation applicable until December 31, 2016, excess presumptive income and minimum base excesses generated before 2017 in income and supplementary taxes and in income tax for equality – (CREE, as its acronym in Spanish) respectively, they may be compensated with the ordinary taxable income obtained by each Company within the following five years, using for this purpose, the formula established the article 290 of law 1819/ 2016.

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The movements of deferred income tax for the years ended December 31, 2018 and 2017 are as follows:

	2018	2017	2016
<b>Opening balance</b>	<b>2,682,881</b>	<b>2,608,311</b>	<b>2,213,422</b>
Deferred tax recognized in profit or loss <sup>(a)</sup>	(842,447)	(723,576)	(25,710)
Deferred tax recognized in other comprehensive income <sup>(b)</sup>	701,050	798,146	420,599
<b>Closing balance</b>	<b>2,541,484</b>	<b>2,682,881</b>	<b>2,608,311</b>

(a) This amount includes deferred income tax and adjustments to prior years'.

(b) The following is the detail of the income tax recorded in other comprehensive income:

<b>December 31, 2018</b>	<b>Pre-tax</b>	<b>Deferred Tax</b>	<b>After tax</b>
Actuarial valuation gains (losses)	(29,250)	33,540	4,290
Cash flow coverage for crude exports	2,258,734	(701,231)	1,557,503
Other	-	(33,359)	(33,359)
	<b>2,229,484</b>	<b>(701,050)</b>	<b>1,528,434</b>

<b>December 31, 2017</b>	<b>Pre-tax</b>	<b>Deferred Tax</b>	<b>After tax</b>
Actuarial valuation gains (losses)	2,251,656	(739,382)	1,512,274
Cash flow coverage for crude exports	80,896	(54,056)	26,840
Other	12,119	(4,708)	7,411
	<b>2,344,671</b>	<b>(798,146)</b>	<b>1,546,525</b>

<b>December 31, 2016</b>	<b>Pre-tax</b>	<b>Deferred tax</b>	<b>After tax</b>
Actuarial valuation gains (losses)	1,770,139	(616,697)	1,153,442
Cash flow hedging for future crude oil exports	(537,353)	220,596	(316,757)
Derivative financial instruments	(56,804)	22,722	(34,082)
Other	-	(47,220)	(47,220)
	<b>1,175,982</b>	<b>(420,599)</b>	<b>755,383</b>

**Deferred tax assets (liabilities) not recognized**

As of December 31, 2018, deferred tax assets are not recognized on the difference between the accounting and tax basis associated with the investments in associates and joint ventures of Ecopetrol (Base: COP\$2,981,901 million - Tax: COP\$298,190 million), as the Ecopetrol Business Group does not have any intention to sell any of these investments in the foreseeable future.

**10.3 Other taxes**

**10.3.1 Tax on dividends**

Dividends related to profits generated from the year ended December 31, 2017, will be subject to withholding at a rate of 5%. Further, if the earnings against which the dividends are distributed were not subject to corporate tax, said dividends are taxable by the income tax applicable during the distribution period (for 2018 the rate is 35%). In this scenario, the 5% tax on dividends will be applicable to the distributed amount, once it is reduced with the 35% income tax rate.

The non-taxed dividends that the Company will receive will not be subject to withholding tax due to the express provision of the regulation that establishes the dividends that are distributed within the business groups duly registered with the Chamber of Commerce and decentralized entities, they will not be subject to the retention at the source for this concept.

There are no effects on income tax related to dividend payments made by the Company to its shareholders during 2018 and 2017.

### 10.3.2 Transfer prices

According to the Colombian tax law, income taxpayers who enter into transactions with related parties or related parties located in foreign jurisdictions and in free trade zones or with residents located in jurisdictions considered tax havens, are obliged to determine their ordinary and extraordinary income for purposes of the income and supplementary tax, its costs and deductions, considering for these operations the arm's length principle.

Ecopetrol submitted its transfer pricing informative return for the 2017 taxable year and its corresponding supporting documentation, as well as the country by country notification for the years 2016 and 2017 and the master file for the year 2017, in accordance with current tax regulations.

For fiscal year 2018, the transactions performed with related parties in foreign jurisdictions, as well as the business conditions under which said operations were carried out and the general structure, did not vary significantly with respect to the previous year. For this reason, it is possible to infer that these transactions were carried out in accordance with the arm's length principle. It is estimated that there will be no need for adjustments derived from the analysis of transfer prices for 2018, which imply changes in the income provision of the taxable year 2018.

### 10.3.3 Value added tax (VAT)

General VAT rate is 19% and a differential rate of 5% for certain goods and services is maintained. The modification on the general rate is effective from January 1st, 2017.

VAT taxable event is expanded to all goods in general, including intangible goods (related to intellectual property) and real estate property (unless provided otherwise).

Fixed assets are still not levied with VAT, except for real estate property for residential use, automobile and other fixed assets sold on the ordinary course of business in the name and on behalf of third parties. For this purposes, real estate has been excluded unless the value of the first sale is higher than 26.800 tax value unit ("UVT" by its acronyms in Spanish), approximately COP \$854 million, which will be taxed at a 5% rate.

Unless expressly excluded, services rendered from abroad will be levied with VAT. The assignment of rights is included as a form of service.

Periods for filing VAT returns and payments will be only two, bimonthly and quarterly. The statute of limitations for the request of VAT credit tax balance is increased to three bimonthly periods following the period of causation.

### 10.3.4 Wealth tax

Law 1739 of 2014 established the wealth tax for natural and legal persons whose possession as of January 1, 2015 exceeds COP\$1,000. The taxable base for legal persons is the value of the gross equity owned as of January 1, 2015, 2016, and 2017 minus the current liabilities outstanding at the same dates.

The applicable rate will depend on the taxable base of each taxpayer and the value paid will not be deductible or deductible in the income tax and complementary or in the income tax for equity - CREE, nor can they be compensated with these or with other taxes.

For the year 2018 and following, there is no wealth tax, in the case of domestic companies. During 2017, the tax on wealth paid by the Ecopetrol Business Group amounted to COP\$226,778, which was recognized as an expense for the year.

**10.4 Tax reform**

The Government issued the Law 1943/2018, which makes numerous changes to the Colombian tax rules. The Tax Reform reduces the corporate income tax (CIT) rate from 33% in 2018 to 32% for 2020, 31% for 2021 and 30% for 2022 and onwards.

The presumptive income tax rate (i.e., an alternative tax based on a percentage of the net equity of the last year) is reduced from 3.5% to 1.5% in 2019 and 2020 and 0% for 2021 and onwards.

The thin capitalization rule ratio is modified from 3:1 (which includes all debt that generates interest with local and foreign entities, related or unrelated) to a 2:1 ratio that only considers debt transactions involving related local and foreign parties (including back-to-back transactions involving foreign third parties).

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Dividend tax

The Tax Reform increases the dividend tax on distributions to foreign nonresident entities and individuals from 5% to 7.5%. In addition, the Tax Reform establishes a 7.5% dividend tax on distributions between Colombian companies. The tax will be charged only on the first distribution of dividends between Colombian entities and may be credited against the dividend tax due once the ultimate Colombian company makes a distribution to its shareholders (nonresident shareholders (entities or individuals) or to Colombian individual residents). The dividend tax on local distributions does not apply if the Colombian companies are part of a registered economic group, or the distribution is to a Colombian entity qualifying for the new Colombian holding company (CHC) regime.

Normalization tax

The Tax Reform establishes a tax amnesty to “normalize” (i) unreported assets; or (ii) nonexistent liabilities that were included on a tax return. The amnesty will apply only for 2019 (25 September 2019 is the due date for filing the normalization tax). The applicable tax rate is 13% of the value of the unreported assets or nonexistent liabilities. For money that is repatriated to Colombia before December 31, 2019, and kept in the country for two years, the tax rate is reduced to 6.5%. The normalization tax has a far-reaching scope and applies to assets in private foundations, assets in trusts, insurance with savings components, investment funds and other fiduciary business activities.

Value Added Tax (VAT)

Concerning VAT, changes have been made to the list of goods and services excluded from VAT as set forth in Articles 424, 426 and 476 of the Tax Code, adding Article 437 to the Tax Code, with regard to guidelines on compliance with formal duties concerning VAT by service providers abroad, and it has been noted that VAT withholding may be up to 50% of the tax amount, subject to regulation by the National Government. The VAT rate remains at 19%.

Tax procedure

With regards to procedure, changes have been made: (i) declarations for withholding at source which, that being inefficient, will be enforceable, (ii) electronic notification of administrative actions; (iii) payment of the entire amount covered by a statement of objections to avoid delinquent interest at the current rate plus two points; and (iv) elimination of the extension of enforcement to three (3) additional years to offset tax losses.

Additionally, an audit benefit was included for fiscal years 2019 to 2020. Under this benefit, private settlement by taxpayers of income tax and supplements that increase net income tax by a minimum of at least 30% or 20% over the net income tax of the immediately preceding year shall be considered firm for six (6) or twelve (12) months, respectively after the date of presentation if not notified of a deadline for correction or special requirement, or a special deadline or provisional settlement, provided that the return is filed timely and the payment is made within the established deadlines.

The above benefit does not apply to: (i) taxpayers who enjoy tax benefits due to their location in a specified geographic region; (ii) if it is demonstrated that declared withholdings at source are non-existent; (iii) if the net income tax is less than 71 UVT (COP\$2,433,170). The deadline stipulated in this law does not extend to declarations of withholdings at source nor to the sales tax, which shall be established by the general regulation.

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**11. Other assets**

The balance as of December 31, 2018 and 2017 of other assets is as follows:

	2018	2017
<b>Current</b>		
Partners in joint operations <sup>(1)</sup>	519,460	583,656
Advanced payments to contractors and suppliers	221,767	103,762
Prepaid expenses	191,168	115,866
Related parties (Note 29)	19,214	7,716
Other assets	68,819	69,425
	<b>1,020,428</b>	<b>880,425</b>
<b>Non-current</b>		
Abandonment and pension funds <sup>(2)</sup>	392,084	323,621
Employee benefits	213,645	202,012
Trust funds	147,471	32,748
Advanced payments and deposits	61,556	74,225
Judicial deposits and attachments	43,137	43,248
Other assets	2,837	5,155
	<b>860,730</b>	<b>681,009</b>

- (1) Corresponds to the net amount of cash calls and cutbacks generated in relation to the operations carried out with partners through Exploration and Production (E&P) contracts, Technical Evaluations (TEA) contracts and agreements entered in to with the National Hydrocarbons Agency (ANH), as well as through association contracts and other types of contracts.
- (2) Corresponds to Ecopetrol's share in trusts established to support costs of abandonment of wells and dismantling of facilities, as well as the payment of future retirement pensions in some association contracts.

**12. Investments in associates and joint ventures**

The details on the participations, economic activity, address, area of operations and financial information of the investments in joint ventures and associates can be found in Exhibit 1.

**12.1 Composition and movements**

	2018	2017
<b>Investment in joint ventures</b>		
Equion Energy Limited	1,364,933	1,057,466
Offshore International Group	727,194	845,325
Ecodiesel Colombia SA	41,304	38,383
	<b>2,133,431</b>	<b>1,941,174</b>
Less impairment:		
Equion Energy Limited	(187,636)	(296,427)
Offshore International Group	(346,121)	(539,465)
	<b>1,599,674</b>	<b>1,105,282</b>
<b>Investments in associates</b>		
Invercolsa S.A.	243,294	223,963
Serviport S.A.	11,212	9,905
Sociedad Portuaria de Olefinas y Derivados S.A.	1,368	1,214
	<b>255,874</b>	<b>235,082</b>
Less impairment: Serviport S.A.	(11,212)	(9,904)
	<b>244,662</b>	<b>225,178</b>
	<b>1,844,336</b>	<b>1,330,460</b>

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The following is the movement of investments in associates and joint ventures:

For the year ended December 31, 2018:

	Associates	Joint ventures	Total
<b>Opening balance</b>	<b>225,178</b>	<b>1,105,282</b>	<b>1,330,460</b>
Effects of equity method through:			
Profit or loss	105,908	59,928	165,836
Other comprehensive income	1,731	135,831	137,562
Dividends declared	(86,847)	(3,503)	(90,350)
Impairment (Note 16.1.2)	(1,308)	302,136	300,828
<b>Closing balance</b>	<b>244,662</b>	<b>1,599,674</b>	<b>1,844,336</b>

For the year ended December 31, 2017:

	Associates	Joint ventures	Total
<b>Opening balance</b>	<b>249,537</b>	<b>1,303,157</b>	<b>1,552,694</b>
Effects of equity method through:			
Profit or loss	46,669	46,869	93,538
Other comprehensive income	-	(14,752)	(14,752)
Dividends declared	(61,124)	(224,837)	(285,961)
Impairment (Note 16.1.2)	(9,904)	(5,155)	(15,059)
<b>Closing balance</b>	<b>225,178</b>	<b>1,105,282</b>	<b>1,330,460</b>

For the year ended December 31, 2016:

	Associates	Joint ventures	Total
<b>Opening balance</b>	<b>69,516</b>	<b>1,862,418</b>	<b>1,931,934</b>
Effects of equity method through:			
Profit or loss	48,299	13,046	61,345
Other comprehensive income	173,772	(49,127)	124,645
Dividends declared	(42,050)	(384,787)	(426,837)
Impairment (Note 16.1.2)	-	(127,858)	(127,858)
Reclassifications	-	(10,535)	(10,535)
<b>Closing balance</b>	<b>249,537</b>	<b>1,303,157</b>	<b>1,552,694</b>

## 12.2 Restrictions on investments

Regarding the legal process related to the shares of Inversiones de Gases de Colombia S.A. acquired by Fernando Londoño in 1997, Ecopetrol as of the date of this report exercises rights over 11.59% (of the 20.11% that was acquired by Fernando Londoño) and Arrendadora Financiera Internacional Bolivariana (AFIB) exercises them over 8.52%, participation that was protected by the Constitutional Court through an action for the protection of a fundamental right and that are in judicial discussion in the ordinary process, at the place of cassation.



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**12.3 Additional information about associates and joint ventures**

The following is the breakdown of assets, liabilities and results of the two main investments in associates and joint ventures, Equion Energy Limited and the Offshore International Group, as of December 31, 2018 and 2017:

	2018		2017	
	Equion Energy Limited	Offshore International Group	Equion Energy Limited	Offshore International Group
<b>Statement of financial position</b>				
Current assets	2,083,614	354,959	909,927	289,618
Non-current assets	484,336	1,523,549	955,849	1,568,395
<b>Total assets</b>	<b>2,567,950</b>	<b>1,878,508</b>	<b>1,865,776</b>	<b>1,858,013</b>
Current liabilities	550,933	221,606	430,130	192,513
Non-current liabilities	77,331	885,410	98,835	657,746
<b>Total liabilities</b>	<b>628,264</b>	<b>1,107,016</b>	<b>528,965</b>	<b>850,259</b>
<b>Equity</b>	<b>1,939,686</b>	<b>771,492</b>	<b>1,336,811</b>	<b>1,007,754</b>
<b>Other complementary information</b>				
Cash and cash equivalents	185,762	96,592	170,618	32,490
Current financial liabilities	3,176	95,633	2,256	97,960
Non-current financial liabilities	–	137,708	2,921	214,259

	2018		2017		2016	
	Equion Energy Limited	Offshore International Group	Equion Energy Limited	Offshore International Group	Equion Energy Limited	Offshore International Group
<b>Statement of profit or loss</b>						
Sales revenue	1,490,177	653,054	1,213,692	393,210	1,204,301	379,811
Costs	(755,656)	(585,192)	(793,999)	(508,461)	(969,318)	(502,107)
Administrative expenses and others	29,136	(353,010)	12,188	(103,340)	(44,810)	(221,238)
Financial income (expenses)	(3,659)	(21,227)	2,373	(20,264)	59,143	(12,010)
Income tax	(338,487)	(16,594)	(180,546)	60,575	30,199	107,507
<b>Financial year results</b>	<b>421,511</b>	<b>(322,969)</b>	<b>253,708</b>	<b>(178,280)</b>	<b>279,515</b>	<b>(248,037)</b>
<b>Other comprehensive results</b>	<b>1,095,090</b>	<b>–</b>	<b>913,728</b>	<b>–</b>	<b>935,847</b>	<b>–</b>
<b>Other complementary information</b>						
Dividends paid to the Ecopetrol Business Group	–	–	217,075	–	375,035	–
Depreciation and amortization	511,615	243,601	557,970	232,953	678,488	228,250

This is a reconciliation of equity of the significant investments and the carrying amount of investments as of December 31:

	2018		2017	
	Equion Energy Limited	Offshore International Group	Equion Energy Limited	Offshore International Group
<b>Equity of the joint venture</b>	<b>1,939,686</b>	<b>771,492</b>	<b>1,336,811</b>	<b>1,007,754</b>
% of Ecopetrol's ownership	51%	50%	51%	50%
Ecopetrol's ownership	989,240	385,746	681,773	503,877
Additional value of the investment	375,693	341,448	375,693	341,448
Impairment	(187,636)	(346,121)	(296,427)	(539,465)
<b>Carrying amount of the investment</b>	<b>1,177,297</b>	<b>381,073</b>	<b>761,039</b>	<b>305,860</b>

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**13. Property, plant and equipment**

The following shows a breakdown of the changes in property, plant and equipment and depreciation and impairment for the years ended December 31, 2018 and 2017:

	<u>Plant and equipment</u>	<u>Pipelines, networks and lines</u>	<u>Work in progress(1)</u>	<u>Buildings</u>	<u>Lands</u>	<u>Other</u>	<u>Total</u>
<b>Cost</b>							
<b>Balance as of December 31, 2017</b>	<b>42,561,894</b>	<b>32,000,049</b>	<b>3,866,318</b>	<b>7,618,586</b>	<b>3,839,355</b>	<b>2,806,696</b>	<b>92,692,898</b>
Additions/capitalizations	1,196,520	944,797	993,817	147,005	14,909	5,881	3,302,929
Increase in abandonment costs	85,580	209,028	-	-	-	-	294,608
Capitalized financial interests (2)	48,351	34,399	14,853	14,350	6,703	5,316	123,972
Exchange differences capitalized	4,107	2,922	1,262	1,219	569	451	10,530
Disposals	(135,468)	(112,171)	(14,723)	(11,997)	(9,763)	(56,734)	(340,856)
Foreign currency translation	2,324,744	849,868	32,585	100,091	124,903	55,983	3,488,174
Transfers (3)	388,641	420,391	(269,409)	(16,976)	7,900	28,209	558,756
<b>Balance as of December 31, 2018</b>	<b>46,474,369</b>	<b>34,349,283</b>	<b>4,624,703</b>	<b>7,852,278</b>	<b>3,984,576</b>	<b>2,845,802</b>	<b>100,131,011</b>
<b>Accumulated depreciation and impairment losses</b>							
<b>Balance as of December 31, 2017</b>	<b>(14,779,973)</b>	<b>(12,461,626)</b>	<b>(553,420)</b>	<b>(2,668,562)</b>	<b>(39,522)</b>	<b>(785,421)</b>	<b>(31,288,524)</b>
Depreciation expense	(2,008,348)	(1,465,429)	-	(347,510)	-	(123,792)	(3,945,079)
(Losses) recoveries of impairment (Nota 16)	(752,534)	(311,080)	55,979	(64,279)	5,220	(16,591)	(1,083,285)
Disposals	116,225	84,217	-	8,996	-	40,957	250,395
Foreign currency translation	(677,901)	(313,311)	-	(27,782)	-	(23,804)	(1,042,798)
Transfers (3)	117,115	(310,561)	-	(23,386)	-	(4,905)	(221,737)
<b>Balance as of December 31, 2018</b>	<b>(17,985,416)</b>	<b>(14,777,790)</b>	<b>(497,441)</b>	<b>(3,122,523)</b>	<b>(34,302)</b>	<b>(913,556)</b>	<b>(37,331,028)</b>
<b>Net balance as of December 31, 2017</b>	<b>27,781,921</b>	<b>19,538,423</b>	<b>3,312,898</b>	<b>4,950,024</b>	<b>3,799,833</b>	<b>2,021,275</b>	<b>61,404,374</b>
<b>Net balance as of December 31, 2018</b>	<b>28,488,953</b>	<b>19,571,493</b>	<b>4,127,262</b>	<b>4,729,755</b>	<b>3,950,274</b>	<b>1,932,246</b>	<b>62,799,983</b>

- (1) The balance of work in progress as of December 31, 2018, mainly includes the works executed in production by facilities of the Castilla field, facilities in Cupiagua, air injection pilot facilities in the Chichimene field and secondary recovery of Yarigui, and in refining by the modernization project of Barrancabermeja.
- (2) Financial interests are capitalized based on the weighted average rate of borrowing costs. See Note 18 - Loans and financing.
- (3) Transfers corresponds mainly to: i) recognition of financial leasing contracts, ii) transfers from natural resources and the environment.

**Guarantees**

The Esperanza 1 and 2 farms were pledged as guarantee for the loan obtained by Bioenergy S.A.S. for the financing of the project (see Note 18.6 – Guarantees and covenants).

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	Plant and equipment	Pipelines, networks and lines	Work in progress <sup>(1)</sup>	Buildings	Lands	Other	Total
<b>Cost</b>							
<b>Balance as of December 31, 2016</b>	<b>42,608,276</b>	<b>29,087,782</b>	<b>4,874,406</b>	<b>6,911,757</b>	<b>3,894,220</b>	<b>3,482,439</b>	<b>90,858,880</b>
Additions/capitalizations	904,854	876,940	(102)	363,836	14,631	203,124	2,363,283
Increase in abandonment costs	51,619	105,097	-	-	-	-	156,716
Capitalized financial interests	38,847	33,875	8,501	6,941	1,027	20,113	109,304
Exchange differences capitalized	2,636	2,299	577	471	70	672	6,725
Disposals	(67,326)	(56,147)	(26,991)	(6,539)	(23)	(2,727)	(159,753)
Foreign currency translation	(136,501)	(49,800)	(13,302)	(4,904)	(7,850)	(3,394)	(215,751)
Transfers <sup>(2)</sup>	(840,511)	2,000,003	(976,771)	347,024	(62,720)	(893,531)	(426,506)
<b>Balance as of December 31, 2017</b>	<b>42,561,894</b>	<b>32,000,049</b>	<b>3,866,318</b>	<b>7,618,586</b>	<b>3,839,355</b>	<b>2,806,696</b>	<b>92,692,898</b>
<b>Accumulated depreciation and impairment losses</b>							
<b>Balance as of December 31, 2016</b>	<b>(15,511,995)</b>	<b>(9,965,554)</b>	<b>(262,597)</b>	<b>(2,088,478)</b>	<b>(26,852)</b>	<b>(674,902)</b>	<b>(28,530,378)</b>
Depreciation expense	(1,996,614)	(1,479,792)	-	(416,698)	-	(106,878)	(3,999,982)
Recovery (losses) for impairment (Note 16)	1,014,613	316,360	(372,804)	11,538	(7,794)	16,006	977,919
Disposals	54,244	13,464	-	807	-	2,583	71,098
Foreign currency translation	15,166	32,729	-	3,929	-	3,802	55,626
Transfers <sup>(2)</sup>	1,644,613	(1,378,833)	81,981	(179,660)	(4,876)	(26,032)	137,193
<b>Balance as of December 31, 2017</b>	<b>(14,779,973)</b>	<b>(12,461,626)</b>	<b>(553,420)</b>	<b>(2,668,562)</b>	<b>(39,522)</b>	<b>(785,421)</b>	<b>(31,288,524)</b>
Net balance as of December 31, 2016	<u>27,096,281</u>	<u>19,122,228</u>	<u>4,611,809</u>	<u>4,823,279</u>	<u>3,867,368</u>	<u>2,807,537</u>	<u>62,328,502</u>
<b>Net balance as of December 31, 2017</b>	<b><u>27,781,921</u></b>	<b><u>19,538,423</u></b>	<b><u>3,312,898</u></b>	<b><u>4,950,024</u></b>	<b><u>3,799,833</u></b>	<b><u>2,021,275</u></b>	<b><u>61,404,374</u></b>

(1) The balance of work in progress as of December 31, 2017, mainly includes investments in production at the Castilla field, the integral plan of electrical energy and secondary recovery of Yarigui and the modernization project of the Barrancabermeja refinery.

(2) Correspond mainly to transfers to: a) inventory of project materials for use in the operation for COP\$250,239, b) classification of the intangible part of projects to natural resources for COP\$7,222 and c) others for COP\$31,852.

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**14. Natural and environmental resources**

The following is the movement of natural resources and amortization and impairment for the years ended December 31, 2018 and 2017:

	Oil investments	Asset retirement cost	Exploration and evaluation <sup>(1)</sup>	Total
<b>Cost</b>				
<b>Balance as of December 31, 2017</b>	<b>50,183,858</b>	<b>2,215,263</b>	<b>4,508,808</b>	<b>56,907,929</b>
Additions/capitalizations	3,579,982	(27,839)	1,499,685	5,051,828
Acquisition of interests in joint operations (2)	(12,065)	-	-	(12,065)
Increase in abandonment costs	-	733,609	34,063	767,672
Disposals	(79)	(2,080)	(87,953)	(90,112)
Dry wells (3)	(1,563)	-	(897,361)	(898,924)
Capitalized financial interests (4)	70,186	-	6,675	76,861
Exchange differences capitalized	5,961	-	567	6,528
Foreign currency translation	773,678	24,574	75,203	873,455
Transfers	(663,917)	(24,381)	(333,687)	(1,021,985)
<b>Balance as of December 31, 2018</b>	<b>53,936,041</b>	<b>2,919,146</b>	<b>4,806,000</b>	<b>61,661,187</b>
<b>Accumulated amortization and impairment losses</b>				
<b>Balance as of December 31, 2017</b>	<b>(34,014,963)</b>	<b>(1,584,701)</b>	<b>-</b>	<b>(35,599,664)</b>
Depletion expense	(3,471,803)	(196,286)	-	(3,668,089)
Recovery (losses) for impairment (Nota 16)	414,208	(106)	-	414,102
Disposals	79	-	-	79
Foreign currency translation	(563,229)	(19,080)	-	(582,309)
Transfers	829,041	21,103	-	850,144
<b>Balance as of December 31, 2018</b>	<b>(36,806,667)</b>	<b>(1,779,070)</b>	<b>-</b>	<b>(38,585,737)</b>
Net balance as of December 31, 2017	16,168,895	630,562	4,508,808	21,308,265
<b>Net balance as of December 31, 2018</b>	<b>17,129,374</b>	<b>1,140,076</b>	<b>4,806,000</b>	<b>23,075,450</b>

- (1) The balance of oil investments in progress includes mainly investments made in the Purple Angel, Tayrona and unconventional hydrocarbons projects. In the developing fields, the most representative correspond to Castilla, Chichimene pilot and CPO09 re sanction.
- (2) Adjustment in the acquisition value of the participation of MCX Exploration USA LLC (see note 30.3).
- (3) Includes dry wells: 1) Ecopetrol America Inc: Leon 2) Hocol: Payero, Bonifacio, Pegaso-1 and Ocelote.
- (4) Borrowing costs are capitalized at the weighted average rate of borrowing costs. See Note 18 - Loans and financing.

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<b>Cost</b>	<b>Oil investments</b>	<b>Asset retirement cost</b>	<b>Exploration and evaluation<sup>(1)</sup></b>	<b>Total</b>
<b>Balance as of December 31, 2016</b>	<b>47,079,096</b>	<b>2,304,915</b>	<b>4,818,124</b>	<b>54,202,135</b>
Additions/capitalizations	2,422,203	59,345	944,857	3,426,405
Acquisition of interests in joint operations (Note 30.3)	141,950	-	-	141,950
Adjustment to fair value of participation in joint operations (Note 30.3)	451,095	-	-	451,095
Increase (decrease) in abandonment costs	224	(143,241)	25,935	(117,082)
Disposals	(38,072)	(629)	(214,850)	(253,551)
Dry wells <sup>(2)</sup>	-	-	(898,264)	(898,264)
Capitalized financial interests	72,395	-	9,952	82,347
Exchange differences capitalized	4,913	-	675	5,588
Foreign currency translation	(62,446)	(573)	(14,504)	(77,523)
Transfers <sup>(3)</sup>	112,500	(4,554)	(163,117)	(55,171)
<b>Balance as of December 31, 2017</b>	<b>50,183,858</b>	<b>2,215,263</b>	<b>4,508,808</b>	<b>56,907,929</b>
<b>Accumulated amortization and impairment losses</b>				
<b>Balance as of December 31, 2016</b>	<b>(30,470,415)</b>	<b>(1,390,673)</b>	<b>-</b>	<b>(31,861,088)</b>
Depletion expense	(3,979,179)	(194,140)	-	(4,173,319)
Recovery (losses) for impairment (Note 16)	376,934	-	-	376,934
Disposals	37,808	290	-	38,098
Foreign currency translation	42,114	245	-	42,359
Transfers <sup>(3)</sup>	(22,225)	(423)	-	(22,648)
<b>Balance as of December 31, 2017</b>	<b>(34,014,963)</b>	<b>(1,584,701)</b>	<b>-</b>	<b>(35,599,664)</b>
Net balance as of December 31, 2016	16,608,681	914,242	4,818,124	22,341,047
<b>Net balance as of December 31, 2017</b>	<b>16,168,895</b>	<b>630,562</b>	<b>4,508,808</b>	<b>21,308,265</b>

- (1) The balance of exploration and evaluation includes mainly investments made in the Purple Angel, Tayrona and unconventional hydrocarbons projects and in the developing fields, Piedemonte, Castilla y Tibú.
- (2) Includes mainly dry wells in operation of: 1) Ecopetrol S.A. for (COP\$450,524): Kronos, Brama, Catfish and Venus, among others, 2) Ecopetrol America Inc for (COP\$312,684): Warrior # 2 and Parmer and 3) Ecopetrol Costa Afuera for (COP\$57,877): Molusco.
- (3) Corresponds mainly to transfers to property, plant and equipment.

#### Accounting for suspended exploratory wells

The following table shows the classification by age, from the completion date, of the exploratory wells that are suspended as of December 31, 2018, 2017 and 2016:

	<b>2018</b>	<b>2017</b>	<b>2016</b>
Between 1 and 3 years <sup>(a)</sup>	496,871	600,767	1,300,874
Between 3 and 5 years <sup>(b)</sup>	375,371	791,261	197,997
More than 5 years <sup>(c)</sup>	273,764	250,219	153,552
Total suspended exploratory wells	<b>1,146,006</b>	<b>1,642,247</b>	<b>1,652,423</b>
Number of projects exceeding 1 year	24	24	24
Wells under 1 year of suspension	9,511	2,480	528,313

- (a) As of December 2018, suspended exploratory wells correspond mainly to Ecopetrol: Purple Angel, Caronte and discovery wells of Ecopetrol America Inc: Warrior 1. As of December 31, 2017 suspended exploratory wells correspond mainly to discovery wells of Ecopetrol America Inc: Leon 2 and Warrior 1, which were under evaluation.
- (b) For 2018, the balance corresponds mainly to wells of Ecopetrol S.A.: Orca 1, Tiribita 1A and Tiribita 3, which are under evaluation.
- (c) Correspond mainly to i) Ecopetrol S.A.: Quifa, Purple Angel-1 and Gordon-1, which are under evaluation; and ii) Offshore International Group, temporarily abandoned for future production plans.

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15. **Intangible assets**

The following is the movement of intangibles and their amortization and impairment for the years ended December 31, 2018 and 2017:

	Licenses and software	Other intangibles <sup>(1)</sup>	Total
<b>Cost</b>			
<b>Balance as of December 31, 2017</b>	<b>960,556</b>	<b>168,552</b>	<b>1,129,108</b>
Acquisitions	69,442	36,227	105,669
Disposals	(46,007)	(5,643)	(51,650)
Foreign currency translation	25,339	2,955	28,294
Transfers	6,390	(4,808)	1,582
<b>Balance as of December 31, 2018</b>	<b>1,015,720</b>	<b>197,283</b>	<b>1,213,003</b>
<b>Accumulated amortization</b>			
<b>Balance as of December 31, 2017</b>	<b>(665,415)</b>	<b>(83,467)</b>	<b>(748,882)</b>
Amortization of the period	(75,818)	(15,864)	(91,682)
Disposals	46,004	5,546	51,550
Foreign currency translation	(20,501)	(184)	(20,685)
Transfers	3,401	4,042	7,443
<b>Balance as of December 31, 2018</b>	<b>(712,329)</b>	<b>(89,927)</b>	<b>(802,256)</b>
Net balance as of December 31, 2017	295,141	85,085	380,226
<b>Net balance as of December 31, 2018</b>	<b>303,391</b>	<b>107,356</b>	<b>410,747</b>
<b>Useful life</b>	<b>&lt;5 years</b>	<b>&lt;7 years</b>	

	Licenses and software	Other intangibles <sup>(1)</sup>	Total
<b>Cost</b>			
<b>Balance as of December 31, 2016</b>	<b>784,320</b>	<b>138,982</b>	<b>923,302</b>
Acquisitions	169,545	6,323	175,868
Disposals	(9,469)	–	(9,469)
Foreign currency translation	(1,414)	(92)	(1,506)
Transfers	17,574	23,339	40,913
<b>Balance as of December 31, 2017</b>	<b>960,556</b>	<b>168,552</b>	<b>1,129,108</b>
<b>Accumulated amortization</b>			
<b>Balance as of December 31, 2016</b>	<b>(583,680)</b>	<b>(67,490)</b>	<b>(651,170)</b>
Amortization of the period	(89,216)	(18,830)	(108,046)
Disposals	8,744	–	8,744
Foreign currency translation	979	–	979
Transfers	(2,242)	2,853	611
<b>Balance as of December 31, 2017</b>	<b>(665,415)</b>	<b>(83,467)</b>	<b>(748,882)</b>
Net balance as of December 31, 2016	200,640	71,492	272,132
<b>Net balance as of December 31, 2017</b>	<b>295,141</b>	<b>85,085</b>	<b>380,226</b>
<b>Useful life</b>	<b>&lt;5 years</b>	<b>&lt;7 years</b>	

(1) Corresponds mainly to easements.

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**16. Impairment of non-financial assets**

As mentioned in Note 4.12, each year the Ecopetrol Business Group assesses whether there is an indication that an asset or cash-generating unit may be impaired or if impairment losses recognized in previous periods should be reversed (except for goodwill impairment losses).

The impairment of non-financial assets includes property, plant and equipment and natural resources, investments in companies, goodwill and other non-current assets. The Ecopetrol Business Group is exposed to future risks derived mainly from variations in: (i) the estimate of future oil prices, (ii) refining margins and profitability, (iii) cost profile, (iv) investments and maintenance expenses, (v) amounts of recoverable reserves, (vi) market and country risk assessments reflected in the discount rate and (vii) changes in domestic and international regulations, among others.

Any changes in the above estimates used to calculate the recoverable amount of a non-current asset can have a material impact on the recognition impairment losses or reversals (other than goodwill impairment losses) in the profit or loss. Highly sensitive significant estimates affecting each business segments, among others include: (i) in the exploration and production segment, variations of recoverable hydrocarbon estimates, changes in projected realization prices and discount rate; (ii) in the refining segment, changes in finished products and crude oil prices, discount rate, refining margins, changes in environmental regulations, cost structure and the level of capital expenditures; and (iii) in the transport and logistics segment, changes in regulated tariffs and transported volumes.

Based on the impairment tests conducted by the Ecopetrol Business Group, the following are the impairment (losses) or reversals for the years ended on December 31, 2018, 2017 and 2016 are presented:

<b>(Impairment loss) reversal of impairment by segment</b>	<b>2018</b>	<b>2017</b>	<b>2016</b>
Exploration and Production	785,940	183,718	(196,448)
Refining and Petrochemicals	(984,704)	1,067,965	(773,361)
Transport and Logistics	(169,870)	59,455	41,062
	<b>(368,634)</b>	<b>1,311,138</b>	<b>(928,747)</b>
<b>Recognized in:</b>			
Property, plant and equipment (Note 13)	(1,083,285)	977,919	(561,738)
Natural resources (Note 14)	414,102	376,934	(239,151)
Investment in joint ventures and associates (Note 12)	300,828	(15,059)	(127,858)
Other non-current assets	(279)	(28,656)	-
	<b>(368,634)</b>	<b>1,311,138</b>	<b>(928,747)</b>

**16.1 Exploration and production**

The impairment (loss) reversal of assets of the Exploration and Production segment for the years ended December 31 of 2018, 2017 and 2016 is as follows:

	<b>2018</b>	<b>2017</b>	<b>2016</b>
Oilfields	483,803	188,873	(68,590)
Investment in joint ventures (Note 12)	302,136	(5,155)	(127,858)
Other	1	-	-
	<b>785,940</b>	<b>183,718</b>	<b>(196,448)</b>

**16.1.1 Oilfields**

In 2018, based on new market variables, incorporation of new reserves, Ecopetrol's crude oil basket price discounts as compared to the ICE Brent crude price, available technical and operational information, there was a partial reversal of an impairment recognized in previous years for the oil fields that operate in Colombia Casabe, Provincia, Underriver, Tisquirama and Orito and in fields operated abroad Gunflint and K2, and an impairment mainly in Tibú and Dina Norte fields.

In 2017, based on new market variables, incorporation of new reserves, Ecopetrol's crude oil basket price discounts as compared to the ICE Brent crude price, available technical and operational information, there was a partial reversal of an impairment recognized in previous years for the oil fields that operate in Colombia CPO09, Casabe and Oripaya and in fields operated abroad Gunflint Dalmatian and K2, and an impairment in the Tibú, Underriver, Provincia and Orito fields, mainly.

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In 2016, as a result of the revision of prospective oil prices in the long term, it was identified that some impairments recognized in previous years for oil fields could be recovered due to an improved future price scenarios. The main fields on which there was a recovery of impairment were Chichimene, Caño Sur, Apiay and Llanito. Similarly, the new technical information and operational aspects that gave rise to changes in investment levels caused an impairment in the Casabe, Tibú, Gunflint and Niscota fields, mainly.

The following is the breakdown of oilfields impairment losses or reversals for the years ended December 31, 2018, 2017 and 2016:

**2018**

Cash generating units	Carrying amount	Recoverable amount	(Impairment loss) reversal
<b>Oil fields in Colombia</b>			
Reversal	19,156,326	50,462,080	689,665
Loss	764,808	405,421	(359,387)
<b>Fields operated abroad</b>			
Reversal	1,810,618	2,719,086	157,709
Loss	184,375	180,191	(4,184)
			<b>483,803</b>

**2017**

Cash generating units	Carrying amount	Recoverable amount	(Impairment loss) reversal
<b>Oil fields in Colombia</b>			
Loss	2,172,747	1,588,207	(584,540)
Reversal	13,229,212	23,906,828	298,210
<b>Fields operated abroad</b>			
Reversal	748,510	1,324,010	475,203
			<b>188,873</b>

**2016**

Cash generating units	Carrying amount	Recoverable amount	(Impairment loss) reversal
<b>Oil fields in Colombia</b>			
Loss	5,258,265	4,902,943	(1,117,020)
Reversal	17,502,391	36,704,807	1,090,434
<b>Fields operated abroad</b>			
Loss	688,895	647,272	(42,004)
			<b>(68,590)</b>

The grouping of assets to determine the CGUs is consistent as compared to the prior periods.



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The assumptions used to determine the recoverable amount include the following:

- The fair value less costs of disposal of the Exploration and Production segment assets was determined based on cash flows after tax derived from the business plans approved by Group's management, which are developed based on long-term macroeconomic policies and fundamental assumptions of supply and demand. The fair value hierarchy is 3.
- Balance of oil and gas reserves, in addition to proven reserves; probable and possible reserves were also considered, adjusted by different risk factors.
- The real discount rate determined as the average weighted cost of capital (WACC) and it corresponds to 7.46% (2017–8.17% and 2016 – 7.9% and 8.9%).
- Oil price – Brent: the forecasts include US\$81.4/barrel for the first year, US\$67.6/barrel for the medium term and US\$71.4/barrel for the long term. In 2017, the assumptions taken US\$52.9/barrel for 2018, US\$72.5/barrel average for the next six years and US\$81.9/barrel as of 2030. In 2016, the assumptions made used a price of US\$56.8/barrel in 2017, US\$67.9/barrel average for the medium term and US\$80/barrel in the long term. International oil price projections were carried out by an independent agency specializing in oil and gas, taking into account the current scenarios of oil quota agreements of the OPEC (Organization of Petroleum Exporting Countries) and the impact of the changes in specifications issued by the international agreement to prevent pollution by ships (Marpol) as of the year 2020 on crude and fuels with high sulfur content.

### 16.1.2 Investments in joint ventures

Investments in joint ventures in the Exploration and Production segment are recorded using the equity method of accounting. Ecopetrol evaluates if there is objective evidence that indicate that the fair value of such investments has deteriorated in the period, especially those for which goodwill has been recorded.

As a result, Ecopetrol recognized an (impairment loss) or reversal on the carrying value as of December 31, as follows:

	<b>2018</b>	<b>2017</b>	<b>2016</b>
Equion Energy Limited	108,791	(42,744)	(81,155)
Offshore International Group	193,345	37,589	(46,703)
	<b>302,136</b>	<b>(5,155)</b>	<b>(127,858)</b>

The significant assumptions used to determine the recoverable amount of these investments are consistent with those described in the previous section, except for the use of a discount rate in real terms in 2018 for Offshore International Group of 8.92% (2017 – 8.61% and 2016 – 8.0%).

In 2018, the market showed an improvement in the crude oil and gas production forecast. Operational performance and technical evolution have contributed to strengthening future cash flows that, in turn, contributed to the reversal of the impairment charged recognized in previous years for Offshore International Group and Equion Energy.

In 2017, because of new market variables, new reserves, price differentials against reference indicators and available technical and operational information, there was a recovery of an impairment recognized in previous years for Offshore International Group and Equion Energy.

For 2016, in spite of better forecasts of oil prices in the long term, there was an additional impairment in the investment in the Offshore International Group for the reversion to local authorities of some low-prospective success exploration blocks, high geological risk, and low economic viability with respect to a new price scenario.

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**16.2 Refining and Petrochemical**

The Cash Generating Units with an (expense for) recovery of impairment in the Refining and Petrochemical Segment for the years ended December 31, 2018, 2017 and 2016 include:

**2018**

Cash-generating units	Carrying amount	Recoverable amount	(Impairment loss) reversal
Refinería de Cartagena	23,411,058	22,640,761	(770,297)
Bioenergy	774,343	560,882	(213,461)
Other	946	-	(946)
			<b>(984,704)</b>

**2017**

Cash-generating units	Carrying amount	Recoverable amount	(Impairment loss) reversal
Refinería de Cartagena	20,578,412	22,012,710	1,434,298
Refinería de Barrancabermeja (projects)	1,172,773	898,786	(273,987)
Bioenergy	757,741	665,395	(92,346)
			<b>1,067,965</b>

**2016**

Cash-generating units	Carrying amount	Recoverable amount	Impairment loss
Refinería de Cartagena	21,672,367	21,206,515	(465,852)
Bioenergy	925,955	618,446	(307,509)
			<b>(773,361)</b>

The grouping of assets to determine the CGUs is consistent with prior periods.

**16.2.1 Refinería de Cartagena**

The recoverable amount of the Refinería de Cartagena was calculated based on its fair value less costs of disposal, which is higher than its value in continued use. The fair value less costs of disposal of the Refinería de Cartagena was determined based on cash flows after taxes that are derived from business plans approved by the Ecopetrol Business Group's management, which are developed based on market prices provided by a third-party expert, which considers long-term macroeconomic variables and fundamental supply and demand assumptions for crude oil and refined products. The fair value hierarchy is 3.

The significant assumptions to determine the recoverable amount included: (i) a gross refining margin determined by crude oil feedstock and products price outlook provided by an independent third-party expert; (ii) an actual discount rate of 6.48% (2017 – 6.00%) determined under WACC methodology; (iii) current conditions or benefits, or similar, as an industrial user of goods and services of the free trade zone and during the validity of the license; (iv) level of costs and long-term operating expenses in line with international refinery standards of similar configuration and conversion capacity; (v) refinery throughput and production; and (vi) level of continued investment.

It is important to mention that the refining business is highly sensitive to the volatility of the margins and the macroeconomic variables implicit in the determination of the discount rate, therefore, any change in these assumptions could potentially result in significant variations in the determination of impairment losses or reversal amounts.

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The impairment recorded for 2018 is explained by: i) an adjustment in market expectations in relation to the impact that the implementation of the MARPOL regulation will have on margins of refined products, ii) the differential of light and heavy crudes that serve as raw material; and iii) fundamental macroeconomic changes that increased the discount rate used for the valuation of Reficar's assets, mainly associated with the increase in the risk-free rate and higher market risk premiums. Improvements in operational and commercial inputs associated to the refinery optimization as well as the tax effects of the "Financing Law" (tax reform) partially offset the effects of the macroeconomic variables.

In 2017, we recorded a partial reversal of the impairment recorded in previous periods primarily as a result of: (a) an improved outlook in refining margins due to the ratification of the implementation of the International Convention for the Prevention of Pollution from Ships (Marpol) starting in 2020; (b) a lower discount rate resulting from the application of WACC methodology; and (c) operational and financial optimizations identified as part of the stabilization of the refinery.

In 2016, we recorded an impairment caused mostly by adjustment of operational variables based on what was observed during the stabilization period, partially offset by a lower discount rate and better refining margins.

#### **16.2.2 Bioenergy**

The recoverable amount of Bioenergy was calculated based on the fair value less the costs of disposal level, which is greater than the value in use and corresponds to the future cash flows discounted after taxes on profit. The fair value hierarchy is 3.

The significant assumptions used to determine the recoverable amount included: (a) forecast of ethanol prices based on projections made by Group specialists; (b) expected agricultural and operational yields; and (c) a 6.97% discount rate in real terms (2017 – 6.23%) determined under the WACC methodology.

In 2018, impairment is presented due to: i) a lower prospect of short-term ethanol prices, associated with imports from abroad in an environment of global over-supply of ethanol, ii) updating of agricultural variables in the short term, iii) an increase in the discount rate used for the valuation in line with fundamentals of the market. These impacts were partially offset by the updating of operating variables associated with the stabilization and tax effects of the "Financing Law".

In 2017 and 2016, we recorded an impairment loss mainly due to the updating the dates of start of operations of the project, the stabilization process of the industrial plant and the changes in the operational variables and ethanol prices.

#### **16.2.3 Refinería de Barrancabermeja**

During 2018, the Refinería de Barrancabermeja Modernization Project, which is currently suspended, was evaluated and there were no indications that implied the recognition of additional impairment.

During 2017, an impairment loss of COP\$273,987 was recognized on the Refinería de Barrancabermeja, mainly related to the write off of certain management and financial capitalized balances associated with the suspension of the modernization project of the Refinery. This suspension is in response to capital discipline criteria implemented to ensure the growth and financial sustainability of Ecopetrol S.A. and the Ecopetrol Business Group in the adverse context that the hydrocarbons sector experienced in previous years. This project is being assessed within the Ecopetrol Business Group's strategic plan therefore any impairment loss recognized in previous years may be subject to recovery.

#### **16.3 Transport and Logistics**

The recoverable amount of these assets was determined based on its fair value with costs of disposal, which corresponds to discounted cash flows based on the hydrocarbon production curves and refined products transport curves. The fair value hierarchy is 3.

The assumptions used in the model to determine the recoverable value included: i) the tariffs regulated by the Ministry of Mines and Energy and the Energy and Gas Regulation Commission - CREG, ii) the actual discount rate used in the valuation was 5.60% (2017 - 5.00%) and iii) transport volume projections based on the end of year results for 2018 and the long-term volumetric transport program from 2019 onwards.

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In 2018, the main impairment recorded was COP\$167,917, corresponding to the systems of the Southern Cash Generating Unit (CGU), composed of the Tumaco Port and the TransAndino Pipeline (OTA) and its afferent pipelines, the Mansoyá - Orito Pipeline (OMO), San Miguel - Orito (OSO), and Churuyaco- Orito (OCHO). This value was generated mainly by a decrease in the volume projections for the southern systems, and an increase in the need for maintenance capex to reduce the operational risk of the transport systems.

In 2017, there was a recovery of an impairment for the Transportation and Logistics segment for COP\$59,455, mainly in Oleoducto del Sur, which includes, among others, the Trans Andino Pipeline. The recovery was due to the inclusion of the Port of Tumaco in that generating unit.

The recovery of COP\$41,062 in 2016 was caused mainly by the incorporation of crude oil throughput associated with the San Fernando – Apiay system, which affects the recoverable amount of Los Llanos transport line, but was offset by the impairment of the Oleoducto del Sur.

**17. Goodwill**

The balance as of December 31, 2018 and 2017 of goodwill in acquisitions of subsidiaries was:

	<u>2018</u>	<u>2017</u>
<b>Transport and Logistics</b>		
Oleoducto Central S.A.	683,496	683,496
<b>Exploration and Production</b>		
Hocol Petroleum Ltd.	537,598	537,598
<b>Refining and Petrochemicals</b>		
Andean Chemical Ltd	127,812	127,812
Propilco S.A.	108,137	108,137
	<u>1,457,043</u>	<u>1,457,043</u>
Less impairment Hocol Petroleum Ltd.	<u>(297,121)</u>	<u>(297,121)</u>
	<u>1,159,922</u>	<u>1,159,922</u>

As of December 31, 2018 and 2017, the Ecopetrol Business Group assessed the recoverability of the carrying value of goodwill generated in the acquisition of subsidiaries. The recoverable amount was determined based on the realization value less costs of disposal using the present value of future cash flows for each of the companies acquired with goodwill. The source of information used the financial projections of each company derived from the business plans approved by management, which were developed based on long-term macroeconomic factors such as price curves and margins and fundamental assumptions of supply and demand. As a result of the analysis, the Ecopetrol Business Group did not recognize any goodwill impairment.

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**18. Loans and borrowings**

Exhibit 2 details the main conditions of the most significant loans of the Business Group.

**18.1 Composition of loans and borrowings**

The balances of the loans and financing, which are recorded at amortized cost, as of December 31, 2018 and 2017:

	Weighted average effective interest rate as of December		2018	2017
	2018	2017		
<b>Local currency</b>				
Bonds	8.0%	8.9%	1,568,034	1,692,471
Syndicated loan	7.9%	8.7%	1,439,590	3,307,950
Other (1)	7.6%	7.7%	1,041,151	978,795
			<b>4,048,775</b>	<b>5,979,216</b>
<b>Foreign currency</b>				
Bonds	5.7%	6.1%	25,599,996	29,166,594
Commercial loans – Refinería de Cartagena (2)	4.4%	4.3%	7,352,002	7,401,781
Commercial loans	-	4.3%	-	528,815
Loans from related parties (Note 29)	2.5%	1.5%	855,135	259,760
Other (1)	3.1%	-	206,737	211,669
			<b>34,013,870</b>	<b>37,568,619</b>
			<b>38,062,645</b>	<b>43,547,835</b>
Current			4,019,927	5,144,504
Non-current			34,042,718	38,403,331
			<b>38,062,645</b>	<b>43,547,835</b>

(1) Includes financial leasing and debt in connection with build, operation, maintenance and transfer (BOMT) contracts.

(2) Corresponds to the commercial credits that Refinería de Cartagena S.A. and which were assumed by Ecopetrol through voluntary assumption of the debt, transaction made on December 13, 2017.

**18.2 Main movements**

**Local currency**

- On August 6, 2018, Ecopetrol made the advance payment of the total syndicated loan held in 2013 with local banks, whose amortization was expected until the year 2025. The total amount to be paid is COP\$1,430,333 million, for the concept of capital plus interests.
- On August 27, 2018, the local 5 year series bond issued in 2013 became due. The total nominal amount paid was COP\$120,950.

**Foreign currency**

- On April 13, 2018, Ecopetrol S.A. paid in advance the entire international bond issued in 2013 with a maturity of 5 years; the value paid was USD\$354 million, including interest.
- On July 6 and 25, 2018, Ecopetrol S.A. made the advance payment of all the loans entered into in 2013 with international banks, guaranteed by the Export-Import Bank of the United States, and whose amortization was foreseen until the year 2023. The total nominal amount paid was USD\$156 million for capital, plus the interest caused.
- On September 20, 2018, Ecopetrol S.A. subscribed a committed line of credit for USD\$665 million, with Scotiabank (USD\$430 million) and Mizuho Bank (USD\$235 million). Under this type of credit, banks commit to disburse resources when Ecopetrol S.A. require it, under the terms and conditions previously agreed between the parties. The committed line of credit has two (2) years of availability for disbursements, with the following conditions: (i) amortized capital at maturity within a period of 5 years from the date of subscription of the contract and (ii) a rate of Libor interest (6M) + 125 basis points and a commission of 30 basis points per year on capital not paid during the period of availability. This facility would only increase the Ecopetrol Business Group's level of indebtedness at the time disbursements are made.

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- On December 27, 2018, Ecopetrol S.A. paid in advance the entire 10-year international bond issued in 2009, the value paid was USD\$1,587 million, including interest.

### 18.3 Maturity of loans and borrowings

The following are the maturities of loans and borrowing as of December 31, 2018:

	Up to 1 year (1)	1 - 5 years	5-10 years	> 10 years	Total
<b>Local currency</b>					
Bonds	116,693	842,514	362,446	246,381	1,568,034
Syndicated loan	406,582	1,033,008	-	-	1,439,590
Commercial loans and other	120,069	491,781	270,920	158,381	1,041,151
	<b>643,344</b>	<b>2,367,303</b>	<b>633,366</b>	<b>404,762</b>	<b>4,048,775</b>
<b>Foreign currency</b>					
Bonds	1,374,390	10,605,708	8,664,732	4,955,166	25,599,996
Commercial loans – Refinería de Cartagena	1,116,370	4,061,541	2,174,091	-	7,352,002
Other	885,823	136,574	39,475	-	1,061,872
	<b>3,376,583</b>	<b>14,803,823</b>	<b>10,878,298</b>	<b>4,955,166</b>	<b>34,013,870</b>
	<b>4,019,927</b>	<b>17,171,126</b>	<b>11,511,664</b>	<b>5,359,928</b>	<b>38,062,645</b>

(1) Includes short-term credit and the current portion of long-term debt, as applicable.

The following are the maturities of loans and borrowing as of December 31, 2017:

	Up to 1 year (1)	1-5 years	5-10 years	> 10 years	Total
<b>Local currency</b>					
Bonds	253,172	742,512	322,956	373,831	1,692,471
Syndicated loan	739,348	2,009,420	559,182	-	3,307,950
Other	98,729	415,599	308,121	156,346	978,795
	<b>1,091,249</b>	<b>3,167,531</b>	<b>1,190,259</b>	<b>530,177</b>	<b>5,979,216</b>
<b>Foreign currency</b>					
Bonds	2,651,174	9,948,238	12,018,813	4,548,369	29,166,594
Commercial loans – Refinería de Cartagena	958,918	3,635,848	2,807,015	-	7,401,781
Commercial loans	153,873	315,849	59,093	-	528,815
Other	289,290	119,014	63,125	-	471,429
	<b>4,053,255</b>	<b>14,018,949</b>	<b>14,948,046</b>	<b>4,548,369</b>	<b>37,568,619</b>
	<b>5,144,504</b>	<b>17,186,480</b>	<b>16,138,305</b>	<b>5,078,546</b>	<b>43,547,835</b>

(1) Includes short-term credit and the current portion of long-term debt, as applicable.

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**18.4 Breakdown by type of interest rate and currency**

The following is the breakdown of loans and borrowing by type of interest rate as of December 31, 2018 and 2017:

	<b>2018</b>	<b>2017</b>
Local currency		
Fixed rate	252,224	143,156
Floating rate	3,796,551	5,836,060
	<b>4,048,775</b>	<b>5,979,216</b>
Foreign currency		
Fixed rate	31,432,667	35,062,742
Floating rate	2,581,203	2,505,877
	<b>34,013,870</b>	<b>37,568,619</b>
	<b>38,062,645</b>	<b>43,547,835</b>

The interest on the bonds in national currency is indexed to the CPI (Consumer Price Index) and bank loans and variable rate leasing in Colombian pesos are indexed to the DTF (Fixed Term Deposits) and IBR (Banking Reference Indicator), plus a differential. Interest on loans in foreign currency is calculated based on the LIBOR rate plus a spread and the interests of the other types of debt are at a fixed rate.

**18.5 Loans designated as hedging instrument**

As of December 31, 2018, Ecopetrol S.A. designated US\$6,500 million (2017 – US\$8,532 million) of foreign currency debt as a hedging instrument, of which US\$5,200 million is used to hedge the net investment in foreign operations with the US dollar as their functional currency, and US\$1,300 million is used to hedge the cash flows of future crude oil exports. See Note 28 – *Risk management*.

**18.6 Guarantees and covenants**

Financing obtained directly by Ecopetrol S.A. in capital markets has no guarantees granted or financial covenant restrictions.

Until December 13, 2017, product of the voluntary assumption of international credit held by Refinería de Cartagena S.A. on the part of Ecopetrol SA, in its capacity as sponsor, restrictions applied in relation to financial commitments to maintain a minimum service coverage rate of 1.35: 1 debt at certain points in the life of the loan by Refinería de Cartagena SA, as well as the obligation to have a commercial trust and a depositary and security contract to receive the resources of the new refinery to fulfill specific purposes such as operating expenses, interest and others.

The following is a summary of certain restrictions contained in certain other loan instruments of Ecopetrol’s subsidiaries:

- The loan entered into by Oleoducto de los Llanos is guaranteed with the economic rights of the ship–or–pay transportation agreements with Frontera Energy Corp and also includes certain restrictions regarding capital contributions and asset disposal.
- The syndicated loan entered into by Oleoducto Bicentenario requires that this subsidiary maintain an established relationship of leverage and solvency and cash flow / service to the debt.
- The loan entered into by Bioenergy with Bancolombia is guaranteed with the La Esperanza 1 and 2 farms and there are certain restrictions on the variation of direct or indirect ownership by Ecopetrol S.A. in this subsidiary.

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**18.7 Fair value of loans**

The fair value of loans and borrowings is COP\$38,305,674 and COP\$45,781,317 as of December 31, 2018 and 2017, respectively.

For fair value measurement, local currency bonds were valued using Infovalmer reference prices, while bonds in U.S. dollars were valued using Bloomberg. With regard to the other financial obligations for which there is no market benchmark, a discount to present value technique was used. These rates incorporate market risk through some benchmarks (Libor, FTD) and the Ecopetrol Business Group's credit risk (spread).

**18.8 Movement of net financial debt**

The following is the movement of net financial debt as of December 31, 2018, 2017 and 2016:

	<b>Cash and equivalents</b>	<b>Other financial assets</b>	<b>Loans and borrowings</b>	<b>Net financial debt</b>
<b>Balance as of December 31, 2016</b>	<b>8,410,467</b>	<b>6,686,895</b>	<b>(52,222,027)</b>	<b>(37,124,665)</b>
Cash flow	(174,272)	(564,755)	11,259,492	10,520,465
Exchange difference:				
Recognized in profit or loss	(290,310)	208,394	147,993	66,077
Recognized in other comprehensive income	-	-	70,958	70,958
Financial cost registered to projects	-	-	(203,964)	(203,964)
Financial income (expense) recognized in profit or loss	-	104,706	(2,385,994)	(2,281,288)
Foreign currency translation	-	39,628	(76,171)	(36,543)
Other movements that do not generate cash flow	-	58,857	(138,122)	(79,265)
<b>Balance as of December 31, 2017</b>	<b>7,945,885</b>	<b>6,533,725</b>	<b>(43,547,835)</b>	<b>(29,068,225)</b>
Cash flow	(2,040,387)	843,612	11,363,077	10,166,302
Exchange difference:				
Recognized in profit or loss	406,246	920,609	(816,840)	510,015
Recognized in other comprehensive income	-	-	(2,165,569)	(2,165,569)
Financial cost registered to projects	-	-	(217,891)	(217,891)
Financial income (expense) recognized in profit or loss	-	92,906	(2,399,414)	(2,306,508)
Foreign currency translation	-	(245,958)	(203,446)	(449,404)
Other movements that do not generate cash flow	-	2,921	(74,727)	(71,806)
<b>Balance as of December 31, 2018</b>	<b>6,311,744</b>	<b>8,147,815</b>	<b>(38,062,645)</b>	<b>(23,603,086)</b>



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**19. Trade and other payables**

The balance of trade and other payables, as of December 31, 2018 and 2017, is comprised as follows:

	<b>2018</b>	<b>2017</b>
Suppliers	6,878,510	5,088,957
Partners' advances	874,010	880,420
Withholding tax	246,867	376,169
Related parties (Note 29)	116,418	129,520
Insurance and reinsurance	211,883	121,555
Agreements in transport contracts (1)	210,196	91,324
Deposits received from third parties	49,158	25,523
Dividends payable	84,657	3,723
Various creditors	304,613	280,485
	<b>8,976,312</b>	<b>6,997,676</b>
Current	8,945,790	6,968,207
Non-current	30,522	29,469
	<b>8,976,312</b>	<b>6,997,676</b>

(1) Corresponds to the value of debt from agreements in transport contracts of oil pipelines and poliducts, impacted by volumetric adjustments, compensation for quality and other inventory management agreements.

The carrying amount of trade accounts and other accounts payable approximates their fair value due to their short-term nature.

**20. Provisions for employees' benefits**

The following are the balances of provisions for employee benefits as of December 31, 2018 and 2017:

	<b>2018</b>	<b>2017</b>
Post-employment benefits		
Healthcare	5,507,784	5,367,005
Pension	1,452,322	1,327,859
Education	479,945	502,260
Bonds	331,064	348,442
Other plans	82,576	77,636
Termination benefits – Voluntary retirement plan	137,859	155,286
	<b>7,991,550</b>	<b>7,778,488</b>
Social benefits and salaries	521,802	485,939
Other employee benefits	93,199	67,867
	<b>8,606,551</b>	<b>8,332,294</b>
Current	1,816,882	1,829,819
Non-current	6,789,669	6,502,475
	<b>8,606,551</b>	<b>8,332,294</b>

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**20.1 Post-employment benefits liability (asset)**

The following table shows the movement in liabilities and assets, net of post-employment benefits and termination benefits, as of December 31, 2018 and 2017:

	Pension and bonds (1)		Other		Total	
	2018	2017	2018	2017	2018	2017
<b>Liabilities for employee benefits</b>						
<b>Opening balance</b>	<b>14,147,464</b>	<b>12,463,433</b>	<b>6,105,432</b>	<b>5,041,133</b>	<b>20,252,896</b>	<b>17,504,566</b>
Current service cost	–	–	77,373	52,164	77,373	52,164
Past service cost	–	–	50,489	–	50,489	–
Interest expense	888,583	872,524	377,923	350,060	1,266,506	1,222,584
Actuarial (gains) losses	(56,655)	1,621,184	(27,651)	1,012,205	(84,306)	2,633,389
Benefits paid	(847,449)	(809,677)	(371,448)	(350,130)	(1,218,897)	(1,159,807)
<b>Closing balance</b>	<b>14,131,943</b>	<b>14,147,464</b>	<b>6,212,118</b>	<b>6,105,432</b>	<b>20,344,061</b>	<b>20,252,896</b>
<b>Plan assets</b>						
<b>Opening balance</b>	<b>12,471,163</b>	<b>12,123,175</b>	<b>3,245</b>	<b>2,473</b>	<b>12,474,408</b>	<b>12,125,648</b>
Return on assets	780,494	848,677	170	385	780,664	849,062
Contributions to funds	–	–	21,971	22,465	21,971	22,465
Benefits paid	(847,449)	(809,677)	(21,526)	(22,078)	(868,975)	(831,755)
Actuarial (losses) gains	(55,651)	308,988	94	–	(55,557)	308,988
<b>Closing balance</b>	<b>12,348,557</b>	<b>12,471,163</b>	<b>3,954</b>	<b>3,245</b>	<b>12,352,511</b>	<b>12,474,408</b>
<b>Net post-employment benefits liability</b>	<b>1,783,386</b>	<b>1,676,301</b>	<b>6,208,164</b>	<b>6,102,187</b>	<b>7,991,550</b>	<b>7,778,488</b>

(1) There is no cost for the pension and pension plans service, due to the fact that the beneficiaries were retired as of July 31, 2010.

The following table shows the movement in profit and loss and in other comprehensive income as of December 31, 2018, 2017 and 2016:

	2018	2017	2016
<b>Recognized in profit or loss</b>			
Interest expense, net	485,842	373,522	259,266
Current service cost	77,373	52,164	53,771
Past service cost	50,489	–	164,271
Remedies	503	13,889	–
	<b>614,207</b>	<b>439,575</b>	<b>477,308</b>
<b>Recognized in other comprehensive income</b>			
Education and severance	45,509	(203,779)	175,259
Pension and pension bonds	1,003	(1,312,195)	(1,533,256)
Termination benefits – Voluntary retirement plan	93	(3)	67
Healthcare	(17,356)	(794,535)	(792,093)
Change in the effect of asset ceiling	–	–	379,884
	<b>29,249</b>	<b>(2,310,512)</b>	<b>(1,770,139)</b>
Deferred tax	(33,539)	762,469	616,697
	<b>(4,290)</b>	<b>(1,548,043)</b>	<b>(1,153,442)</b>

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**20.2 Plan assets**

Plan assets are resources held by pension trusts for payment of pension obligations. Payments for health and education post-employment benefits is Ecopetrol's responsibility. The destination of trust resources and its yields cannot be changed or returned to the Ecopetrol Business Group until all pension obligations have been fulfilled.

The following is the composition of the plan assets of pension and pension bonds by type of investment as of December 31, 2018 and 2017:

	<b>2018</b>	<b>2017</b>
Bonds issued by the national government	4,307,972	4,349,400
Bonds of private entities	2,910,071	2,967,030
Other local currency	2,219,634	2,340,825
Other public bonds	1,014,663	1,149,200
Variable yield	653,828	605,380
Bonds of foreign entities	554,685	558,920
Other foreign currency	691,658	503,653
	<b>12,352,511</b>	<b>12,474,408</b>

47.4% of plan assets are classified as level 1 in the fair value hierarchy where prices for the assets are directly observable on actively traded markets, and 52.6% are classified as level 2 (46.0% and 54.0% for 2017, respectively).

The fair value of level 2 plan assets is calculated using prices quoted in the assets' market. The Ecopetrol Business Group obtains these prices through reliable financial data providers recognized in Colombia or abroad depending on the investment.

For the securities issued in local currency, the fair value of plan assets is calculated using information published by Infovalmer, a price supplier authorized by the Financial Superintendence of Colombia. According to its methodology, prices are calculated based on market information on the valuation date or estimated from historical inputs according to the criteria established for the calculation of each of the prices.

The average price is calculated based on the most representative market of the transactions carried out through electronic platforms approved and supervised by the regulator.

On the other hand, the estimated price is calculated for investments that do not reflect enough information to estimate an average market price, replicating the quoted prices for similar assets or prices obtained through quotes from brokers. This estimated price is also given by Infovalmer as a result of the application of robust methodologies approved by the financial regulator and widely used by the financial sector.

The following table reflects the credit quality of the issuers and counterparties in assets held by the autonomous pension funds:

	<b>2018</b>	<b>2017</b>
AAA	4,683,190	4,870,932
Nation	4,364,188	4,471,274
AA+	860,905	690,391
BBB-	426,743	192,636
BAA3	310,788	45,699
F1+	249,361	230,321
BBB	193,579	246,795
BRC1+	89,211	118,008
BBB+	86,040	159,103
A	62,754	39,048
AA-	60,382	18,770
AA	28,367	58,234
BAA1	21,395	5,296
A3	17,075	29,098
BAA2	-	371,972
Other qualifications	55,768	50,784
No rating available	842,765	876,047
	<b>12,352,511</b>	<b>12,474,408</b>

See credit risk policy in Note 28.2.

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**20.3 Actuarial assumptions**

The following are the actuarial assumptions used in determining the present value of defined employee benefit obligations used for the actuarial calculations as of December 31, 2018 and 2017:

<b>2018</b>	<b>Pension</b>	<b>Bonds</b>	<b>Health</b>	<b>Education</b>	<b>Other benefits <sup>(1)</sup></b>
Discount rate	6.75%	6.50%	7.00%	6.75%	5.87%
Salary growth rate	N/A	N/A	N/A	N/A	5.10% / 4.70%
Expected inflation rate	3.00%	3.00%	3.00%	3.00%	3.00%
Pension growth rate	3.00%	N/A	N/A	N/A	N/A
Cost trend					
Short-term rate	N/A	N/A	7.00%	4.00%	N/A
Long-term rate	N/A	N/A	4.00%	4.00%	N/A

<b>2017</b>	<b>Pension</b>	<b>Bonds</b>	<b>Health</b>	<b>Education</b>	<b>Other benefits <sup>(1)</sup></b>
Discount rate	6.50%	6.25%	6.50%	5.50%	5.51%
Salary growth rate	N/A	N/A	N/A	N/A	4.75% / 4.25%
Expected inflation rate	3.00%	3.00%	3.00%	3.00%	3.00%
Pension growth rate	3.00%	N/A	N/A	N/A	N/A
Cost trend					
Short-term rate	N/A	N/A	6.00%	4.00%	N/A
Long-term rate	N/A	N/A	4.00%	4.00%	N/A

N/A: Not applicable for this benefit.

(1) Weighted average discount rate.

The cost trend is the projected increase for the initial year, which includes the expected inflation rate.

The mortality table used for the calculations was that of 'Valid Annuitant' for men and women based on the experience gained for the period 2005–2008 of the Colombian Social Security Institute.

**20.4 Maturity of benefit obligation**

The cash flows required for payment of post-employment obligations are the following:

<b>Period</b>	<b>Pension and bonds</b>	<b>Other benefits</b>	<b>Total</b>
2019	914,959	366,866	1,281,825
2020	939,158	373,953	1,313,111
2021	962,651	381,734	1,344,385
2022	973,491	387,940	1,361,431
2023	996,864	397,555	1,394,419
2024 - 2028	5,434,882	2,104,259	7,539,141

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## 20.5 Sensitivity analysis

The following sensitivity analysis shows the effect of such possible changes on the obligation for defined benefits, while keeping the other assumptions constant, as of December 31, 2018:

	Pension	Bonds	Health	Education	Other benefits
Discount rate					
–50 basis points	13,896,668	1,030,073	5,907,754	500,234	229,859
+50 basis points	12,449,997	956,984	5,152,929	461,725	219,178
Inflation rate					
–50 basis points	12,395,671	955,640	N/A	N/A	139,854
+50 basis points	13,951,861	1,031,197	N/A	N/A	143,807
Salary growth rate					
–50 basis points	N/A	N/A	N/A	N/A	78,849
+50 basis points	N/A	N/A	N/A	N/A	86,509
Cost trend					
–50 basis points	N/A	N/A	5,155,141	461,296	N/A
+50 basis points	N/A	N/A	5,902,319	500,566	N/A

## 20.6 Voluntary retirement plan

In August 2016, the Ecopetrol Business Group offered a voluntary retirement plan to 200 employees who met certain criteria. As of December 31, 2018, 2017 and 2016, 137 employees were part of the plan, with a corresponding cost of COP\$137,859 (2017 – COP\$155,286 and 2016 – COP\$161,796). This plan includes benefits such as monthly income, education and health benefits until the date on which the employee is granted their retirement pension.

## 21. Accrued liabilities and provisions

Below is the breakdown of the changes in the different categories of provisions and contingencies as of December 31, 2018 and 2017:

	Asset retirement obligation	Litigation	Environmental contingencies and others	Total
<b>Balance as of December 31, 2017</b>	<b>5,527,324</b>	<b>182,966</b>	<b>827,159</b>	<b>6,537,449</b>
Increase in abandonment costs	1,062,280	-	-	1,062,280
Additions	71,015	61,851	174,780	307,646
Uses	(182,130)	(114,647)	(100,215)	(396,992)
Financial costs	186,518	-	-	186,518
Foreign currency translation	54,610	(2,368)	10,983	63,225
Transfers	(342)	143	(5,915)	(6,114)
<b>Balance as of December 31, 2018</b>	<b>6,719,275</b>	<b>127,945</b>	<b>906,792</b>	<b>7,754,012</b>
Current	549,678	88,623	176,108	814,409
Non-current	6,169,597	39,322	730,684	6,939,603
	<b>6,719,275</b>	<b>127,945</b>	<b>906,792</b>	<b>7,754,012</b>

	Asset retirement obligation	Litigation	Environmental contingencies and others	Total
<b>Balance as of December 31, 2016</b>	<b>5,064,660</b>	<b>209,932</b>	<b>643,278</b>	<b>5,917,870</b>
Increase in abandonment costs	39,634	-	-	39,634
Additions (reversals)	110,587	(19,185)	106,532	197,934
Uses	(66,469)	(7,742)	(19,613)	(93,824)
Financial costs	379,891	-	(367)	379,524
Foreign currency translation	(979)	(39)	718	(300)
Transfers (1)	-	-	96,611	96,611
<b>Balance as of December 31, 2017</b>	<b>5,527,324</b>	<b>182,966</b>	<b>827,159</b>	<b>6,537,449</b>
Current	199,824	159,881	199,123	558,828
Non-current	5,327,500	23,085	628,036	5,978,621
	<b>5,527,324</b>	<b>182,966</b>	<b>827,159</b>	<b>6,537,449</b>

(1) Mainly includes transfers to liabilities associated with assets held for sale.

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	Asset retirement obligation	Litigation	Comuneros provision	Environmental contingencies and others	Total
<b>Balance as of December 31, 2015</b>	<b>4,452,369</b>	<b>99,798</b>	<b>702,486</b>	<b>822,694</b>	<b>6,077,347</b>
Increase in abandonment costs	404,797	-	-	-	404,797
Additions (reversals)	18,285	44,120	(702,486)	(74,312)	(714,393)
Uses	(68,460)	(4,585)	-	(31,218)	(104,263)
Financial costs	317,448	-	-	(173)	317,275
Foreign currency translation	(14,703)	(355)	-	(2,759)	(17,817)
Transfers (1)	(45,076)	70,954	-	(70,954)	(45,076)
<b>Balance as of December 31, 2016</b>	<b>5,064,660</b>	<b>209,932</b>	<b>-</b>	<b>643,278</b>	<b>5,917,870</b>
Current	330,057	146,767	-	345,130	821,954
Non-current	4,734,603	63,165	-	298,148	5,095,916
	<b>5,064,660</b>	<b>209,932</b>	<b>-</b>	<b>643,278</b>	<b>5,917,870</b>

(1) Mainly includes transfers to liabilities associated with assets held for sale.

### 21.1 Asset retirement obligation

The estimated liability for asset retirement obligation costs corresponds to the future obligation that the Ecopetrol Business Group to restore environmental conditions to a level similar to that existing before the start of projects or activities, as described in Note 3.5 – Abandonment and dismantling costs of fields and other facilities. As these relate to long-term obligations, this liability is estimated by projecting the expected future payments and discounting at present value with a rate indexed to the Ecopetrol Business Group's financial obligations, taking into account the temporariness and risks of this obligation. The discount rates used in the estimate of the obligation as of December 31, 2018 were: Exploration and Production 3.54%, Transportation and Logistics 3.69% and Refining and Petrochemicals 3.84%. For 2017, the equivalent real discount rates were: Production 3.34%, Transportation 3.43% and Refining 3.77%.

### 21.2 Litigation

The following is a summary of the main legal proceedings recognized in the consolidated statement of financial position, where the expectation of loss is probable and could imply an outflow of resources as of December 31, 2018 and 2017:

Proceedings	2018	2017
Controversy for breach of contract with the firms Consulting Group and Industrial Consulting S.A.S., with Refinería de Cartagena.	15,541	-
Damages to third parties due to hydrocarbon easement in a property close to Refinería de Cartagena.	11,019	11,019
Lawsuit filed by a group of people who claim to be victims of the incident in Machuca, Municipality of Segovia - Antioquia against Oleoducto Central S.A. - Ocesa	9,410	9,410
Provision for the payment of the 2016 legal stability contract premium with the Ministry of Finance and Public Credit, in Refinería de Cartagena – Payment made in 2018	-	64,104
Litigation with Schrader Camargo, supplier of Refinería de Cartagena. In 2018, a payment agreement was reached.	-	17,003

### 21.3 Environmental contingencies and others

These correspond to contingencies for environmental incidents and obligations related to environmental compensation and mandatory investment of 1% for the use of, exploitation of or effect on natural resources imposed by national, regional and local environmental authorities. Mandatory investment of 1% is based on the use of water taken directly from natural sources in accordance with the provisions of Law 99 of 1993, Article 43, Decree 1900 of 2006, Decree 2099 of 2017 and 075 and 1120 of 2018 in relation to the projects that Ecopetrol develops in Colombia.

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The Colombian Government through the Ministry of Environment and Sustainable Development, issued in December 2016 and in January 2017 the Decrees 2099 and 075, which modify the Single Regulatory Decree of the environment and sustainable development sector, Decree 1076 of 2015, related to the mandatory investment for the use of water taken directly from natural sources.

The main changes established by these decrees were related to the areas and lines of investment and the basis for settlement of the obligations. Similarly, June 30, 2018 was declared the maximum date to modify investment plans that were underway.

On June 30, 2017, Ecopetrol filed with the National Environmental Licensing Authority (ANLA) certain investment plans to meet the 1% mandatory investment based on the new decrees, relative to investment lines, maintaining the settlement base of Decree 1900.

As of December 31, 2018, the provision for the 1% mandatory investment for the use of water was estimated based on the parameters established in Decree 1076 of 2015. The Ecopetrol Business Group is in the process of analyzing the impact of the applicability of the changes set out in the aforementioned decrees.

#### 21.4 Contingencies

##### **Oleoducto Central S.A. - Ocesa**

In 2017, Oleoducto Central Ocesa. S.A. (Ocesa) recognized a provision to address a probable loss from the potential outcome of the arbitration process filed by Frontera Energy Colombia Corp., Colombia Branch (Frontera); this arbitration process concluded on July 12, 2018 as a result of the Arbitral Court's approval of the reconciliation agreement achieved by the parties, pursuant to which the standard transport rate was revised along with the monetary conditions of the transport agreements entered into July 29, 2014 for expanded capacity resulting from the P135 Project, in turn extending its effects from July 1, 2017 (effective date of the transport agreements). On July 12, 2018, the parties entered into the corresponding addenda to the current transport agreements, reflecting the changes contained in the approved reconciliation agreement.

Similarly, for Project P135 carriers that accepted the binding offer extended by Ocesa with regard to the principles of Resolution No. 72146 of 2014, a transaction agreement has been entered into along with the respective additional provisions amending the transport agreements, under identical or equivalent conditions as those contained in the reconciliation agreement and addenda with Frontera. Concerning the arbitral proceeding convened by Vitol Colombia C.I. S.A.S., the parties have requested, by mutual consent, that the Arbitral Court terminate the proceeding as a result of the settlement agreement reached on July 23, 2018. This request was accepted by the Court at the hearing of August 8, 2018, thus concluding the arbitral process.

The reconciliation and settlement agreements entered into established the obligation of the carriers to cease their current administrative or legal actions and refrain from filing new claims in the future.

As a result, Ocesa reconciled and adjusted the accounts receivable and payable that were held between the parties and the credit notes were issued to reflect the balances in favor of the senders. This recognition in the financial statements generated a movement of the provision and its corresponding effect on other operating income of COP COP\$56,122, in addition to the decrease in income from ordinary activities as of June 30th because of the issued credit notes.

##### **Oleoducto Bicentenario de Colombia S.A.S.**

During July 2018 the carriers Frontera Energy Colombia Corp. ("Frontera"), Canacol Energy Colombia S.A.S. ("Canacol") and Vetra Exploración y Producción Colombia S.A.S. ("Vetra" and, together with Frontera and Canacol, the "Carriers") sent letters to Oleoducto Bicentenario de Colombia S.A.S. ("Bicentenario") alleging they were early termination rights under the Ship-or-Pay Transport Agreements entered by each of them and Bicentenario in 2012 (the "Transport Agreements"). Bicentenario has rejected the terms of the letters, noting that there is no option for early termination and reiterating to the Carriers that the Transport Agreements are current and therefore the Carriers must fulfill their obligations under the Transport Agreements in a timely fashion.

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Under Bicentenario's understanding that the Transport Agreements remain current and that the Carriers are in violation of their obligations under such agreements, Bicentenario declared the Carriers delinquent because of their failure to pay for transport service under the aforementioned agreements. Consequently, Bicentenario executed the standby letters of credit posted as guarantee for the Transport Agreements.

On October 19, 2018, Bicentenario notified Frontera of the existence of a "Dispute" pursuant to Clause 20 of the respective Transport Agreement and moved to the party dispute settlement stage as provided for in such clause. Such discussions ended without an agreement on December 19, 2018. On January 28, 2019, Bicentenario filed an Arbitration Claim against Frontera in accordance with the arbitration clause of the Transportation Agreement to claim any compensation, indemnification or other restitution deriving from the alleged early termination of said agreements.

Similarly, on November 1, 2018, Bicentenario notified Vetra and Canacol of the existence of a "Dispute" pursuant to Clause 20 of the respective Transport Agreement and moved to the party dispute settlement stage as provided for in each such respective clause. Such discussions ended without agreement on March, 2019.

As of the date of these financial statements, Bicentenario continues evaluating its options under the Transport Agreements and the Shareholders Agreement (*Acuerdo Marco de Inversión*) in order to guarantee compliance and claim any compensation, indemnification or other restitution deriving from the alleged early termination of said agreements and any other contractual breaches by the Carriers.

**Cenit Transporte y Logística de Hidrocarburos S.A.S.**

During July 2018, the carriers Frontera, Vetra and Canacol ("carriers") sent notifications to Cenit Transporte y Logística de Hidrocarburos SAS ("Cenit") alleging they were exercising their early termination right under the Ship-or-Pay Crude Oil Transport Agreements (SoP agreements) entered among each of them and Cenit for the transportation of crude oil through the Caño Limón – Coveñas pipeline (owned by Cenit).

In response to the alleged termination of SoP Agreements, CENIT issued letters stating that the alleged event which would have given the carriers early termination rights had not occurred as provided for in Clause 13.3 and other clauses of the aforementioned SoP agreements. In the same letters, CENIT stated that it would continue invoicing and charging for the transport services as stipulated in the SoP agreements, since they remain in force, and therefore, Carriers must fulfill their contractual obligations.

In November, 2018, CENIT filed an arbitration demand against Frontera Energy Group pleading that SoP Agreements are in full force and effect, that Frontera is obliged to comply its terms and conditions and, therefore, is obliged to pay transportation tariffs as agreed in the SoP agreements. In similar terms an arbitration demand was also filed against Vetra and the same will occur against Canacol.



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## 21.5 Legal proceedings not provided for

The following is a summary of the main contingent liabilities that have not been recognized in the statement of financial position as, according to the evaluations made by internal and external advisors of the Ecopetrol Business Group, the expectation of loss is not probable as of December 31, 2018 and 2017:

Proceedings	2018	2017
Administrative and patrimonial responsibility for terrorist attack perpetuated in 2015 against the TransAndino Pipeline.	500,000	-
Action of group that claim damages derived from the pollution caused by the attack on the TransAndino pipeline in 2015.	358,201	-
Environmental damages for terrorist attack perpetuated in 2015 against the Transandino pipeline.	209,220	209,220
Breaking of the economic and financial balance with contractor for the construction of transport system.	110,266	110,266
Breach of contract and recognition of salary readjustments and other claims related to an engineering service provider.	85,198	-
On March 14, 2016, a claim was filed for breach in the settlement of the contract between Konidol and Ecopetrol, which generated cost overruns in the maintenance contract.	62,131	62,131
Salary readjustments to the values established by Ecopetrol for personnel related to a contract signed with a third party for the assembly and construction of surface facilities for production and exploration projects.	60,313	60,313
Contractual imbalance with a technical maintenance provider.	51,429	-
Contractual imbalance with a third party that provides assembly and construction services for surface facilities for exploration and production projects.	35,741	-
Contractual imbalance with a third party in connection with road connection works.	31,679	31,679
Breach of certain obligations agreed in contract with supplier for the construction and assembly of tanks.	31,213	-
Contractual controversial with a third party in relation to seismic program acquisition and processing service.	30,000	30,000

## 21.6 Details of contingent assets

The following is a breakdown of the Ecopetrol Business Group's principal contingent assets, where the associated contingent gain is likely, but not certain:

Proceedings	2018	2017
Claim by Ecopetrol for differences in the settlement of additional income due to high prices.	286,331	-
Disagreement regarding the interpretation and application of the staggered production clause.	98,031	-
Non-compliance with the association contract in relation to reimbursement of administrative costs and other claims.	43,007	40,711
In 2015, the administrator of the Agreements signed with a Corporation filed a criminal complaint for the alleged falsification of a document. Ecopetrol is a victim in the process.	32,000	32,000
Failure to comply with the pipe purchase order, the physical characteristics of the coating do not correspond to those contracted.	21,232	21,232
Contractual controversy by others for the maintenance of some production fields.	13,449	-

### Refinería de Cartagena S.A.

In March 2016, Reficar filed a Request for Arbitration before the International Chamber of Commerce (the "ICC"), against Chicago Bridge & Iron Company N.V., CB&I (UK) Limited, and CBI Colombiana S.A. (jointly, "CB&I") concerning a dispute related to the Engineering, Procurement, and Construction Agreements entered into by and between Reficar and CB&I for the expansion of the Cartagena Refinery in Cartagena, Colombia. Reficar is the Claimant in the ICC arbitration and seeks no less than US\$2 billion in damages plus lost profits.

On May 25, 2016, CB&I filed its Answer to the Request for Arbitration and Counterclaim for approximately US\$106 million and COP\$324,052 million. On June 27, 2016, Reficar filed its reply to CB&I's counterclaim denying and disputing the declarations and relief requested by CB&I. On April 28, 2017, CB&I submitted its Statement of Counterclaim increasing its claims to approximately US\$116 million and COP\$387,558 million. On March 16, 2018, CB&I submitted its Exhaustive Statement of Counterclaim further increasing its claims to approximately US\$129 million and COP\$432,303 million (including in each case interest).

The date for the filing of the Third Written Submission is to be set by the Arbitral Tribunal and the oral hearing is scheduled to begin in April 2020. After the hearing, the Tribunal will analyze the parties' arguments to render its final decision on Reficar's and CB&I's claims. Until then, the outcome of this arbitration is unknown.

## 21.7 Investigations of control entities

### Reficar

#### 1. The Office of the Comptroller General's investigations and proceedings

- 1.1 Because of the modifications of the schedule and budget related to Reficar's expansion and modernization project (the "Project"), the Office of the Comptroller General initiated a special audit investigation of the Project in 2016 and delivered a final report to Reficar on December 5, 2016. The report made 36 findings most of which were related to increased costs compared to budget for services, labor and materials. As required, on January 18, 2017, Reficar submitted an action plan exposing and addressing the 36 findings in the following areas: (i) contract management, (ii) supervision of engineering standards contracted with third parties, and (iii) documentation of the control, reporting and monitoring mechanisms of subcontracts.
- 1.2 As a result of the findings described above, on March 10, 2017, the Office of the Comptroller General opened actions for financial responsibility (*proceso de responsabilidad fiscal*) against 36 individuals and the six companies involved in the Project, including former members of Ecopetrol's Board of Directors, former members of Reficar's Board of Directors, former employees of Ecopetrol, and former employees of Reficar, as well as Chicago Bridge & Iron Company N.V., CBI - Chicago Bridge & Iron company (CB&I) Americas Ltd., Chicago Bridge & Iron Company CB&I UK Limited, CBI Colombiana S.A., Foster Wheeler USA Corporation and Process Consultants Inc.

These actions were initiated based on the Office of the Comptroller General's theory that lower than expected profitability at Reficar could have been caused by (i) modifications to the schedule and, (ii) the increase of the budget for the Project.

On June 5, 2018, the Office of the Comptroller General split the initial proceeding in two. The first one is related to the increase of the Project's budget and the second one is related to the modifications in the Project's schedule.

Regarding the first proceeding, on June 5, 2018, the Office of the Comptroller General issued charges for financial responsibility (*proceso de responsabilidad fiscal*) against (i) 15 individuals, which include former members of Reficar's Board of Directors, a current employee of Ecopetrol, and former employees of Reficar, as well as against (ii) Chicago Bridge & Iron Company N.V., CBI - Chicago Bridge & Iron company (CB&I) Americas Ltd., Chicago Bridge & Iron Company CB&I UK Limited, CBI Colombiana S.A., Foster Wheeler USA Corporation and Process Consultants Inc, and the following insurance companies, Compañía Aseguradora de Fianzas S.A., CHUBB de Colombia, Compañía de Seguros S.A., Mapfre Seguros, as third parties with joint liability.

As for the other 21 individuals initially investigated in 2017, the Office of the Comptroller General closed the investigations. Therefore, as of the date of these financial statements, no current or former member of Ecopetrol's Board of Directors was charged in the first proceeding relating to the increase in the Project's budget.

As of the date of these financial statements, no charges have been issued in the second proceeding relating to the modifications in the Project's schedule.

While the content and status of the proceedings remains confidential, we can report that Reficar and several of its employees have cooperated with and provided the information required by the department of the Office of the Comptroller General in charge of leading the proceedings.

As of the date of these financial statements, Reficar has no liability under these proceedings.

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1.3 In January 2017, the Office of the Comptroller General initiated a special audit in Reficar and delivered a final report to Reficar on July 12, 2017. In this report the Office of the Comptroller General concluded that, in their opinion, Reficar's 2016 Financial Statements do not reasonably represent, in all important aspects, the entity's financial position as of December 31, 2016.

On February 2, 2018, the Legal Accounts Commission of the National House of Representatives of the Republic of Colombia informed Reficar that the House of Representatives decided, through Resolution No. 2713, that it would not close the General Budget and Treasury Account and the National Balance Sheet for the 2016 fiscal year, since the 2016 Financial Statements of several state entities, among them Reficar, had received a negative opinion from the Office of the Comptroller General. Pursuant to Resolution No. 2713, Colombian control entities were ordered to initiate the corresponding disciplinary, fiscal and/or criminal investigations.

1.4 In December 2017, the Office of the Comptroller General initiated a special audit in Reficar and submitted a final report to Reficar on May 18, 2018. In this report the Office of the Comptroller General concluded that, in their opinion, Reficar's 2017 Financial Statements do not reasonably represent, in all important aspects, the entity's financial position as of December 31, 2017.

On February 6, 2019, the Legal Accounts Commission of the National House of Representatives of the Republic of Colombia informed Reficar that the House of Representatives decided, through Resolution No. 3135, that it would not close the General Budget and Treasury Account and the National Balance Sheet for the 2017 fiscal year, since the 2017 Financial Statements of several state entities, among them Reficar, had received a negative opinion from the Office of the Comptroller General. Pursuant to Resolution No. 3135, Colombian control entities were ordered to initiate the corresponding disciplinary, fiscal and/or criminal investigations.

In respect of the special audits mentioned in sections 1.3 and 1.4 above, as of the date of these financial statements, Reficar has no knowledge of any procedural action carried out by any of the Colombian control entities regarding the disciplinary, fiscal and/or criminal investigations ordered neither by the Resolution No. 2713 nor by the Resolution No. 3135.

1.5 In January 2019, the Office of the Comptroller General initiated a financial audit in Reficar. The final report is expected to be submitted on May 2019.

Reficar's external auditors issued an unqualified opinion on Reficar's financial position as of December 31, 2016, 2017 and 2018. As of the date of these financial statements, such auditors have not informed Reficar that there has been any change to their opinion.

As of the date of these financial statements, to the best of Ecopetrol's knowledge, the financial statements continue to fairly represent the financial and operational condition of the Company in all material aspects and its internal controls remain effective.

2. The Attorney General's Office investigations:

Reficar has been officially informed that the Attorney General's Office currently has five ongoing investigation related to the Project.

Regarding one of these five investigations, on September 12, 2017, the Attorney General's Office issued a list of charges against certain former members of Reficar's Board of Directors, as well as certain former officers of Reficar. The charges were related to the failure to fulfill some of their duties as administrators and/or for acting "ultra vires" in the exercise of their functions against: (i) Javier Genaro Gutiérrez (Ecopetrol CEO, 2007-2015); (ii) Felipe Laverde (Reficar General Counsel, 2009-March 2017); (iii) Pedro Rosales (Ecopetrol Downstream Executive Vice President, 2008-2015); (iv) Diana Constanza Calixto (Ecopetrol Head of the Corporate Finance Unit, 2009-2014) and (v) Reyes Reinoso Yañez (Reficar CEO, 2012-2016). The Attorney General's Office closed the case against the rest of the members of Reficar's Board of Directors and the rest of the former officers of Reficar.

The specific content and status of the remaining four ongoing investigations remains confidential.

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3. The Prosecutor's Office investigations:

The Prosecutor's Office has been conducting the following legal proceedings:

3.1 Between July 25 and August 2, 2017, the Prosecutor's Office indicted the following individuals with charges, the majority of which are related to offenses against the public administration and illegal interest in the execution of agreements: (i) Orlando José Cabrales Martínez (Reficar CEO, 2009-2012); (ii) Reyes Reinoso Yañez (Reficar CEO, 2012-2016); (iii) Felipe Laverde Concha (Reficar General Counsel, 2009-March 2017); (iv) Pedro Alfonso Rosales Navarro (Ecopetrol Downstream Executive Vice President, 2008-2015); (v) Masoud Deidehban (CBI Executive Project Director); (vi) Phillip Asherman (CBI CEO) and (vii) Carlos Lloreda (Reficar's statutory auditor from 2013-2015.) The arraignment hearing began on May 30, 2018, and as of the date of these financial statements has not yet concluded.

The Prosecutor's Office has already made public the factual basis for such charges, which is based on the theory that: (i) executing a cost reimbursable engineering, procurement and construction contract (EPC) and not a lump sum agreement favored CBI interests, and (ii) executing special invoicing procedures (MOA –Memorandum of Agreement and PIP –Project Invoicing Procedure) with CBI allowed the payments of unreasonable amounts not duly verified by Foster Wheeler USA Corporation. The defense attorneys have not yet had an opportunity to present their case against such facts in a court of law.

On May 9, 2017, Ecopetrol's Audit and Risk Committee retained a U.S.-based outside law firm to commence a third-party investigation into the matters set forth in the Prosecutor's Office announcement. The results were presented in December 2017 to Ecopetrol's Audit and Risk Committee. This investigation concluded that to date there has been no evidence of possible unlawful acts that affect Ecopetrol's internal control over the financial reporting of the Company, on the allegations made by the Prosecutor's Office.

3.2 On October 22 and 23, 2018, the Prosecutor's Office indicted the following individuals with charges related to improper management and obtaining false public documents: Javier Genaro Gutiérrez Pemberthy (Ecopetrol CEO, 2007-2015), Reyes Reinoso Yáñez (Reficar CEO, 2012-2016), Pedro Alfonso Rosales Navarro (Ecopetrol Downstream Executive Vice President, 2008-2015), and Diana Constanza Calixto Hernández (Ecopetrol Head of the Corporate Finance Unit, 2009-2014). As of the date of these financial statements, the arrangement hearing has not yet taken place.

3.3 On March 18, 2019, the Prosecutor's Office issued a public statement in which it announced that on April 25, 2019 it was going to indict the following individuals, in an indictment hearing that has not yet taken place, with charges related to entering into agreements without compliance with legal requirements: Orlando José Cabrales Martínez (Reficar CEO, 2009-2012) and Felipe Castilla (Reficar CEO, 2009).

Considering the current stage of these legal proceedings, we are not in a position to predict the outcome of the Prosecutor's Office's investigation or the disposition of any of the charges brought by the Prosecutor's Office.

Ecopetrol and Reficar have cooperated closely and extensively with the control entities in furthering their investigations and will continue to monitor the status and development of these investigations.

## 22. Equity

The main components of equity are detailed below:

### 22.1 **Subscribed and paid-in capital**

Ecopetrol's authorized capital amounts to \$36,540,000, and is comprised of 60,000,000,000 ordinary shares, of which 41,116,694,690 are outstanding, and 11.51% (4,731,906,273 shares) are held privately and 88.49% (36,384,788,417 shares) are held by the Colombian Government. The value of the reserve shares amounts to \$11,499,933 comprised of 18,883,305,310 shares. As of December 31, 2018 and 2017, subscribed and paid-in capital amounts to \$25,040,067. There are no potentially dilutive shares.

### 22.2 **Additional paid-in capital**

Additional paid-in capital mainly corresponds to: (i) share premium from the Ecopetrol Business Group's capitalization in 2007, for COP\$4,457,997, (ii) COP\$31,377 share premium from the placement of shares on the secondary market, arising from the calling of guarantees from debtors in arrears, according to the provisions of Article 397 of the Code of Commerce, (iii) share premium from the sale of shares awarded in the second capitalization, which took place in September 2011, of COP\$2,118,468, and (iv) additional paid-in capital receivables for COP\$(143).

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### 22.3 Equity reserves

The following is the composition of the Ecopetrol Business Group's reserves as of December 31, 2018 and 2017:

	2018	2017
Legal reserve	2,088,192	1,426,151
Fiscal and statutory reserves	509,081	512,632
Occasional reserves <sup>(1)</sup>	2,541,622	239,086
	<b>5,138,895</b>	<b>2,177,869</b>

The movement of equity reserves is the following for the years ended December 31, 2018 and 2017:

	2018	2017
<b>Opening balance</b>	2,177,869	1,558,844
Release of reserves	(751,718)	(289,164)
Allocation to reserves	3,712,744	908,189
<b>Closing balance</b>	<b>5,138,895</b>	<b>2,177,869</b>

<sup>(1)</sup> Occasional reserves

As of December 31, 2018, occasional reserves correspond to allocation of net income as approved by the shareholders at the Stockholders' Meeting to carry out new explorations and strategic growth. As of December 31, 2017, the appropriation of occasional reserves correspond to the establishment of a reserve for new explorations.

### 22.4 Retained earnings and dividends

The Ecopetrol Business Group distributes dividends based on its separate annual financial statements, prepared under International Financial Reporting Standards accepted in Colombia (NCIF, by its acronym in Spanish).

The Ordinary General Shareholders' Meeting, held on March 29, 2019, approved the profit distribution for 2018 and set the distribution of dividends at COP\$9,251,256.

The Ordinary General Shareholders' Meeting, held on March 23, 2018, approved the profit distribution for 2017 and set the distribution of dividends at COP\$3,659,386. Dividends paid in 2018 attributable to the shareholders of Ecopetrol S.A. amounted to COP\$3,659,373 (2017 - COP\$945,661) and those of the non-controlling interest to COP\$768,328 (2017 - COP\$558,986).

### 22.5 Other comprehensive income attributable to owners of parent

The following is the composition of the other comprehensive income attributable to the shareholders of the parent, Ecopetrol S.A., net of tax:

	2018	2017	2016
Foreign currency translation	10,412,499	7,883,231	8,138,382
Cash flow hedge with derivative instruments	(30,962)	6,942	(19,042)
Cash flow hedges for future exports (Note 28.1.2)	(374,079)	159,295	244,131
Actuarial gain on defined benefit plans	(557,381)	(553,091)	994,953
Hedge of a net investment in a foreign operation (Note 28.1.3)	(1,069,316)	(97,362)	(155,359)
Gain on equity instruments measured at fair value	-	-	7,828
Others	-	-	11,817
	<b>8,380,761</b>	<b>7,399,015</b>	<b>9,222,710</b>

### 22.6 Earnings per share

	2018	2017	2016
Profit attributable to Ecopetrol's shareholders	11,381,386	7,178,539	2,447,881
Weighted average number of outstanding shares	41,116,694,690	41,116,694,690	41,116,694,690
Net basic earnings per share (Colombian pesos)	<b>COPS 276.8</b>	<b>COPS 174.6</b>	<b>COPS 59.5</b>

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**23. Sales revenue from contracts with customers**

The following is the breakdown of sales revenue for the years ended December 31, 2018, 2017 and 2016:

	2018	2017	2016
<b>National sales</b>			
Mid-distillates	11,586,192	9,590,326	8,553,503
Gasoline and turbo fuels	7,952,852	6,990,187	6,092,739
Transport services	3,531,404	3,589,553	3,817,991
Natural gas	1,885,846	1,815,754	1,988,336
Plastic and rubber	822,367	833,982	724,708
LPG and propane	574,639	509,619	405,869
Crude oil	550,479	909,871	553,666
Fuel oil	509,482	354,058	148,248
Asphalts	335,426	275,803	340,400
Aromatics	282,545	217,418	186,228
Polyethylene	270,887	167,348	203,959
Services	239,410	283,799	225,293
Other income gas contracts	156,031	188,195	271,337
Other products	489,507	280,226	184,873
	<b>29,187,067</b>	<b>26,006,139</b>	<b>23,697,150</b>
Recognition of price differential (1)	3,835,533	2,229,953	1,048,022
	<b>33,022,600</b>	<b>28,236,092</b>	<b>24,745,172</b>
<b>Foreign sales</b>			
Crude oil	26,898,737	21,479,063	17,278,579
Diesel	3,050,839	1,213,740	1,604,498
Fuel oil	2,053,594	1,982,408	2,158,539
Gasoline and turbo fuels	1,782,194	1,223,994	1,046,758
Plastic and rubber	1,268,582	1,169,101	1,171,342
Natural gas	27,899	32,303	58,809
LPG and propane	20,212	15,631	8,568
Cash flow hedge for future exports – Reclassification to profit or loss (Note 28.1.2)	128,404	160,772	33,074
Other products	350,811	441,124	380,222
	<b>35,581,272</b>	<b>27,718,136</b>	<b>23,740,389</b>
	<b>68,603,872</b>	<b>55,954,228</b>	<b>48,485,561</b>

(1) Corresponds to the application of Decree 1068 of 2015, which establishes the procedure to recognize the subsidy for refiners and importers of current motor gasoline and ACPM, and the methodology for calculating the net position (value generated between the parity price and the regulated price, which can be positive or negative). See Note 4.16 – Sales revenue recognition from contracts with customers.

**Sales by geographic areas**

The following are the sales revenue by geographic area for the years ended December 31, 2018, 2017 and 2016:

	2018	%	2017	%	2016	%
Colombia	33,022,600	48.1%	28,236,092	50.5%	24,745,172	51.0%
United States	14,765,674	21.5%	12,532,932	22.4%	11,956,967	24.7%
Asia	12,271,225	17.9%	6,136,796	11.0%	2,717,414	5.6%
Central America and the Caribbean	4,449,033	6.5%	6,070,565	10.8%	3,551,894	7.3%
South America and others	2,968,038	4.3%	1,947,226	3.5%	2,568,163	5.3%
Europe	1,127,302	1.6%	1,030,617	1.8%	2,945,951	6.1%
	<b>68,603,872</b>	<b>100%</b>	<b>55,954,228</b>	<b>100%</b>	<b>48,485,561</b>	<b>100%</b>

**Concentration of customers**

During 2018, Organización Terpel S.A. represented 14.0% of sales revenue for the period (2017 – 14.3% and 2016 – 14.4%); no other customer represented more than 10% of total sales. There is no risk of the Ecopetrol Business Group's financial situation being affected by a potential loss of the client. The commercial relationship with this customer is for the sale of refined products and transportation services.

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24. **Cost of sales**

	2018	2017	2016
<b>Variable costs</b>			
Imported products (1)	11,809,529	11,637,419	12,049,477
Purchases of hydrocarbons – ANH (2)	5,667,567	4,338,576	3,178,199
Depreciation, amortization and depletion	5,064,518	5,765,186	5,333,245
Purchases of crude in association and concession	3,820,746	2,240,704	1,517,829
Process materials	968,884	889,122	608,535
Hydrocarbon transport services	696,964	665,714	783,307
Electric energy	662,297	561,424	618,675
Purchases of other products and gas	632,509	488,056	519,884
Taxes and contributions (3)	441,207	449,959	478,332
Services contracted in associations	260,207	195,689	305,326
Others (4)	(186,087)	(663,916)	(432,694)
	<b>29,838,341</b>	<b>26,567,933</b>	<b>24,960,115</b>
<b>Fixed costs</b>			
Depreciation and amortization	2,555,176	2,366,849	2,050,739
Maintenance	2,260,984	2,038,970	1,998,128
Labor costs	2,105,803	1,815,213	1,571,511
Services contracted	1,796,354	1,414,056	1,083,176
Services contracted in associations	1,040,221	1,008,336	1,260,470
Materials and operating supplies	565,601	468,205	333,258
Taxes and contributions (3)	393,690	343,505	391,032
Hydrocarbon transport services	261,237	333,671	157,463
General costs	366,972	551,587	445,531
	<b>11,346,038</b>	<b>10,340,392</b>	<b>9,291,308</b>
	<b>41,184,379</b>	<b>36,908,325</b>	<b>34,251,423</b>

(1) Imported products correspond mainly to diesel fuel and diluent to facilitate the transport of heavy crude oil.

(2) Corresponds to purchases of crude oil by Ecopetrol from the National Hydrocarbons Agency (ANH) derived from national production, both of the Ecopetrol Business Group in direct operation and of third parties.

(3) Includes gas royalties paid and carbon tax.

(4) Corresponds to the capitalization of the inventory, product of the costing and valuation process, since the concepts that make up the cost of sales are recognized for the entire amount incurred.

25. **Administrative, operations and project expenses**

The following is the detail of administration, operation and project expenses, according to their function, for the years ended December 31, 2018, 2017 and 2016:

	2018	2017	2016
<b>Administrative expenses</b>			
General expenses	911,645	723,341	556,563
Labor expenses	662,258	624,424	657,051
Taxes (1)	39,117	362,963	663,889
Depreciation and amortization	40,838	53,796	45,765
	<b>1,653,858</b>	<b>1,764,524</b>	<b>1,923,268</b>
<b>Operations and project expenses</b>			
Exploration costs	1,387,379	1,341,940	728,590
Taxes (1)	433,506	324,223	286,331
Commissions, fees, freights and services	466,862	471,657	568,513
Labor expenses	316,386	310,947	278,383
Fee for regulatory entities	98,794	63,470	87,325
Depreciation and amortization	44,318	95,516	177,252
Maintenance	50,846	122,273	147,197
Others	105,041	196,039	478,096
	<b>2,903,132</b>	<b>2,926,065</b>	<b>2,751,687</b>

(1) For 2017 and 2016, mainly corresponds to the recognition of the wealth tax. See Note 10 – Taxes.

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**26. Other operating (expenses) income, net**

The following is the detail of other operating income or expenses for the years ended December 31, 2018, 2017 and 2016:

	<b>2018</b>	<b>2017</b>	<b>2016</b>
(Expense) reversal of provisions for litigations	(68,398)	(72,408)	112,999
Expense for gas pipeline availability BOMT contracts <sup>(1)</sup>	-	(72,318)	(125,077)
Impairment loss of short-term assets	(105,692)	(68,800)	(98,739)
(Loss) profit on sale of assets	(93,601)	40,227	(82,200)
(Loss) gain on acquisition of interests in joint operation (Note 30.3)	(12,065)	451,095	-
Compensation received	-	-	17,790
Deferred income BOMT contracts <sup>(2)</sup>	-	-	211,768
Other income	244,301	227,607	237,571
	<b>(35,455)</b>	<b>505,403</b>	<b>274,112</b>

(1) Corresponds to the services rendered in connection with the BOMT contracts for the construction, operation, maintenance and transfer of gas pipelines with Transgas. This contract terminated in August 2017.

(2) Corresponds to the amortization of the deferred income recognized by Ecopetrol in 2007 for the advance payment made by the Ministry of Finance and Public Credit of the obligations by Ecogas, in relation to the BOMT contracts for the construction, operation, maintenance and transfer of gas pipelines, signed between Ecopetrol and Transgas de Occidente, Centragas and Gases de Boyacá and Santander S.A. in 1997. The amortization of this deferred income ended in December 2016.

**27. Financial result, net**

The following is the detail of financial results for the years ended December 31, 2018, 2017 and 2016:

	<b>2018</b>	<b>2017</b>	<b>2016</b>
<b>Finance income</b>			
Results from financial assets and others	745,571	739,148	136,715
Yields and interests	383,624	405,562	386,001
Gain on sale of equity instruments	-	13,236	47,129
Resources from Santiago de las Atalayas <sup>(1)</sup>	-	-	688,664
Other financial income	368	1,410	53,234
	<b>1,129,563</b>	<b>1,159,356</b>	<b>1,311,743</b>
<b>Finance expenses</b>			
Interest <sup>(2)</sup>	(2,399,414)	(2,385,994)	(2,765,024)
Financial cost of other liabilities <sup>(3)</sup>	(668,782)	(753,047)	(580,491)
Results from financial assets	(381,445)	(481,308)	(48,997)
Other financial expenses	(62,520)	(40,252)	(69,028)
	<b>(3,512,161)</b>	<b>(3,660,601)</b>	<b>(3,463,540)</b>
<b>Foreign exchange gain (loss), net</b>	<b>372,223</b>	<b>5,514</b>	<b>976,430</b>
<b>Financial result, net</b>	<b>(2,010,375)</b>	<b>(2,495,731)</b>	<b>(1,175,367)</b>

(1) On November 8, 2016, the Ministry of Mines and Energy concluded that the resources that were restricted in relation to this process were not royalties and, therefore, were not due to the Comuneros. In accordance with the foregoing, the resources held by Ecopetrol are its property, without any claim or discussion to date regarding ownership title thereof. On November 8, 2016, the amount claimed reached COP\$688,664, originated mostly from the valuation and financial yield of the fund where the resources were deposited. The recovery of this provision was recognized in the net financial results of the period ending December 31, 2016.

(2) As of December 31, 2018, borrowing costs for the financing of developing natural resources and property, plant and equipment of COP\$200,833 (2017 – COP\$191,651 and 2016 – COP\$341,209) were capitalized.

(3) Includes the financial expense of the asset retirement obligation and the liabilities for post-employment benefits.



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**28. Risk management**

**28.1 Exchange rate risk**

The Ecopetrol Business Group operates mainly in Colombia and makes sales in the local and international markets, for that reason, it is exposed to exchange rate risk, which arises from various foreign currency exposures due to commercial transactions and assets and liabilities denominated in foreign currency. The impact of exchange rate fluctuations, especially the Colombian peso/U.S. dollar exchange rate, has been material in previous years. To mitigate this risk, the Ecopetrol Business Group's risk management strategy involves the use of non-derivative financial instruments related to cash flow hedges for future exports and net investment of foreign operations to minimize exchange rate risk exposure.

The U.S. dollar/Colombian peso exchange rate has fluctuated over the last few years. As of December 31, 2018, the Colombian peso depreciated 8.9%. The closing rates were COP\$3,249.75, COP\$2,984.00 and COP\$3,000.71 for 2018, 2017 and 2016, respectively.

When the Colombian peso appreciates in relation to the U.S. dollar, export sales revenue decreases when converted to Colombian pesos; by contrast, imported goods, operating costs and interest on foreign debt denominated in U.S. dollars become less expensive. Conversely, when the Colombian peso depreciates, export revenues, when translated to Colombian pesos, increase and imports and servicing of the external debt become more expensive.

The following table sets out the carrying amount for financial assets and liabilities with exchange exposure denominated as of December 31, 2018 and 2017:

(in US\$Million)	2018	2017
Cash and cash equivalents	514	1,203
Other financial assets	2,138	1,072
Trade receivables and payables, net	(202)	(7)
Loans and borrowings	(9,689)	(12,590)
Other assets and liabilities, net	63	-
<b>Net liability position</b>	<b>(7,176)</b>	<b>(10,322)</b>

Of the total net liability position, US\$(335) million correspond to net liabilities in dollars with exchange exposure of companies with Colombian peso as functional currency and a net amount of US\$(341) million correspond to monetary assets and liabilities with exchange exposure of companies whose functional currency is different from Colombian peso; for both cases valuation is recognized in profit or loss. The balance of loans and borrowings includes non-derivative hedging instruments of Ecopetrol for US\$(6,500), for which valuation is recognized in other comprehensive income, within the equity.

**28.1.1 Sensitivity analysis for exchange rate risk**

The Ecopetrol Business Group's risk management strategy involves the use of non-derivative financial instruments related to cash flow hedges for future exports and hedges of a net investment in a foreign operation in order to minimize exposure to currency rate risk, which is detailed below.

The following is the effect of a change of 1% and 5% in the exchange rate of the Colombian peso as compared with the U.S. dollar, on the balance of financial assets and liabilities denominated in foreign currency as of December 31, 2018:

Scenario / Variation in the exchange rate	Effect on income before taxes (+/-)	Effect on other comprehensive income (+/-)
1%	(10,887)	222,315
5%	(54,433)	1,111,577

The sensitivity analysis only includes financial assets and liabilities in foreign currency at the closing date.

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**28.1.2 Cash flow hedge for future exports**

Ecopetrol is exposed to foreign exchange risk given that a significant percentage of its income from crude oil exports is denominated in U.S. dollars. In recent years, the Ecopetrol Business Group has acquired long-term debt for investment activities in the same currency in which it expects to receive the cash flow of its export sales revenues. This situation creates a natural hedge relationship due to the fact that the risks generated by the foreign exchange difference of export sales revenues when booked in Ecopetrol's functional currency (Colombian pesos) are naturally hedged with the foreign exchange variances of the long-term debt, in line with the Ecopetrol Business Group's risk management strategy.

With the objective of presenting in the financial statements, the effect of the existing natural hedge between exports and debt, understanding that the exchange rate risk materializes when the exports are made, on October 1, 2015, the Board of Directors designated the sum of US\$5,440 million of Ecopetrol's foreign currency debt as a hedge instrument of future revenue from crude oil exports, for the period 2015–2023, in accordance with IAS 39 – Financial instruments.

The following is the movement of foreign currency debt designated as a non-derivative hedging instrument for the years ended December 31, 2018 and 2017:

(US\$Million)	2018	2017
<b>Hedging instrument at the beginning of the period</b>	<b>3,332</b>	<b>5,312</b>
Reassignment of hedging instruments	3,366	1,803
Realization of exports	(3,366)	(1,803)
Capital payments <sup>(1)</sup>	(2,032)	(1,980)
<b>Hedging instrument at the end of the period</b>	<b>1,300</b>	<b>3,332</b>

(1) On December 27, 2018, Ecopetrol S.A. paid in advance the entire 10-year international bond issued in 2009, whose nominal value was USD\$1,500 million. Equally, on June 30, 2017, Ecopetrol prepaid the entire outstanding balance of the international syndicated loan whose nominal value was US\$1,925 million and original maturity date was in February 2020.

The following is the movement of accumulated foreign currency gains and losses in respect of the cash flow hedge recognized in other comprehensive income for the years ended December 31, 2018, 2017 and 2016:

	2018	2017	2016
<b>Opening balance</b>	<b>(159,295)</b>	<b>(244,131)</b>	<b>217,291</b>
Exchange difference	704,871	15,933	(724,395)
Reclassification to profit or loss	128,404	160,772	(33,074)
Ineffectiveness	(35,617)	(9,247)	–
Deferred income tax	(264,284)	(82,622)	296,047
<b>Closing balance</b>	<b>374,079</b>	<b>(159,295)</b>	<b>(244,131)</b>

The expected reclassification of the cumulative exchange rate difference in other comprehensive income to the profit or loss statement, is as follows:

Year	Before taxes	Taxes	After taxes
2019	(375,261)	123,836	(251,425)
2020	(45,940)	15,160	(30,780)
2021	(48,203)	15,907	(32,296)
2022	(48,203)	15,907	(32,296)
2023	(34,878)	7,596	(27,282)
	<b>(552,485)</b>	<b>178,406</b>	<b>(374,079)</b>

**28.1.3 Hedge of a net investment in a foreign operation**

The Board of Directors approved the application of net investment hedge accounting from June 8, 2016. The measure is intended to reduce the volatility of non-operating income due to exchange rate variations. The net investment hedge will be applied on a portion of the Ecopetrol Business Group's investments in foreign operations, in this case on investments in subsidiaries which have the U.S. dollar as their functional currency, using a portion of the Ecopetrol Business Group's U.S. dollar denominated debt as the hedging instrument.

Ecopetrol S.A. has designated its net investments in Ocesa, Ecopetrol America Inc., Hocol Petroleum Ltd. (HPL) and Reficar as hedged items and as a hedging instrument and US\$5,200 million of the Ecopetrol Business Group's U.S. dollar debt as a hedging instrument.

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The following is the movement of accumulated foreign currency gains and losses in respect of the net investment hedge recognized in other comprehensive income for the years ended December 31, 2018, 2017 and 2016:

	2018	2017	2016
<b>Opening balance</b>	<b>97,362</b>	<b>155,359</b>	–
Exchange difference	1,381,900	(86,892)	231,879
Ineffectiveness	378	329	–
Deferred income tax	(410,324)	28,566	(76,520)
<b>Closing balance</b>	<b>1,069,316</b>	<b>97,362</b>	<b>155,359</b>

#### 28.1.4 Hedging with derivatives to minimize currency risk

The Ecopetrol Business Group carries out forward hedging operations using the non-delivery modality, for mitigating the volatility of the exchange rate in the cash flow required for operations of its subsidiary, Ocesa, whose functional currency is the US dollar. The forward hedging instruments are used to enable setting sales prices in U.S. dollars, mitigating the foreign exchange variation given Ocesa's obligations relative to operational cost and tax payments are payable in Colombian pesos. The accounting policy applicable to this operation is described in the Note 4.1.5.1.

As of December 31, 2018, there are forward contracts with a net short position for US\$332 million (2017 – US\$325 million) with maturities between January and December 2019.

The impact on the statement of profit or loss for the settlement of these hedges amounted to COP\$80,636 (2017 – COP\$99,971) and the amount recognized in the other comprehensive income was a loss of COP\$(52,174) (2017 COP\$35,768 and 2016 COP\$33,869).

#### 28.1.5 Commodity price risk

Ecopetrol's business is significantly impacted by international prices for crude oil and refined products. The prices for these products are volatile and drastic changes could adversely affect the Ecopetrol Business Group business prospects and results of operations.

A large proportion of Ecopetrol's sales revenues come from sales of crude oil, natural gas and refined products. These products are indexed to international reference prices such as the Brent index. Consequently, fluctuations in those international indexes have a direct effect on the financial condition and Group's results of operations.

Prices of crude oil, natural gas and refined products have historically fluctuated as a result of a variety of factors including, among others, competition within the oil and natural gas industry; changes in international prices of natural gas and refined products; long-term changes in the demand for crude oil, natural gas and refined products; regulatory changes; changes in the cost of capital; adverse economic conditions; transactions in derivative financial instruments related to oil and gas and development or availability of alternative fuels.

The Ecopetrol Business Group has a policy approved by the Board of Directors that allows it to use derivative financial instruments in the organized over the counter (OTC) market to cover itself from the risk of price fluctuations of crude oil and refined products associated with physical transactions. The Ecopetrol Business Group has established appropriate processes to handle risk which include constant monitoring of physical and financial markets to identify risks in order to subsequently prepare and execute hedging strategies.

Ecopetrol does not regularly use derivative instruments to hedge exposures to sales or purchase price risks. The impact of the settlement of the price hedges made in 2016 was not material and was made as hedging instruments to mitigate risk at different price indices to the benchmark of the Ecopetrol Business Group's international trade strategy on exports of crude and imports of products.

In 2018 and 2017, hedging transactions were not carried out with derivative instruments. In 2016, then outstanding price hedges were settled in full, with an impact on the result of the period of COP\$3,181.

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**28.2 Credit risk**

Credit risk is the risk that the Ecopetrol Business Group may suffer financial losses as a consequence of default of: (a) payments by its clients for the sale of crude oil, gas, products or services; (b) financial institutions in which it keeps investments, or (c) by counterparties with which it has contracted financial instruments.

**28.2.1 Credit risk for customers**

In the selling process of crude oil, gas, refined products and petrochemicals, and transport services, the Ecopetrol Business Group may be exposed to credit risk in the event that customers fail to fulfill their payment obligations. The Ecopetrol Business Group's risk management strategy has designed mechanisms and procedures that aim to minimize such events, thus safeguarding the Ecopetrol Business Group's cash flow.

The Ecopetrol Business Group performs a continuous analysis of the financial strength of its counterparties, by classifying them according to their risk level and financial guarantees in the event of a default of payments. Similarly, the Ecopetrol Business Group continuously monitors national and international market conditions for early alerts of major changes that may have an impact on the timely payment of obligations from customers of the Ecopetrol Business Group.

Allowances for loan losses are set by individual analysis of each customer's situation. The Ecopetrol Business Group performs administrative and legal actions required to recover amounts past due and charges interest from customers that fail to comply with payment policies.

Ecopetrol does not have a significant concentration of credit risk. An aging analysis of the accounts receivable portfolio in arrears, but not impaired, as of December 31, 2018 and 2017 is as follows:

	<b>2018</b>	<b>2017</b>
Less than 3 months overdue	157,608	65,354
Between 3 and 6 months overdue	41,263	1,131
More than 6 months overdue	93,657	79,688
	<b><u>292,528</u></b>	<b><u>146,173</u></b>

### 28.2.2 Credit quality of resources in financial assets

Following the promulgation of Decree 1525 of 2008, which provides general rules on investments for public entities, Ecopetrol's management established guidelines for our investment portfolios. These guidelines determine that investments in Ecopetrol's U.S. dollar portfolio are generally limited to investments of our excess cash in fixed-income securities issued by entities rated A or higher in the long term and A1/P1/F1 or higher in the short term (international scale) by Standard & Poor's Ratings Services, Moody's Investors Service or Fitch Ratings.

In addition, Ecopetrol S.A. may also invest in securities issued or guaranteed by the U.S. government or Colombian government, without regard to the ratings assigned to such securities. In Ecopetrol's Colombian Peso portfolio, it must invest our excess cash in fixed-income securities of issuers rated AAA in the long term, and F1+/BRC1+ in the short term (local scale) by Fitch Ratings Colombia or BRC Standard & Poor's. In addition, Ecopetrol may also invest in securities issued or guaranteed by the Colombian government without rating restrictions.

In order to diversify risk in our Colombian Peso portfolio, Ecopetrol does not invest more than 10% of the excess of cash in one specific issuer. In the case of our U.S. dollar portfolio, it does not invest more than 5% of the excess of cash in one specific issuer in the short term (up to one year), or 1% in the long term. The Ecopetrol Business Group has complied with this policy.

Ecopetrol's investment portfolio in U.S. dollars is segmented into four tranches, each one matching our liquidity needs. The working capital tranche is calculated taking into account our cash flow needs for the next 60 days. The liquidity tranche is calculated as the contingent cash flow needs over the working capital, taking into account the development of capital expenditures related to projects. The asset liability tranche is built to match our long-term debt. The investment tranche includes the remaining amount of the total portfolio after deducting the amounts pertaining to the above mentioned tranches and after subtracting the Colombian Peso portfolio.

Ecopetrol's investment portfolio in Colombian Pesos is segmented in two tranches, each one matching our liquidity needs. The first tranche is calculated taking into account our cash flow needs for the next 30 days, and the second tranche is built for investment purposes.

The credit rating of issuers and counterparties in transactions involving financial instruments is disclosed in Note 6 – Cash and cash equivalents, Note 9 – Other financial assets and Note 20 – Provisions for employees' benefits.

### 28.3 Interest rate risk

Interest rate risk arises from Ecopetrol's exposure to changes in interest rates because the Ecopetrol Business Group has investments in fixed and floating-rate instruments and has issued floating rate debt linked to LIBOR, DTF and CPI interest rates. Thus, interest rate volatility may affect the fair value and cash flows of the Ecopetrol Business Group's investments and the financial expense of floating rate loans and financing.

As of December 31, 2018, 17% (2017, 19% and 2016, 31%) of the Ecopetrol Business Group's indebtedness is linked to floating interest rates. As a result, if market interest rates rise, financing expenses will increase, which could have an adverse effect on the results of operations.

Ecopetrol controls the exposure to interest rate risk by establishing limits to exposure duration, Value at Risk – VAR and *tracking error*.

Autonomous equities linked to Ecopetrol's pension obligations are also exposed to changes in interest rates, as they include fixed and floating rate instruments that are marked to market. Colombian regulation for pension funds, as stipulated in the Decree 941 of 2002 and Decree 1861 of 2012, indicates that they have to follow the same regime as the regular obligatory pension funds in their moderate portfolio.

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The following table provides information about the sensitivity of the Ecopetrol Business Group's results and other comprehensive income for the next 12 months to variations in interest rate of 100 basis points:

	<b>Effect on profit or loss (+/-)</b>		<b>Effect on Other</b>
	<b>Financial assets</b>	<b>Financial Liabilities</b>	<b>Comprehensive Income (+/-)</b>
+100 basis points	(71,123)	240,711	(513,699)
-100 basis points	71,123	(94,062)	527,058

A sensitivity analysis of discount rates on pension plan assets and liabilities is disclosed in Note 20 – Provisions for employees' benefits.

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#### 28.4 Liquidity risk

The ability to access capital necessary to finance the Ecopetrol Business Group's investment plans on acceptable terms can be limited due to deterioration in market conditions. A global financial crisis could worsen risk perception in emerging markets.

Events impacting the political and regional environment of Colombia, could make it difficult for our subsidiaries to access capital markets. These conditions, together with potential significant losses in the financial services sector and changes in credit risk assessments, may make it difficult to obtain financing on favorable terms. As a result, the Ecopetrol Business Group may be forced to review the opportunity and scope of its investment plans as necessary, or access financial markets under less favorable terms, thereby negatively affecting the Ecopetrol Business Group's results of operations and financial position.

Liquidity risk is managed in accordance with the Ecopetrol Business Group's policies aimed at ensuring that there are sufficient net funds to meet the Ecopetrol Business Group's financial commitments within its maturity schedules with no additional costs. The main method for the measurement and monitoring of liquidity is cash flow forecasting.

During 2018, the Ecopetrol Business Group used US\$2,446 million equivalents (2017 – US\$2,400 million) as part of its liquidity surpluses to prepay part of its debts with original maturities between 2019 and 2025. The details of these movements are described in Note 18 – Loans and borrowings.

The following is a summary of the maturity of financial liabilities as of December 31, 2018. The amounts disclosed in the table are the contractual undiscounted cash flows. The payments in foreign currency were restated taking a constant exchange rate of COP\$3,249.75 per U.S. dollar. Consequently, these amounts may not reconcile with the amounts disclosed on the consolidated statement of financial position:

	Up to 1 year	1–5 years	5–10 years	> 10 years	Total
Loans (payment of principal and interest)	3,570,843	16,093,120	20,942,328	19,300,708	59,906,999
Trade and other payables	8,945,790	30,522	–	–	8,976,312
<b>Total</b>	<b>12,516,633</b>	<b>16,123,642</b>	<b>20,942,328</b>	<b>19,300,708</b>	<b>68,883,311</b>

#### 28.5 Capital management

The main objective of the capital management of the Ecopetrol Business Group is to ensure a financial structure that optimizes the cost of capital, maximizes the rate of return to its shareholders and allows access to financial markets at a competitive cost to cover financing needs that support an investment grade credit rating profile.

Net financial debt is calculated by taking short-term and long-term loans and borrowings less cash and cash equivalents and investments in securities as of December 31 of each year. The level of leverage is calculated as the ratio between net financial debt and the sum of equity and net financial debt. The following is the information of these indicators as of December 31, 2018 and 2017:

	2018	2017
Loans and borrowings (Note 18)	38,062,645	43,547,835
Cash and cash equivalents (Note 6)	(6,311,744)	(7,945,885)
Other financial assets (Note 9)	(8,147,815)	(6,533,725)
<b>Net financial debt</b>	<b>23,603,086</b>	<b>29,068,225</b>
<b>Equity (Note 22)</b>	<b>57,107,780</b>	<b>48,215,699</b>
<b>Leverage</b>	<b>29.24%</b>	<b>37.61%</b>

The movement of the net financial debt is detailed in Note 18.8.



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**29. Related parties**

Balances with associates and joint ventures as of December 31, 2018 and 2017 are as follows:

	Accounts receivable	Accounts receivable – Loans	Other assets	Accounts payable	Loans	Other liabilities
<b>Joint Ventures</b>						
Equion Energy Limited <sup>(1)</sup>	22,958	–	19,214	87,079	855,135	67
Ecodiesel Colombia S.A.	522	–	–	23,857	–	1
Offshore International Group Inc. <sup>(2)</sup>	–	117,824	–	–	–	–
<b>Associates</b>						
Serviport S.A.	–	–	–	5,482	–	–
<b>Balance as of December 31, 2018</b>	<b>23,480</b>	<b>117,824</b>	<b>19,214</b>	<b>116,418</b>	<b>855,135</b>	<b>68</b>
Current	23,480	–	19,214	116,418	855,135	68
Non-current	–	117,824	–	–	–	–
	<b>23,480</b>	<b>117,824</b>	<b>19,214</b>	<b>116,418</b>	<b>855,135</b>	<b>68</b>
	(Note 7)	(Note 7)	(Note 11)	(Note 19)	(Note 18)	

	Accounts receivable	Accounts receivable – Loans	Other assets	Accounts payable	Loans	Other liabilities
<b>Joint Ventures</b>						
Equion Energy Limited <sup>(1)</sup>	4,010	–	7,716	101,472	259,760	7
Ecodiesel Colombia S.A.	362	–	–	22,228	–	–
Offshore International Group Inc. <sup>(2)</sup>	–	154,810	–	–	–	–
<b>Associates</b>						
Invercolsa S.A.	18,641	–	–	–	–	–
Serviport S.A.	–	–	–	5,820	–	–
<b>Balance as of December 31, 2017</b>	<b>23,013</b>	<b>154,810</b>	<b>7,716</b>	<b>129,520</b>	<b>259,760</b>	<b>7</b>
Current	23,013	–	7,716	129,520	259,760	7
Non-current	–	154,810	–	–	–	–
	<b>23,013</b>	<b>154,810</b>	<b>7,716</b>	<b>129,520</b>	<b>259,760</b>	<b>7</b>
	(Note 7)	(Note 7)	(Note 11)	(Note 19)	(Note 18)	

**Loans with related parties:**

(1) Deposits held by Equion in Capital AG for a nominal value of USD\$263 million (2017 – USD\$77 million), with a three-month Libor rate + 1.92% (2017 - 1.44%).

(2) Loan granted by Ecopetrol S.A. to Savia Perú S.A. (subsidiary of Offshore International Group) for US\$57 million in 2016, with an interest rate of 4.99% payable semiannually from 2017 and maturing in 2021. The balance in nominal value of this loan as of December 31, 2018 is USD\$35 million (2017 – USD\$49 million).

The amounts outstanding are not guaranteed and will be settled in cash. No expense has been recognized in the current period or in previous periods with respect to uncollectible or doubtful accounts related to the amounts owed by related parties.

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The main transactions with related parties for years ended December 31, 2018, 2017 and 2016 are detailed as follows:

	2018		2017		2016	
	Sales and services	Purchases and others	Sales and services	Purchases and others	Sales and services	Purchases and others
<b>Joint Ventures</b>						
Equion Energy Limited	67,002	846,284	425,881	598,636	491,698	418,618
Ecodiesel Colombia S.A	6,860	267,498	6,583	259,269	5,744	265,584
Offshore International Group	2,386	–	15,188	–	6,285	–
<b>Associates</b>						
Serviport S.A.	–	–	–	–	–	24,572
	<b>76,248</b>	<b>1,113,782</b>	<b>447,652</b>	<b>857,905</b>	<b>503,727</b>	<b>708,774</b>

### 29.1 Directors and key management personnel

In accordance with the approval given by the shareholders' meeting in 2012, compensation paid to directors for attending the meetings of the Board of Directors and/or committees increased from four to six minimum legal monthly salaries in force, or approximately to COP\$4,687,000 for 2018, from COP\$4,426,000 for 2017 and COP\$4,140,000 for 2016. For non-face-to-face sessions, 50% of the quota for face-to-face meetings is set. The members of the Board of Directors do not have any kind of variable remuneration. The amount paid in 2018 for compensation to members of the Board of Directors amounted to COP\$2,152 (2017 – COP\$1,877 and 2016 – COP\$1,253).

The total compensation paid to Directors as of December 31, 2018, amounted to COP\$21,580 (2017 – COP\$20,669 and 2016 – COP\$13,901). Directors are not eligible to receive pension and retirement benefits. The total amount reserved as of December 31, 2018, to provide pension and retirement benefits to our eligible executive officers amounted to COP\$5,491 (2017 – COP\$5,401 and 2016 – COP\$4,674).

As of December 31, 2018, key management officers owned less than 1% of the outstanding shares of Ecopetrol S.A. as follows:

Key management personnel	% Shares
Felipe Bayón	<1% outstanding shares
Jaime Caballero	<1% outstanding shares
Jorge Calvache	<1% outstanding shares
Rafael Espinosa Rozo	<1% outstanding shares

### 29.2 Post-employment benefit plans

The administration and management of resources for payment of Ecopetrol's pension obligations are managed by autonomous pension funds (PAPs, by its acronym in Spanish) which serve as guarantee and payment sources. In 2008, Ecopetrol S.A. received the authorization to partially commute the value corresponding to monthly payments, bonds and quotas, transferring said obligations and the monies that support them to autonomous patrimonies of a pension nature, in accordance with the requirements of Decree 1833 of 2016.

Since November 2016, the entities that administer the resources are: Fiduciaria Bancolombia, Fiduciaria de Occidente and Consorcio Ecopetrol PACC (formed by Fiduciaria La Previsora, Fiduciaria Bancoldex, Fiduagraria and Fiduciaria Central).

These fiduciaries will manage the pension resources for a period of five years (2016-2021) and as compensation they receive remuneration with fixed and variable components, the latter are settled on the gross yields of the portfolios and charged to the resources administered.

### 29.3 Government related parties

The Colombian Government controls Ecopetrol with a stock ownership of 88.49%. The most significant transactions with governmental entities are comprised as follows:

#### (a) Purchase of oil from the National Hydrocarbons Agency – ANH

By nature of the business, the Ecopetrol Business Group has a direct relationship with ANH, an entity which operates under the rules of the Ministry of Mines and Energy, whose objective is to manage the oil and gas reserves and resources owned by the Colombian Nation.

Ecopetrol purchases the crude oil that the ANH receives from producers in Colombia at the prices set in accordance with a jointly established formula, which reflects the export sale prices (crude oils and products), adjusted for API gravity quality, sulfur content, transportation rates from the wellhead to the ports of Coveñas and Tumaco, refining process cost and a commercialization rate. This contract was extended to January 31, 2020.

From December 2013 the Ecopetrol Business Group commercialized, on behalf of the ANH, the natural gas received by the latter in kind from producers. Since January 2014, ANH has received royalties in cash for the production of natural gas.

The purchase value of oil and gas from ANH is detailed in Note 24 – Cost of sales.

Additionally Ecopetrol, like other oil companies, takes part in “rounds” for the allocation of exploration blocks in Colombia without implying special treatment for Ecopetrol on account of it being an entity whose majority shareholder is the Colombian Government.

#### (b) Price differential

Regular gasoline and diesel sale prices are regulated by the National Government. In this case, there are differentials between the volume reported by the Colombian companies at the time of the sale and the difference between the international parity price and the regulated price actually charged, where the parity price is the daily price of gasoline and diesel oil of the respective month in Colombian pesos, indexed to the United States of America Gulf market, calculated in accordance with Resolution 18 0522 of 2010 and the Producer Price reference defined by the Ministry of Mines and Energy. These differentials may be in favor or against the producers. The value of this differential is detailed in Note 23 – Sales revenue from contracts with customers and Note 7 – Trade and other receivables, net.

#### (c) National Tax and Customs Direction

Ecopetrol, just like any other company in Colombia, has tax obligations that it must comply with and does not have any other kind of association or commercial relationship with the National Tax and Customs Direction. For more information see Note 10 – Taxes.

#### (d) Comptroller General of the Republic

Ecopetrol, just like any other state entity in Colombia, is obliged to comply with the requirements set out by the Comptroller General of the Republic and make an annual payment to this entity on account of a maintenance fee. Ecopetrol does not have any other kind of association or commercial relationship with this entity.

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**30. Joint operations**

The Ecopetrol Business Group carries out exploration and production operations through Exploration and Production (E&P) Contracts, Technical Evaluation (TEA) Contracts and Agreements signed with the National Hydrocarbons Agency or ANH, as well as through Partnership Contracts and other types of contracts. The main joint operations in 2018 are as follows:

**30.1 Contracts in which Ecopetrol is not the operator**

Partners	Contract	Type	% Participation	Geographic area of operations
Occidental Andina LLC	Chipirón	Production	30-40%	Colombia
	Harvest		30%	
	Cravo Norte Rondón		50% 50%	
Chevron Petroleum Group	Guajira	Production	57%	Colombia
Mansarovar Energy Colombia Ltd	Nare	Production	50%	Colombia
Frontera Energy Colombia Corp	Quifa	Production	40%	Colombia
Equion Energy Limited	Piedemonte	Production	50%	Colombia
Perenco Colombia Limited	Casanare	Production	64%	Colombia
	Corocora		56%	
	Estero		89%	
	Garcero		76%	
	Orocúe		63%	
ONGC Videsh Limited	RC-10 Caribbean Round	Exploration	50%	North Caribbean Offshore
Petrobras, Repsol & Statoil	Tayrona	Exploration	30%	North Caribbean Offshore
Repsol & Statoil	TEA GUA OFF-1	Exploration	50%	North Caribbean Offshore
Anadarko	Fuerte Norte	Exploration	50%	North Caribbean Offshore
Shell	Deep Rydberg/Aleatico	Exploration	29%	Gulf of Mexico
Repsol – Leon	Leon	Exploration	40%	Gulf of Mexico
Noble Energy	Gunflint	Production	32%	Gulf of Mexico
Murphy Oil	Dalmatian	Production	30%	Gulf of Mexico
Anadarko	K2	Production	21%	Gulf of Mexico
Equion Energia Limited	Niscota	Production	20%	Colombia
CNOOC – British Petroleum	Pau Brasil	Exploration	20%	Brazil
Chevron	CE-M-715_R11	Exploration	50%	Brazil
PC Carigali Mexico Operations S.A. de C.V. (Petronas)	CNH-R02-L01-A6.CS/2017	Exploration	50%	Mexico
Petroleos Mexicanos (PEMEX)	CNH-R02-L01-A8.CS/2017	Exploration and production	50%	Mexico

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**30.2 Contracts in which Ecopetrol is the operator**

Partners	Contract	Type	% Participation	Geographic area of operations
ExxonMobil Exploration Colombia	VMM29 CR2 C62	Exploration	50%	Colombia
Talisman Colombia Oil	CPO9	Exploration	55%	Colombia
ONGC Videsh Limited Colombia Branch	RC9	Exploration	50%	Colombia
CPVEN Sucursal Colombia	VMM32	Exploration	51%	Colombia
Shell Exploration and Production	CR4	Exploration	50%	Colombia
SK Innovation Co Ltd.	San Jacinto	Exploration	70%	Colombia
Repsol Exploración Colombia S.A.	Catleya	Exploration	50%	Colombia
Emerald Energy PLC Suc. Colombia	Cardon	Exploration	50%	Colombia
Talismán Colombia oil and gas Ltd.	CPO9 – Akacias	Production	55%	Colombia
Occidental Andina LLC	La Cira Infantas Teca	Production	62.1% 82%	Colombia Colombia
Ramshorn International Limited	Guariques I	Production	50%	Colombia
Equion Energy Limited	Cusiana	Production	98%	Colombia
Perenco Oil And Gas	San Jacinto Rio Paez	Production	18%	Colombia
Cepsa Colombia	San Jacinto Rio Paez	Production	18%	Colombia
Total Colombia	Mundo Nuevo	Exploration	15%	Colombia
Talisman Oil & Gas	Mundo Nuevo	Exploration	15%	Colombia
Lewis	Clarinero	Exploration	50%	Colombia
Maurel & Prom Suramerica	CPO17	Exploration	50%	Colombia
Equion Energia Limited	Alto Magdalena Pipeline	OAM	45%	Colombia
Emerald Energy	Alto Magdalena Pipeline	OAM	45%	Colombia
Frontera Energy	Alto Magdalena Pipeline	OAM	45%	Colombia
ONGC Videsh Limited	Block RC-9 Contract- Caribbean Round No. 37 -2007	Exploration	50%	Colombia
JX Nippon	FAZ-M-320 R11	Exploration	70%	Brazil
Ecopetrol	Potiguar	Exploration	100%	Brazil

### 30.3 Relevant operations during the period

During 2018 and 2017, the following significant events occurred in respect of our joint operations contracts:

#### (a) Agreement to acquire 10% of the Saturno Block

In December 2018, the Ecopetrol Business Group entered into an agreement with Shell and Chevron for a 10% interest in the Saturno block, located in the central region of the Santos basin, which was allocated to Shell and Chevron on September 28, 2018 in the Fifth Pre-Salt Round held by the Brazilian National Oil, Natural Gas and Biofuels Agency (ANP).

This deal is subject to approval by the Brazilian Ministry of Mines and Energy and the ANP. Once the respective approvals are forthcoming, the partners' shares of the block will be the following: Ecopetrol 10%, Shell (operating partner) 45% and Chevron 45%.

#### (b) Acquisition of interests in joint operations

On December 11, 2017, Ecopetrol América Inc. acquired the 11.6% interest in the K2 oil field in the Gulf of Mexico MCX Exploration USA LLC ("MCX"), increasing its share from 9.2% to 20.8%.

The acquisition of MCX's interest was recognized in accordance with policy 4.4 Joint Operations. To determine the fair value of the assets acquired and liabilities assumed, the income approach model was used, using the discounted cash flow and market data to determine the fair values of oil and gas properties. This model incorporated future commodity prices, estimated volumes of oil and gas reserves, future developments, operating costs, future abandonment and packing costs and a risk adjusted discount rate.

The fair value of the consideration transferred in the operation was US\$47.6 million (COP\$141,950), the fair value of the net assets acquired was US\$198.4 million before deferred taxes (US\$146 million net of deferred taxes) with recognition of a gain of US\$150.8 million before deferred taxes (US\$98 million after deferred taxes) in the period's statement of profit or loss (equivalent to COP\$451,095 before deferred taxes), mainly due to the transaction price being fixed before the closing date of the transaction and the fair value of the net identifiable assets acquired having increased during the interim period.

Transaction costs incurred in the operation amounted to US\$0.2 million, recognized in profit or loss for 2017.

During 2018, the Final Settlement Statement was made for COP\$12,065 (US COP\$4.2 million) recognized as an adjustment to the fair value of interests in joint operations.

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**31. Information by segments**

A description of the Ecopetrol Business Group's business segments is in Note 4.19 – Information by business segment.

**31.1 Statement of profit or loss**

The following segment information is reported based on the information used by the Board of Directors as the top body to make strategic and operational decisions of these business segments. The performance of the segments are based primarily on an analysis of income, costs, expenses and results for the period generated by each segment which are regularly monitored.

The information disclosed in each segment is presented net of transactions between the Ecopetrol Business Group companies.

Below are the consolidated statements of profit or loss by segment for the years ended December 31, 2018, 2017 and 2016:

	<b>For the year ended on December 31, 2018</b>				
	<b>Exploration and Production</b>	<b>Refining and Petrochemicals</b>	<b>Transport and Logistics</b>	<b>Eliminations</b>	<b>Total</b>
Third-party sales	30,112,900	34,947,948	3,543,024	-	68,603,872
Inter-segment sales	20,259,864	2,063,425	7,811,143	(30,134,432)	-
<b>Total sales revenue</b>	<b>50,372,764</b>	<b>37,011,373</b>	<b>11,354,167</b>	<b>(30,134,432)</b>	<b>68,603,872</b>
Fixed costs	(8,871,709)	(3,204,791)	(2,805,516)	3,535,979	(11,346,037)
Variable costs	(23,367,475)	(32,453,962)	(596,571)	26,579,666	(29,838,342)
<b>Cost of sales</b>	<b>(32,239,184)</b>	<b>(35,658,753)</b>	<b>(3,402,087)</b>	<b>30,115,645</b>	<b>(41,184,379)</b>
<b>Gross profit</b>	<b>18,133,580</b>	<b>1,352,620</b>	<b>7,952,080</b>	<b>(18,787)</b>	<b>27,419,493</b>
Administrative expenses	(889,293)	(443,880)	(320,498)	(187)	(1,653,858)
Operation and project expenses	(1,993,054)	(668,177)	(263,104)	21,203	(2,903,132)
Impairment of non-current assets	785,940	(984,704)	(169,870)	-	(368,634)
Other operating income and expenses, net	(137,836)	(13,652)	118,905	(2,872)	(35,455)
<b>Operating income (expenses)</b>	<b>15,899,337</b>	<b>(757,793)</b>	<b>7,317,513</b>	<b>(643)</b>	<b>22,458,414</b>
Financial result, net					
Financial income	1,099,893	147,689	110,898	(228,917)	1,129,563
Financial expenses	(2,038,312)	(1,295,528)	(407,589)	229,268	(3,512,161)
Foreign exchange gain (loss), net	868,479	(517,410)	21,154	-	372,223
	(69,940)	(1,665,249)	(275,537)	351	(2,010,375)
Share of profits of associates and joint ventures	135,265	27,730	2,841	-	165,836
<b>Income before tax</b>	<b>15,964,662</b>	<b>(2,395,312)</b>	<b>7,044,817</b>	<b>(292)</b>	<b>20,613,875</b>
Income tax	(6,096,591)	420,224	(2,582,118)	-	(8,258,485)
<b>Net profit (loss) for the period</b>	<b>9,868,071</b>	<b>(1,975,088)</b>	<b>4,462,699</b>	<b>(292)</b>	<b>12,355,390</b>
Profit (loss) attributable to:					
Group owners of parent	9,930,519	(1,973,075)	3,424,234	(292)	11,381,386
Non-controlling interest	(62,448)	(2,013)	1,038,465	-	974,004
	<b>9,868,071</b>	<b>(1,975,088)</b>	<b>4,462,699</b>	<b>(292)</b>	<b>12,355,390</b>
Supplementary information					
Depreciation, depletion and amortization	5,248,364	1,307,216	1,149,270	-	7,704,850

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**For the year ended on December 31, 2017**

	Exploration and Production	Refining and Petrochemicals	Transport and Logistics	Eliminations	Total
Third-party sales	25,004,320	27,343,359	3,606,549	–	55,954,228
Inter-segment sales	11,490,614	1,300,657	6,991,515	(19,782,786)	–
<b>Total sales revenue</b>	<b>36,494,934</b>	<b>28,644,016</b>	<b>10,598,064</b>	<b>(19,782,786)</b>	<b>55,954,228</b>
Fixed costs	8,055,925	2,886,745	2,637,604	(3,239,880)	10,340,394
Variable costs	18,254,159	23,968,650	634,231	(16,289,109)	26,567,931
<b>Cost of sales</b>	<b>26,310,084</b>	<b>26,855,395</b>	<b>3,271,835</b>	<b>(19,528,989)</b>	<b>36,908,325</b>
<b>Gross profit</b>	<b>10,184,850</b>	<b>1,788,621</b>	<b>7,326,229</b>	<b>(253,797)</b>	<b>19,045,903</b>
Administrative expenses	781,386	516,501	466,669	(32)	1,764,524
Operation and project expenses	2,070,916	965,457	142,847	(253,155)	2,926,065
Impairment of non-current assets	(183,718)	(1,067,965)	(59,455)	–	(1,311,138)
Other operating income and expenses, net	(545,218)	11,694	28,121	–	(505,403)
<b>Operating income (expenses)</b>	<b>8,061,484</b>	<b>1,362,934</b>	<b>6,748,047</b>	<b>(610)</b>	<b>16,171,855</b>
Financial result, net					
Financial income	1,062,393	164,006	106,659	(173,702)	1,159,356
Financial expenses	(2,288,576)	(1,110,874)	(434,664)	173,513	(3,660,601)
Foreign exchange gain (loss), net	(101,030)	163,992	(57,448)	–	5,514
	<b>(1,327,213)</b>	<b>(782,876)</b>	<b>(385,453)</b>	<b>(189)</b>	<b>(2,495,731)</b>
Share of profits of associates and joint ventures	120,786	15,245	(42,493)	–	93,538
<b>Income before tax</b>	<b>6,855,057</b>	<b>595,303</b>	<b>6,320,101</b>	<b>(799)</b>	<b>13,769,662</b>
Income tax	(3,034,556)	(238,625)	(2,527,087)	–	(5,800,268)
<b>Net profit (loss) for the period</b>	<b>3,820,501</b>	<b>356,678</b>	<b>3,793,014</b>	<b>(799)</b>	<b>7,969,394</b>
Profit (loss) attributable to:					
Group owners of parent	3,820,501	358,859	2,999,978	(799)	7,178,539
Non-controlling interest	–	(2,181)	793,036	–	790,855
	<b>3,820,501</b>	<b>356,678</b>	<b>3,793,014</b>	<b>(799)</b>	<b>7,969,394</b>
Supplementary information					
Depreciation, depletion and amortization	5,981,294	1,188,871	1,111,182	–	8,281,347

**For the year ended December 31, 2016**

	Exploration and Production	Refining and Petrochemicals	Transportation and Logistics	Eliminations	Total
Third-party sales	20,527,332	24,194,024	3,764,205	–	48,485,561
Inter-segment sales	7,693,878	629,690	6,884,571	(15,208,139)	–
<b>Total sales revenue</b>	<b>28,221,210</b>	<b>24,823,714</b>	<b>10,648,776</b>	<b>(15,208,139)</b>	<b>48,485,561</b>
Fixed cost	6,940,074	2,458,745	2,861,269	(2,968,780)	9,291,308
Variable cost	16,032,574	20,385,242	488,522	(11,946,223)	24,960,115
<b>Cost of sales</b>	<b>22,972,648</b>	<b>22,843,987</b>	<b>3,349,791</b>	<b>(14,915,003)</b>	<b>34,251,423</b>
<b>Gross profit</b>	<b>5,248,562</b>	<b>1,979,727</b>	<b>7,298,985</b>	<b>(293,136)</b>	<b>14,234,138</b>
Administrative expenses	832,266	574,413	516,884	(295)	1,923,268
Operation and projects expenses	1,656,960	1,206,718	180,353	(292,344)	2,751,687
Impairment of non-current assets	196,448	773,361	(41,062)	–	928,747
Other operating income and expenses, net	(349,419)	20,947	53,559	801	(274,112)
<b>Operating income (expenses)</b>	<b>2,912,307</b>	<b>(595,712)</b>	<b>6,589,251</b>	<b>(1,298)</b>	<b>8,904,548</b>
Financial result, net					
Financial income	983,472	46,469	61,373	220,429	1,311,743
Financial expenses	(2,017,641)	(952,006)	(262,844)	(231,049)	(3,463,540)
Foreign exchange gain (loss), net	923,573	94,715	(41,858)	–	976,430
	<b>(110,596)</b>	<b>(810,822)</b>	<b>(243,329)</b>	<b>(10,620)</b>	<b>(1,175,367)</b>
Share of profit of associates and joint ventures	39,397	22,785	(837)	–	61,345
<b>Income before tax</b>	<b>2,841,108</b>	<b>(1,383,749)</b>	<b>6,345,085</b>	<b>(11,918)</b>	<b>7,790,526</b>
Income tax	(1,518,738)	(446,595)	(2,577,713)	–	(4,543,046)
<b>Net profit (loss) for the period</b>	<b>1,322,370</b>	<b>(1,830,344)</b>	<b>3,767,372</b>	<b>(11,918)</b>	<b>3,247,480</b>
Income attributable to:					
Group owners of parent	1,322,370	(1,823,020)	2,960,449	(11,918)	2,447,881
Non-controlling interest	–	(7,324)	806,923	–	799,599
	<b>1,322,370</b>	<b>(1,830,344)</b>	<b>3,767,372</b>	<b>(11,918)</b>	<b>3,247,480</b>
Supplementary information					
Depreciation, depletion and amortization	5,482,827	1,145,780	978,393	–	7,607,000



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**31.2 Sales by product**

The sales by product for each segment are detailed below for the years ended December 31, 2018, 2017 and 2016:

	<b>For the year ended on December 31, 2018</b>				
	<b>Exploration and Production</b>	<b>Refining and Petrochemicals</b>	<b>Transport and Logistics</b>	<b>Eliminations</b>	<b>Total</b>
<b>Local sales</b>					
Mid-distillates	725	11,662,476	-	(77,009)	11,586,192
Gasoline and turbo fuel	-	9,690,113	-	(1,737,261)	7,952,852
Transport service	37,279	36,321	11,089,012	(7,631,208)	3,531,404
Natural gas	2,535,658	-	-	(649,812)	1,885,846
Plastic and rubber	-	822,367	-	-	822,367
Crude	20,142,527	-	-	(19,592,048)	550,479
LPG and propane	245,875	329,569	-	(805)	574,639
Fuel oil	20,391	489,091	-	-	509,482
Asphats	26,406	309,020	-	-	335,426
Aromatics	-	282,545	-	-	282,545
Polyethylene	-	270,887	-	-	270,887
Services	103,522	190,612	265,059	(319,783)	239,410
Other income gas contracts	156,031	-	-	-	156,031
Other products	11,484	604,530	-	(126,507)	489,507
	<b>23,279,898</b>	<b>24,687,531</b>	<b>11,354,071</b>	<b>(30,134,433)</b>	<b>29,187,067</b>
Recognition of price differential	-	3,835,533	-	-	3,835,533
	<b>23,279,898</b>	<b>28,523,064</b>	<b>11,354,071</b>	<b>(30,134,433)</b>	<b>33,022,600</b>
<b>Foreign sales</b>					
Crude	26,898,737	-	-	-	26,898,737
Diesel	-	3,050,839	-	-	3,050,839
Fuel oil	-	2,053,594	-	-	2,053,594
Gasoline and turbo fuels	-	1,782,194	-	-	1,782,194
Plastic and rubber	-	1,268,582	-	-	1,268,582
Natural gas	27,899	-	-	-	27,899
LPG and propane	20,212	-	-	-	20,212
Cash flow hedge for future exports – Reclassification to profit or loss	128,404	-	-	-	128,404
Other products	17,614	333,101	96	-	350,811
	<b>27,092,866</b>	<b>8,488,310</b>	<b>96</b>	<b>-</b>	<b>35,581,272</b>
	<b>50,372,764</b>	<b>37,011,374</b>	<b>11,354,167</b>	<b>(30,134,433)</b>	<b>68,603,872</b>

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**For the year ended on December 31, 2017**

	<b>Exploration and Production</b>	<b>Refining and Petrochemicals</b>	<b>Transport and Logistics</b>	<b>Eliminations</b>	<b>Total</b>
<b>Local sales</b>					
Mid-distillates	1,334	9,588,992	-	-	9,590,326
Gasoline and turbo fuel	-	8,052,289	-	(1,062,102)	6,990,187
Transport service	41,157	41,998	10,277,921	(6,771,523)	3,589,553
Natural gas	2,540,233	4	-	(724,483)	1,815,754
Plastic and rubber	-	833,982	-	-	833,982
Crude	11,668,529	-	-	(10,758,658)	909,871
LPG and propane	199,796	309,823	-	-	509,619
Fuel oil	14,758	339,300	-	-	354,058
Asphats	34,834	240,969	-	-	275,803
Aromatics	-	217,418	-	-	217,418
Polyethylene	-	167,348	-	-	167,348
Services	140,227	179,912	319,776	(356,116)	283,799
Other income gas contracts	188,195	-	-	-	188,195
Other products	11,107	379,023	-	(109,904)	280,226
	<b>14,840,170</b>	<b>20,351,058</b>	<b>10,597,697</b>	<b>(19,782,786)</b>	<b>26,006,139</b>
Recognition of price differential	-	2,229,953	-	-	2,229,953
	<b>14,840,170</b>	<b>22,581,011</b>	<b>10,597,697</b>	<b>(19,782,786)</b>	<b>28,236,092</b>
<b>Foreign sales</b>					
Crude	21,426,666	52,397	-	-	21,479,063
Diesel	-	1,213,740	-	-	1,213,740
Fuel oil	-	1,982,408	-	-	1,982,408
Gasoline and turbo fuels	-	1,223,994	-	-	1,223,994
Plastic and rubber	-	1,169,101	-	-	1,169,101
Natural gas	32,303	-	-	-	32,303
LPG and propane	15,631	-	-	-	15,631
Cash flow hedge for future exports – Reclassification to profit or loss	160,772	-	-	-	160,772
Other products	19,392	421,365	367	-	441,124
	<b>21,654,764</b>	<b>6,063,005</b>	<b>367</b>	<b>-</b>	<b>27,718,136</b>
	<b>36,494,934</b>	<b>28,644,016</b>	<b>10,598,064</b>	<b>(19,782,786)</b>	<b>55,954,228</b>

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	<b>Exploration and Production</b>	<b>Refining and Petrochemicals</b>	<b>Transport and Logistics</b>	<b>Eliminations</b>	<b>Total</b>
<b>Local sales</b>					
Mid-distillates	-	8,553,503	-	-	8,553,503
Gasoline and turbo fuel	-	6,465,939	-	(373,200)	6,092,739
Transport service	73,247	41,736	10,283,338	(6,580,330)	3,817,991
Natural gas	2,383,323	11,763	-	(406,750)	1,988,336
Plastic and rubber	-	724,708	-	-	724,708
Crude	5,284,554	-	-	(4,730,888)	553,666
LPG and propane	90,783	319,643	-	(4,557)	405,869
Fuel oil	1,382	146,866	-	-	148,248
Asphats	31,277	309,123	-	-	340,400
Aromatics	-	186,228	-	-	186,228
Polyethylene	20	203,939	-	-	203,959
Services	133,429	152,028	301,088	(361,252)	225,293
Other income gas contracts	271,337	-	-	-	271,337
Other products	20,165	313,603	63,537	(212,432)	184,873
	<b>8,289,517</b>	<b>17,429,079</b>	<b>10,647,963</b>	<b>(12,669,409)</b>	<b>23,697,150</b>
Recognition of price differential	-	1,048,022	-	-	1,048,022
	<b>8,289,517</b>	<b>18,477,101</b>	<b>10,647,963</b>	<b>(12,669,409)</b>	<b>24,745,172</b>
<b>Foreign sales</b>					
Crude	17,266,094	-	-	12,485	17,278,579
Diesel	-	1,604,498	-	-	1,604,498
Fuel oil	-	2,158,539	-	-	2,158,539
Gasoline and turbo fuels	-	1,046,758	-	-	1,046,758
Plastic and rubber	-	1,171,342	-	-	1,171,342
Natural gas	58,809	-	-	-	58,809
LPG and propane	6,343	2,225	-	-	8,568
Cash flow hedge for future exports – Reclassification to profit or loss	33,074	-	-	-	33,074
Other products	2,567,372	363,252	813	(2,551,215)	380,222
	<b>19,931,692</b>	<b>6,346,614</b>	<b>813</b>	<b>(2,538,730)</b>	<b>23,740,389</b>
	<b>28,221,209</b>	<b>24,823,715</b>	<b>10,648,776</b>	<b>(15,208,139)</b>	<b>48,485,561</b>

### 31.3 Capital expenditures by segments

The following are the investments amounts made by each segment for the years ended December 31, 2018, 2017 and 2016:

<b>2018</b>	<b>Exploration and Production</b>	<b>Refining and Petrochemicals</b>	<b>Transport and Logistics</b>	<b>Total</b>
Property, plant and equipment	2,071,604	702,247	529,078	3,302,929
Natural and environmental resources	5,051,828	-	-	5,051,828
Intangibles	56,755	20,203	28,711	105,669
	<b>7,180,187</b>	<b>722,450</b>	<b>557,789</b>	<b>8,460,426</b>
<b>2017</b>	<b>Exploration and Production</b>	<b>Refining and Petrochemicals</b>	<b>Transport and Logistics</b>	<b>Total</b>
Property, plant and equipment	927,282	606,749	829,252	2,363,283
Natural and environmental resources	3,568,355	-	-	3,568,355
Intangibles	154,155	4,941	16,772	175,868
	<b>4,649,792</b>	<b>611,690</b>	<b>846,024</b>	<b>6,107,506</b>
<b>2016</b>	<b>Exploration and Production</b>	<b>Refining and Petrochemicals</b>	<b>Transport and Logistics</b>	<b>Total</b>
Property, plant and equipment	1,208,464	1,099,850	1,338,615	3,646,929
Natural and environmental resources	2,121,295	-	-	2,121,295
Intangibles	53,774	10,274	5,205	69,253
	<b>3,383,533</b>	<b>1,110,124</b>	<b>1,343,820</b>	<b>5,837,477</b>

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**32. Subsequent events**

No events subsequent to the date of approval of these Consolidated Financial Statements have been presented.

**33. Supplemental information on oil and gas producing activities (unaudited)**

The information in this note is referred to as “unaudited” as a means of clarifying that it is not covered by the audit opinion of the independent registered public accounting firm that has audited and reported on the “Consolidated Financial Statements.”

In accordance with the requirements of the United States Securities and Exchange Commission (SEC), Rule 4–10(a) of Regulation S–X, Release 33–8879, Accounting Standards Codification 932 and the ASU– 2010–03 “Oil and Gas reserve Estimation and Disclosures” rule, this section provides supplemental information on oil and gas exploration and producing activities of the Ecopetrol Business Group. The information included in sections (a) to (c) provides historical cost information pertaining to costs incurred in exploration, property acquisitions and development, capitalized costs and results of operations. The information included in sections (d) and (e) presents information on Ecopetrol’s estimated net proved reserve quantities, standardized measure of estimated discounted future net cash flows related to proved reserves and changes in estimated discounted future net cash flows.

The following information corresponds to Ecopetrol’s oil and gas producing activities as of December 31 2018, 2017 and 2016, and includes information related to the Ecopetrol Business Group’s consolidated subsidiaries, as well as its investments the joint ventures Equion Energia Limited and Offshore International Group. The oil and gas exploration and production activities of these two joint ventures are immaterial, as such the corresponding information has not been disclosed separately.

Under the SEC final rule optional disclosure of possible and probable reserves is allowed but, the Ecopetrol Business Group opted not to do so. Ecopetrol estimated its reserves without considering non–traditional resources.

**33.1 Capitalized costs relating to oil and gas exploration and production activities**

	<b>2018</b>	<b>2017</b>	<b>2016</b>
Natural and environmental properties	53,752,436	48,129,595	47,097,475
Wells, equipment and facilities – property, plant and equipment	29,416,081	30,405,565	29,931,039
Exploration and production projects	8,463,584	6,632,812	6,855,832
Accumulated depreciation, depletion and amortization	(55,689,222)	(51,791,897)	(49,714,944)
<b>Net capitalized cost</b>	<b>35,942,879</b>	<b>33,376,075</b>	<b>34,169,402</b>

It includes information of the Exploration and Production segment subsidiaries and joint ventures.

In accordance with IAS 37, costs capitalized to natural and environmental properties include provisions for asset retirement obligations of COP\$1,076,116, COP\$598,125 and COP\$766,909 during 2018, 2017 and 2016, respectively.

**33.2 Costs incurred in oil and gas exploration and developed activities**

Costs incurred are summarized below and include both amounts expensed and capitalized in the corresponding period.

	<b>2018</b>	<b>2017</b>	<b>2016</b>
Acquisition of proved properties <sup>(1)</sup>	–	591,875	–
Acquisition of unproved properties <sup>(2)</sup>	81,295	164,180	–
Exploration costs	1,197,946	1,095,588	852,097
Development costs	6,346,276	3,599,385	2,190,426
	<b>7,625,517</b>	<b>5,451,028</b>	<b>3,042,523</b>

(1) On December 11, 2017, Ecopetrol América Inc. acquired the 11.6% interest in the K2 oil field in the Gulf of Mexico from MCX; increasing its share from 9.2% to 20.8%.

(2) On September 2018, Ecopetrol Oleo e Gas do Brasil acquired the 20% interest in the Pau Brasil oil field in the Basin of Santos. As of December 2017, the investments were mainly made by Ecopetrol América Inc. in offshore exploration projects of the Warrior and Rydberg wells.

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### 33.3 Results of operations for oil and gas exploration and production activities

The Ecopetrol Business Group's results of operations from oil and gas exploration and production activities for the years ended December 31, 2018, 2017 and 2016 are as follows:

	2018	2017	2016
Net revenues			
Sales	39,633,866	29,823,565	21,322,662
Transfers	11,794,014	7,518,216	7,734,195
	<b>51,427,880</b>	<b>37,341,781</b>	<b>29,056,857</b>
Production costs <sup>(1)</sup>	8,337,413	6,535,794	5,785,950
Depreciation, depletion and amortization <sup>(2)</sup>	5,591,774	6,349,382	5,927,466
Other production costs <sup>(3)</sup>	18,918,275	14,066,593	12,370,540
Exploration expenses <sup>(4)</sup>	1,387,463	1,342,952	730,393
Other expenses <sup>(5)</sup>	1,036,983	882,743	1,684,590
	<b>35,271,908</b>	<b>29,177,464</b>	<b>26,498,939</b>
Income before income tax expense	16,155,972	8,164,317	2,557,918
Income tax expense	(6,303,251)	(3,678,955)	(1,367,357)
Results of operations for exploration and production activities	<b>9,852,721</b>	<b>4,485,362</b>	<b>1,190,561</b>

(1) Production costs are lifting costs incurred to operate and maintain productive wells and related equipment and facilities including costs such as operating labor, materials, supplies, and fuel consumed in operations and the costs of operating natural gas liquids plants. In addition, they include expenses related to the asset retirement obligations that were recognized during 2018, 2017 and 2016 of COP\$187,340, COP\$380,810 and COP\$305,653, respectively.

(2) In accordance with IAS 37 the expense related to asset retirement obligations that were recognized during 2018, 2017 and 2016 in depreciation, depletion and amortization, were COP\$180,193, COP\$179,601 and COP\$188,370, respectively.

(3) Corresponds to transportation costs and naphtha that are not part of the Ecopetrol Business Group's lifting cost.

(4) Exploration expenses include the costs of geological and geophysical activities, as well as the non-productive exploratory wells.

(5) Corresponds to administration and marketing expenses.

During 2018, 2017 and 2016, the Ecopetrol Business Group transferred approximately 22.9%, 20.1% and 17.7%, respectively, of its crude oil and gas production; (percentages based on the value sales in Colombian pesos) to intercompany business units. Those transfers were 51.8%, 48.4% and 46.1%, respectively, of crude oil and gas production volume (including Reficar).

The intercompany transfers were realized at market prices.

### 33.4 Reserve information

The Ecopetrol Business Group follows international standards for estimating, classifying and reporting reserves framed under SEC definitions. Corporate Reserve Management of Ecopetrol, Upstream Management and the Vice-Presidency of Development and Production, present the reserves balance to the Board of Directors for approval.

The reserves were estimated at a level of 99% by specialized firms: DeGolyer and MacNaughton and Ryder Scott Company, Gaffney Cline & Associates and Sproule International Limited. According to these certifications the reserves report complies with the content and guidelines set forth in Rule 4-10 of Regulation S-X issued by the United States SEC.

The following information relates to the net proven reserves owned by the Ecopetrol Business Group in 2018, 2017 and 2016, and corresponds to the official reserves statements prepared by the Ecopetrol Business Group:

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	2018			2017			2016		
	Oil (Mbls)	Gas (Gpc)	Total (Mbe)	Oil (Mbls)	Gas (Gpc)	Total (Mbe)	Oil (Mbls)	Gas (Gpc)	Total (Mbe)
<b>Proved reserves:</b>									
<b>Opening balance</b>	<b>1,088</b>	<b>3,254</b>	<b>1,659</b>	<b>1,033</b>	<b>3,218</b>	<b>1,598</b>	<b>1,239</b>	<b>3,479</b>	<b>1,849</b>
Revisions of previous estimates <sup>(1)</sup>	121	(4)	121	124	294	175	(50)	(23)	(54)
Improved recovery	128	4	129	72	4	73	11	1	11
Purchases	-	-	-	3	2	4	-	-	-
Extensions and discoveries	54	18	57	44	-	43	22	25	27
Production	(191)	(270)	(239)	(188)	(264)	(234)	(189)	(264)	(235)
<b>Closing balance</b>	<b>1,200</b>	<b>3,002</b>	<b>1,727</b>	<b>1,088</b>	<b>3,254</b>	<b>1,659</b>	<b>1,033</b>	<b>3,218</b>	<b>1,598</b>
<i>Proved developed reserves:</i>									
Opening balance	818	3,158	1,372	779	3,131	1,329	913	3,176	1,470
Closing balance	883	2,882	1,389	818	3,158	1,372	779	3,131	1,329
<i>Proved undeveloped reserves:</i>									
Opening balance	270	96	287	254	87	269	326	303	379
Closing balance	317	119	338	270	96	287	254	87	269

(1) Represents changes in previous proved reserves, upward or downward, resulting from new information (except for an increase in proved area), usually obtained from development drilling and production history or result from changes in economic factors.

For additional information about the changes in Proved Reserves and the process for estimating reserves, see section 3.4.3 – Business Overview – Exploration and Production – Reserves.

### 33.5 Standardized measure of discounted future net cash flows relating to proved oil and gas quantities and changes therein

The standardized measure of discounted future net cash flows related to the above proved crude oil and natural gas reserves is calculated in accordance with the requirements of ASU 2010–03. Estimated future cash inflows from production under SEC requirements are computed by applying unweighted arithmetic average of the first–day–of–the–month for oil and gas price to year–end quantities of estimated net proved reserves, with cost factors based on those at the end of each year, currently enacted tax rates and a 10% annual discount factor. In our view, the information so calculated does not provide a reliable measure of future cash flows from proved reserves, nor does it permit a realistic comparison to be made of one entity with another because the assumptions used cannot reflect the varying circumstances within each entity. In addition, a substantial but unknown proportion of future real cash flows from oil and gas production activities is expected to derive from reserves which have already been discovered, but which cannot yet be regarded as proved.

	2018	2017	2016
Future cash inflows	275,046,421	182,114,282	140,458,230
Future costs			
Production	(90,176,326)	(70,159,534)	(60,705,779)
Development	(21,945,453)	(14,860,992)	(12,005,835)
Income taxes	(41,102,015)	(23,660,328)	(15,400,000)
Future net cash flow	121,822,627	73,433,428	52,346,616
10% discount factor	(35,518,187)	(22,216,583)	(18,221,004)
Standardized measure of discounted net cash flows	<b>86,304,440</b>	<b>51,216,845</b>	<b>34,125,612</b>

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The following are the principal sources of change in the standardized measure of discounted net cash flows in 2018, 2017 and 2016:

	<b>2018</b>	<b>2017</b>	<b>2016</b>
Net change in sales and transfer prices and in production cost (lifting) related to future production	79,632,263	26,918,170	3,603,876
Changes in estimated future development costs	(13,141,340)	(1,978,913)	(4,767,340)
Sales and transfer of oil and gas produced, net of production costs	(43,090,467)	(30,805,987)	(23,270,907)
Net change due to extensions, discoveries and improved recovery <sup>(1)</sup>	8,496,249	3,226,852	326,854
Net change due to purchase and sales of minerals in place	-	211,777	(83,450)
Net change due to revisions in quantity estimates	10,163,131	9,090,882	(2,570,103)
Previously estimated development costs incurred during the period	12,505,421	3,482,570	5,042,697
Accretion of discount	6,771,897	4,416,512	5,423,781
Timing and other <sup>(1)</sup>	(13,633,228)	8,991,981	6,221,902
Net change in income taxes	(12,616,331)	(6,462,611)	9,364,255
<b>Aggregate change in the standardized measure of discounted future net cash flows for the year</b>	<b><u>35,087,595</u></b>	<b><u>17,091,233</u></b>	<b><u>(708,435)</u></b>

<sup>(1)</sup> For comparative purposes, figures as of December 2017 and 2016 were reclassified.

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**Exhibit 1 – Consolidated subsidiaries, associates and joint ventures**

**Consolidated subsidiary companies (1/2)**

Company	Functional currency	Ownership interest Ecopetrol	Activity	Country/ Domicile	Geographic area of operations	Equity	Profit (loss) of the year	Total assets	Total liabilities
Refinería de Cartagena S.A.S.	U.S. dollar	100%	Refining of hydrocarbons, commercialization and distribution of products	Colombia	Colombia	17,075,400	(1,479,448)	26,251,879	9,176,479
Cenit Transporte y Logística S.A.S.	Colombian peso	100%	Storage and transport by pipelines of hydrocarbons	Colombia	Colombia	14,566,611	3,566,742	16,343,576	1,776,965
Oleoducto Central S. A. - Ocesa	U.S. dollar	72.65%	Transportation by crude oil pipelines	Colombia	Colombia	3,431,369	1,976,554	6,550,710	3,119,341
Ecopetrol Global Energy S.L.U	U.S. dollar	100%	Investment vehicle	Spain	Spain	2,777,401	(757,450)	2,777,806	405
Hocol Petroleum Limited - HPL	U.S. dollar	100%	Investment vehicle	Bermuda	Bermuda	2,602,760	210,443	2,602,852	92
Ecopetrol América Inc.	U.S. dollar	100%	Exploration and exploitation of hydrocarbons	United States	United States	2,571,983	(603,957)	3,015,656	443,673
Hocol S.A.	U.S. dollar	100%	Exploration, exploitation and production of hydrocarbons	Cayman Islands	Colombia	1,843,876	208,026	2,709,974	866,098
Propilco S.A.	U.S. dollar	100%	Production and commercialization of polypropylene resin	Colombia	Colombia	1,515,393	165,670	2,024,401	509,008
Ecopetrol Capital AG	U.S. dollar	100%	Collection of surpluses from, and providing funds to, companies of the Ecopetrol Business Group.	Switzerland	Switzerland	1,493,572	129,343	6,544,222	5,050,650
Andean Chemicals Ltd.	U.S. dollar	100%	Investment vehicle	Bermuda	Bermuda	1,183,536	(376,664)	1,184,667	1,131
Oleoducto Bicentenario de Colombia S.A.S.	Colombian peso	55.97%	Transportation by crude oil pipelines	Colombia	Colombia	1,243,689	495,107	3,464,898	2,221,209
Oleoducto de los Llanos Orientales S. A. - ODL	Colombian peso	65%	Transportation by crude oil pipelines	Panama	Colombia	1,083,479	416,347	1,887,076	803,597



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**Consolidated subsidiaries (2/2)**

Company	Functional currency	Ownership interest Ecopetrol	Activity	Country/ Domicile	Geographic area of operations	Equity	Profit (loss) of the year	Total assets	Total liabilities
Black Gold Re Ltd.	U.S. dollar	100%	Reinsurer for companies of the Ecopetrol Business Group	Bermuda	Bermuda	691,710	28,303	905,207	213,497
Oleoducto de Colombia S.A. – ODC	Colombian peso	73%	Transportation by crude oil pipelines	Colombia	Colombia	382,937	265,460	593,387	210,450
Bioenergy S.A.	Colombian peso	99.35%	Production of biofuels	Colombia	Colombia	170,227	(308,331)	249,155	78,928
COMAI - Compounding and Masterbatching Industry	Colombian peso	100%	Manufacture of polypropylene compounds and masterbatches	Colombia	Colombia	149,876	122,537	202,175	52,299
Ecopetrol Oleo é Gas do Brasil Ltda.	Brazilian real	100%	Exploration and exploitation of hydrocarbons	Brazil	Brazil	125,745	(70,052)	140,372	14,627
Bioenergy Zona Franca S.A.S.	Colombian peso	99.35%	Production of biofuels	Colombia	Colombia	100,297	(202,061)	530,651	430,354
Ecopetrol del Perú S.A.	U.S. dollar	100%	Exploration and exploitation of hydrocarbons	Peru	Peru	51,888	(1,353)	55,715	3,827
ECP Hidrocarburos de México S.A. de CV	U.S. dollar	100%	Offshore exploration	Mexico	Mexico	25,836	(80,845)	42,907	17,071
Ecopetrol Costa Afuera S.A.S.	Colombian peso	100%	Offshore exploration	Colombia	Colombia	12,505	(4,427)	31,520	19,015
Esentia Resinas del Perú SAC	U.S. dollar	100%	Commercialization polypropylene resins and masterbatches	Peru	Peru	4,694	404	26,517	21,823
Ecopetrol Energía S.A.S E.S.P.	Colombian peso	100%	Energy supply service	Colombia	Colombia	3,414	414	45,953	42,539
Ecopetrol Germany GmbH (***)	U.S. dollar	100%	Exploration and exploitation of hydrocarbons	Germany	Angola	2,277	(254)	2,632	355

\*\*\* Company in liquidation process.

Ecopetrol S.A.  
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**Associated companies and joint ventures**

<u>Company</u>	<u>Functional currency</u>	<u>Ownership interest Ecopetrol</u>	<u>Activity</u>	<u>Country/ Domicile</u>	<u>Geographic area of operations</u>	<u>Equity</u>	<u>Profit (loss) of the year</u>	<u>Total assets</u>	<u>Total liabilities</u>
<b>Associates</b>									
Invercolsa S.A. (1)	Colombian peso	43%	Holding with investments in transportation and distribution companies of natural gas and LPG in Colombia	Colombia	Colombia	510,116	240,949	560,536	50,420
Serviport S.A. (2)	Colombian peso	49%	Services for the support of loading and unloading of oil ships, supply of equipment, technical inspections and load measurements	Colombia	Colombia	22,882	2,862	67,222	44,340
Sociedad Portuaria Olefinas y Derivados S.A. (1)	Colombian peso	50%	Construction, use, maintenance and administration of port facilities, ports, private docks	Colombia	Colombia	3,173	308	6,145	2,972
<b>Joint ventures</b>									
Equion Energía Limited	U.S. dollar	51%	Exploration, exploitation and production of hydrocarbons	United Kingdom	Colombia	1,939,686	421,511	2,567,950	628,264
Offshore International Group	U.S. dollar	50%	Exploration, exploitation and production of hydrocarbons	United States	Peru	771,492	(322,969)	1,878,508	1,107,016
Ecodiesel Colombia S.A.	Colombian peso	50%	Production, commercialization and distribution of biofuels and oleochemicals	Colombia	Colombia	82,608	12,846	119,991	37,383

(1) Information available as of November 30, 2018.

(2) Information available as of September 30, 2018.

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Notes to the consolidated financial statements  
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**Exhibit 2 – Conditions of the most significant loans**

Class of credit	Company	Initial date	Expiry date	Currency	Disbursement	Outstanding balance Dec 31, 2018	Outstanding balance Dec 31, 2017	Typo de interest	Amortization of the principal	Payment of interest
Bonds, domestic currency	Ecopetrol S.A.	dec-10	dec-20	COP	479,900	479,900	479,900	Floating	Bullet	Half-yearly
		dec-10	dec-40	COP	284,300	284,300	284,300	Floating	Bullet	Half-yearly
		aug-13	aug-23	COP	168,600	168,600	168,600	Floating	Bullet	Half-yearly
		aug -13	aug-28	COP	347,500	347,500	347,500	Floating	Bullet	Half-yearly
		aug -13	aug-43	COP	262,950	262,950	262,950	Floating	Bullet	Half-yearly
Local currency syndicated loan	Oleoducto Bicentenario ODL - Oleoducto de los Llanos Orientales S.A.	jul-12	jul-24	COP	2,100,000	1,191,050	1,373,750	Floating	Quarterly	Quarterly
		aug -13	aug-20	COP	800,000	224,000	352,000	Floating	Quarterly	Quarterly
Bonds, foreign currency	Ecopetrol S.A.	sep-13	sep-23	USD	1,300**	1,300	1,300	Fixed	Bullet	Half-yearly
		sep-13	sep-43	USD	850	850	850	Fixed	Bullet	Half-yearly
		may-14	may-45	USD	2,000	2,000	2,000	Fixed	Bullet	Half-yearly
		sep-14	may-25	USD	1,200	1,200	1,200	Fixed	Bullet	Half-yearly
		jun-15	jun-26	USD	1,500	1,500	1,500	Fixed	Bullet	Half-yearly
		jun-16	sep-23	USD	500	500	500	Fixed	Bullet	Half-yearly
International commercial credits - Refinería de Cartagena	Oleoducto Central S.A.	may-14	may-21	USD	500	500	500	Fixed	Bullet	Half-yearly
		dec-17	dec-27	USD	2,001	1,742	1,941	Fixed	Half-yearly	Half-yearly
		dec-17	dec-27	USD	76	66	73	Floating	Half-yearly	Half-yearly
		dec-17	dec-27	USD	73	63	71	Fixed	Half-yearly	Half-yearly
		dec-17	dec-27	USD	159	138	154	Floating	Half-yearly	Half-yearly
		dec-17	dec-25	USD	359	321	344	Floating	Half-yearly	Half-yearly

\*\* Financial debt designated as hedging instrument (see Note 28.1).

9. Signature Page

**SIGNATURES**

The registrant hereby certifies that it meets all of the requirements for filing on Form 20-F and that it has duly caused and authorized the undersigned to sign this annual report on its behalf.

Ecopetrol S.A.

By: /s/ Felipe Bayón Pardo

Name: Felipe Bayón Pardo

Title: Chief Executive Officer

By: /s/ Jaime Caballero Uribe

Name: Jaime Caballero Uribe

Title: Chief Financial Officer

Dated: April 5, 2019

## 10. Exhibits

<u>Exhibit No.</u>	<u>Description</u>
<u>1.1</u>	<u>Amended and Restated Bylaws of Ecopetrol S.A., dated March 29, 2019 (English Translation).</u>
<u>4.1</u>	<u>Transportation Agreement between Ecopetrol S.A. and Oleoducto Central S.A., dated March 31, 1995 (incorporated by reference to Exhibit 4.1 on Form 20-F filed with the U.S. Securities and Exchange Commission on September 12, 2008 (File No. 001-34175)) (English Translation).</u>
<u>4.2</u>	<u>Supplementary Agreement to Transportation Agreement between Ecopetrol S.A. and Oleoducto Central S.A., dated January 17, 2013 (incorporated by reference to Exhibit 4.2 on Form 20-F filed with the U.S. Securities and Exchange Commission on April 29, 2013 (File No. 001-34175)) (English Translation).</u>
<u>4.3</u>	<u>Natural Gas Transportation Agreement between Ecopetrol S.A. and Transportadora de Gas del Interior S.A. ESP, dated October 1, 2008 (incorporated by reference to Exhibit 4.3 on Form 20-F filed with the U.S. Securities and Exchange Commission on April 29, 2013 (File No. 001-34175)) (English Translation).</u>
<u>4.4</u>	<u>Supplementary Agreement No. 1, dated December 5, 2008, to the Natural Gas Transportation Agreement between Ecopetrol S.A. and Transportadora de Gas del Interior S.A. ESP, dated October 1, 2008 (incorporated by reference to Exhibit 4.4 on Form 20-F filed with the U.S. Securities and Exchange Commission on April 29, 2013 (File No. 001-34175)) (English Translation).</u>
<u>4.5</u>	<u>Supplementary Agreement No. 2, dated April 11, 2012, to the Natural Gas Transportation Agreement between Ecopetrol S.A. and Transportadora de Gas Internacional S.A. E.S.P., dated October 1, 2008 (incorporated by reference to Exhibit 4.5 on Form 20-F filed with the U.S. Securities and Exchange Commission on April 29, 2013 (File No. 001-34175)) (English Translation).</u>
<u>4.6</u>	<u>Crude Oil Transportation Services Agreement between Ecopetrol S.A. and Cenit Transporte y Logística de Hidrocarburos S.A.S., dated April 1, 2013 (incorporated by reference to Exhibit 4.6 on Form 20-F filed with the U.S. Securities and Exchange Commission on April 29, 2013 (File No. 001-34175)) (English Translation).</u>
<u>4.7</u>	<u>Refined Products Transportation Services Agreement between Ecopetrol S.A. and Cenit Transporte y Logística de Hidrocarburos S.A.S., dated April 1, 2013 (incorporated by reference to Exhibit 4.7 on Form 20-F filed with the U.S. Securities and Exchange Commission on April 29, 2013 (File No. 001-34175)) (English Translation).</u>
<u>4.8</u>	<u>Indenture, dated as of July 23, 2009, between the Company and The Bank of New York Mellon, as trustee (incorporated by reference to Exhibit 4.2 to the Company's Form F-4 filed with the U.S. Securities and Exchange Commission on July 31, 2009 (File No. 333-160965)).</u>
<u>4.9</u>	<u>Bicentenario Transport Contract between Oleoducto Bicentenario de Colombia S.A.S. and Ecopetrol S.A., dated June 20, 2012 incorporated by reference to Exhibit 4.9 on Form 20-F filed with the U.S. Securities and Exchange Commission on April 25, 2014 (File No. 001-34175)) (English Translation).</u>
<u>4.10</u>	<u>Amendment No. 1 to the Indenture, dated as of June 26, 2015, between the Company and The Bank of New York Mellon, as trustee (incorporated by reference to Exhibit 4.10 on Form 6-K of the Company furnished to the U.S. Securities and Exchange Commission on June 25, 2015 (File No. 001-34175)).</u>
<u>4.11</u>	<u>Supplementary Agreement No. 2, dated March 28, 2014, to the Bicentenario Transport Contract between Oleoducto Bicentenario de Colombia S.A.S. and Ecopetrol S.A., dated June 20, 2012 (incorporated by reference to Exhibit 4.11 on Form 20-F filed with the U.S. Securities and Exchange Commission on April 28, 2016 (File No. 001-34175)) (English Translation).</u>
<u>4.12</u>	<u>Supplementary Agreement No. 4, dated April 6, 2015, to the Bicentenario Transport Contract between Oleoducto Bicentenario de Colombia S.A.S. and Ecopetrol S.A., dated June 20, 2012 (incorporated by reference to Exhibit 4.12 on Form 20-F filed with the U.S. Securities and Exchange Commission on April 28, 2016 (File No. 001-34175)) (English Translation).</u>
<u>4.13</u>	<u>Amendment No. 6, dated April 25, 2016, to the Crude Oil Transportation Services Agreement between Ecopetrol S.A. and Cenit Transporte y Logística de Hidrocarburos S.A.S., dated April 1, 2013 (English Translation).</u>
<u>4.14</u>	<u>Amendment No. 7, dated December 28, 2016, to the Crude Oil Transportation Services Agreement between Ecopetrol S.A. and Cenit Transporte y Logística de Hidrocarburos S.A.S., dated April 1, 2013 (English Translation).</u>
<u>8.1</u>	<u>List of subsidiaries of Ecopetrol S.A.</u>
<u>12.1</u>	<u>Section 302 Certification of the Chief Executive Officer.</u>

<a href="#">12.2</a>	<a href="#">Section 302 Certification of the Chief Financial Officer.</a>
<a href="#">13.1</a>	<a href="#">Section 906 Officer Certification.</a>
<a href="#">23.1</a>	<a href="#">Consent of Ernst &amp; Young Audit S.A.S.</a>
<a href="#">23.2</a>	<a href="#">Consent of Ryder Scott LP.</a>
<a href="#">23.3</a>	<a href="#">Consent of Sproule International Limited.</a>
<a href="#">23.4</a>	<a href="#">Consent of DeGolyer and MacNaughton.</a>
<a href="#">23.5</a>	<a href="#">Consent of Gaffney, Cline &amp; Associates.</a>
<a href="#">99.1</a>	<a href="#">Third-Party Reserve Report of Ryder Scott Company, L.P.</a>
<a href="#">99.2</a>	<a href="#">Third-Party Reserve Report of Sproule International Limited.</a>
<a href="#">99.3</a>	<a href="#">Third-Party Reserve Report of DeGolyer and MacNaughton.</a>
<a href="#">99.4</a>	<a href="#">Third-Party Reserve Report of Gaffney, Cline &amp; Associates.</a>
101.INS	XBRL Instance Document
101.SCH	XBRL Taxonomy Extension Schema Document
101.CAL	XBRL Taxonomy Extension Calculation Linkbase Document
101.DEF	XBRL Taxonomy Extension Definition Linkbase Document
101.LAB	XBRL Taxonomy Extension Labels Linkbase Document
101.PRE	XBRL Taxonomy Extension Presentation Linkbase Document

## 11. Cross-reference to Form 20-F

		<b>Sections</b>
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Item 2.	Offer Statistics and Expected Timetable	N/A
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	B. Capitalization and Indebtedness	N/A
	C. Reasons for the Offer and Use of Proceeds	N/A
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	D. Trend Information	4.10
	E. Off-Balance Sheet Arrangements	4.9
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	A. Directors and Senior Management	7.3; 7.5
	B. Compensation	7.6; Notes 4, 20 and 29 to the consolidated financial statements
	C. Board Practices	7.3
	D. Employees	3.12
	E. Share Ownership	7.7
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	B. Related Party Transactions	3.10; Note 29 to the consolidated financial statements
	C. Interests of Experts and Counsel	N/A
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	B. Significant Changes	7.8; Note 35 to the consolidated financial statements
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	B. Plan of Distribution	N/A
	C. Markets	6.3
	D. Selling Shareholders	N/A
	E. Dilution	N/A
	F. Expenses of the Issue	N/A
Item 10.	Additional Information	
	A. Share Capital	N/A
	B. Memorandum and Articles of Association	7.1
	C. Material Contracts	3.4.4; 4.8; Exhibits 4.1 – 4.14
	D. Exchange Controls	5.1.4; 6.6
	E. Taxation	4.2.1; 6.5; Note 10 to the consolidated financial statements
	F. Dividends and Paying Agents	N/A
	G. Statements by Experts	N/A
	H. Documents On Display	1.1
	I. Subsidiary Information	N/A
Item 11.	Quantitative and Qualitative Disclosures About Market Risk	4.10; 5.1.1; 5.2.1; 5.2.3; Note 28 to the consolidated financial statements
Item 12.	Description of Securities Other than Equity Securities	
	A. Debt Securities	N/A
	B. Warrants and Rights	N/A
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	D. American Depositary Shares	6.4
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Item 14.	Material Modifications to the Rights of Security Holders and Use of Proceeds	None
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**BYLAWS OF ECOPETROL S.A.**

**CHAPTER I: LEGAL NATURE, CORPORATE NAME, INCORPORATION, DOMICILE AND DURATION**

**ARTICLE ONE. LEGAL NATURE – CORPORATE NAME.**- ECOPETROL S.A. is a corporation, of commercial nature, comprised of public and private shareholders, that carries out its corporate purpose in a competitive manner with private entities. Hereinafter and for the purposes of this document, it will be referred to as “Ecopetrol” or the “Company”.

As established by law, Ecopetrol is a mixed-economy company, from the national order, and assigned to the Ministry of Mines and Energy. All legal acts, agreements and actions required to carry out its corporate purpose are governed exclusively by the rules of private law, regardless of the percentage of the state shareholding in the Company's capital stock.

**ARTICLE TWO. DOMICILE.**- The main domicile of Ecopetrol is the city of Bogotá D.C. the Company may open subsidiaries, branch offices and agencies throughout the country and abroad.

**ARTICLE THREE. DURATION.**- The duration of the Company is one hundred (100) years as of its establishment.

**CHAPTER II: CORPORATE PURPOSE**

**ARTICLE FOUR. CORPORATE PURPOSE.**- The corporate purpose of Ecopetrol is to carry out, in Colombia or abroad, commercial and industrial activities related to the exploration, operation, refining, transportation, storage, distribution and marketing of hydrocarbons and their byproducts.

Additionally, the following activities are part of the corporate purpose of Ecopetrol:

- 1) Administration and management of all assets that were returned to the Government after the termination of the former De Mares Concession. Additionally, over such assets, Ecopetrol shall have, all the powers provided by Law.
  - 2) Exploration and operation of hydrocarbons in oil areas or fields that, prior to January 1, 2004: a) were linked to executed agreements or, b) were being directly operated by Ecopetrol.
  - 3) Exploration and operation of oil areas or fields assigned to Ecopetrol by the National Hydrocarbons Agency - ANH, or the entity acting as such.
  - 4) Exploration and operation of hydrocarbons abroad, directly or through agreements entered into with third parties.
  - 5) Export and import of hydrocarbons, its derivatives and their byproducts.
  - 6) Production, processing, blending, transportation, storage, distribution and/or marketing (purchase and sale), and industrialization of hydrocarbons, their byproducts, and products owned by Ecopetrol or by third parties, domestic or imported.
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- 7) Refining, processing, and any other type of industrial process or petrochemical of the hydrocarbons, its derivatives, similar products, in the grounds of the Company or of third parties.
  - 8) Transportation and storage of hydrocarbons, their byproducts and similar, through transportation or storage systems.
  - 9) Export and import of fuels and oxygenating components of vegetable origin.
  - 10) Construction, operation and maintenance of ports infrastructure for the export and import of hydrocarbons, and their byproducts or oxygenating components.
  - 11) Develop all of the activities required within the electric energy process, in order to generate energy that satisfies the Company's own needs in all its business segments and, furthermore, sell its surplus and buy in case of shortages as a main source or as backup for its operations.
  - 12) Design, construct, operate, and maintain port infrastructure for the export and import of hydrocarbons, its derivatives, products or oxygenates.
  - 13) Construct, operate, administer, maintain, dispose and manage all infrastructure, facilities and property that is required to achieve the Company's corporate purpose.
  - 14) Establish and be part of all types of companies, including sole proprietorships, as well as open branches and agencies that are necessary for the proper implementation of its corporate purpose. The participation permitted by this clause may include involvement in companies whose activity differs from the one of the Company, provided that, in the opinion of the Board of Directors, this is appropriate for the implementation of the corporate purpose.
  - 15) Concluding all kinds of credit and financing operations with financial entities or insurers.
  - 16) Guarantee third-party obligations within the scope of its business and within the framework of its corporate purpose, with the prior authorization of its Board of Directors.
  - 17) Securitizing assets and investments.
  - 18) Temporarily or permanently manage the group's cash surpluses and reserves in the capital markets, and underwrite bonds, purchase securities, equities, interests or rights, make deposits or engage in any type of investment and cash transaction with authorized financial entities.
  - 19) Obtain and exploit industrial property rights on trademarks, drawings, insignia, patents for new technologies and products, results from research, and creations by the Company's competent units, as well as any other intangible property.
  - 20) Training personnel in all specialties required for the proper implementation of the corporate purpose.
  - 21) Participate in research, scientific or technological activities related to its corporate purpose, or to activities that are supplementary, related or useful thereto, as well as taking advantage of them and applying them technically and economically.
  - 22) Carry out the above activities and any other investments, legal acts or related activities which are supplementary or useful for the implementation of its corporate purpose and activities in relation to hydrocarbons, their byproducts, refined products, similar, or products that are able to substitute those mentioned.
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- 23) Participate in the development of social programs for the community, especially with the community that is in places where the Company has influence.
- 24) All other duties assigned by Law.

**PARAGRAPH:** Ecopetrol must accomplish its corporate purpose in a competitive manner, meeting criteria of economic and financial profitability in consideration of the market circumstances and the risks inherent to the industry, while also attending to the needs of the corporate group in which Ecopetrol is the parent company.

### **CHAPTER III: CAPITAL, SHARES AND SHAREHOLDERS RIGHTS**

**ARTICLE FIVE. COMPANY CAPITAL.-** The Company has an authorized share capital of thirty-six trillion five hundred forty thousand billion pesos legal tender (\$36,540,000,000,000.00), divided into sixty billion (60,000,000,000) ordinary shares with a par value of six hundred nine pesos (\$609) each, represented in accordance with the provisions of these Bylaws.

**ARTICLE SIX. SHARE ISSUANCE.-** Ecopetrol may issue shares within the authorized capital limit, in accordance with the limitations established by Law.

**ARTICLE SEVEN. SHAREHOLDER REGISTER.-** The Company will keep a Stock Ledger that has been registered beforehand with the Chamber of Commerce of the main corporate domicile and this register will contain the names of the shareholders, the number of shares corresponding to each of them, the security or securities with their respective numbers and registration dates, the sales and transfers, pledges, usufructs, and judicial attachments and claims, as well as any other act subject to registration pursuant to the law. In the event that the shares are dematerialized, they will be represented by a macro security, which will be held in safekeeping and managed in the central securities depository, which will make annotations regarding the subscribers thereof and will keep the Stock Ledger. Shareholders may request a certificate through their direct depositor, which legitimizes them to exercise the rights inherent to their status.

The Company recognizes the person that appears registered in the Stock Ledger as the owner of shares, and only for the number of securities and under the conditions that are registered therein.

**ARTICLE EIGHT. SECURITIES OR CERTIFICATES.-** The shares of the Company may circulate in physical or dematerialized form.

- a) Shares that circulate physically or in materialized form, will be represented by securities bearing the handwritten signature of the President and of the Secretary of the Company or whomever acts as such, and will be issued in a numeric and continuous series and must comply with all requirements pursuant to Article 401 of the Commerce Code, or the regulations that amend, replace or add to it.
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Until the total amount per share has been paid in its entirety, only provisional securities will be issued to the subscribers. All provisional securities will be exchanged for permanent securities when the shares represented by them are fully paid. The securities may be issued for groups or lots of shares, or for each specific share.

The shareholders will be responsible for any taxes or fees imposed on the issuance of shares that circulate physically or in materialized form, as well as for those generated by transfers, transmission or changes regarding their ownership.

- b) Certificates relating to the shares that are placed, transferred or taxed and that circulate in a dematerialized manner will be safeguarded and managed by a specialized entity or a Centralized Securities Depository with experience in this type of activity. The holders may request a certificate that guarantees the exercise of the rights inherent to the status of shareholder. The entity responsible for management will make the corresponding annotations regarding the subscribers of the shares and will keep the Shareholder Register. The content and characteristics of the certificates will be subject to the relevant legal requirements. Until the value of the shares has been fully paid, the Company may only issue provisional certificates.

The circulation, charges and other matters and operations related to the dematerialized shares will be governed by what is established in the laws applicable to dematerialized securities.

**ARTICLE NINE. SHAREHOLDER DEFAULT.**- When a shareholder fails to pay an installment on a due date for the shares it has subscribed, it cannot exercise the rights inherent to such shares. The Company, at the discretion of the Board of Directors, will proceed with the judicial collection or sell (at the expense of the defaulter and through a broker) the shares they have subscribed, or to allocate the amount received to the release of the number of shares corresponding to the installments paid, after deduction of twenty percent (20%) of such sums as compensation for the damage that will be presumed caused.

**ARTICLE TEN. SHAREHOLDER RIGHTS.**- All ordinary shares confer to the shareholder an equal right to the corporate assets and to the profits that are distributed, and each of them has the right to one vote in the deliberations of the General Shareholders Assembly, within the legal limitations.

The shareholders of the Company, in addition to what is established by law, will enjoy the following rights and guarantees:

- 1) Participate in the deliberations of the General Shareholders Assembly and exercise their voting rights to make the decisions that correspond to the General Shareholders Assembly, including the appointment of bodies and individuals whom, in accordance with the law and these Bylaws, must be appointed by the shareholders and, if necessary, have effective mechanisms for representation in said Meetings.
  - 2) Receive, as a dividend, a percentage of the profits of the Company in pro rata to the shares that the shareholder holds in the Company. Ecopetrol allocates the profits in accordance with the provisions set forth by law and these Bylaws.
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- 3) Have access to the Company's public information in a timely and comprehensive manner, and freely inspect the books and other documents referred to in Articles 446 and 447 of the Commercial Code or the laws that modify, replace or add something to them, within fifteen (15) business days prior to the meeting of the General Shareholders Assembly in which the end-of-year financial statements are considered.
  - 4) Receive by pro rata, part of the corporate assets at the time of liquidation, if applicable and, once the Company's external liabilities have been paid, in proportion to the shares they hold therein.
  - 5) Be represented by a third party, as established by a written document in which they express the name of the party that will represent them and the scope of the mandate. The powers of representation for purposes of the General Shareholders Assembly must be subject to the provisions of Article 184 of the Commercial Code, or the regulations that amend, replace or add to it.
  - 6) Transfer or dispose their shares, as established by law and these Bylaws.
  - 7) Provide recommendations on corporate governance to the Company, through written requests presented to the Shareholder and Investor Attention Office.
  - 8) Request, with other shareholders, that a special Shareholders Assembly be held, in accordance with the provisions of Article 17 of these Bylaws.
  - 9) Request authorization from the Shareholder and Investor Service Office to commission specialized audits, at their expense and under their responsibility, provided that such audit does not hinder the day-to-day operations of the Company, under the following terms:
    - a) Specialized audits may be carried out at any time and on the documents authorized by Article 447 of the Commercial Code, upon request of a plural number of shareholders representing at least five percent (5%) of the Company's subscribed shares.
    - b) Specialized audits may not cover documents that are confidential in nature, in accordance with the law, in particular Article 15 of the Constitution and Article 61 of the Commercial Code, as well as Letter g) of Article 4, Law 964 of 2005 and the regulations that govern, amend, replace or add to these.
    - c) Scientific, technical, economic, and statistic information shall not be subject to specialized audits either, in accordance with the applicable legislation. This shall also be the case for technical and scientific information regarding prospects for reservoirs, obtained directly by the Company or its partners, as well as the information derived from contracts that represent competitive advantages; this type of information will enjoy the commercial confidentiality set out by Colombian commercial law. In any case, specialized audits must deal with specific matters and cannot be conducted on industrial secrets or on matters whose confidentiality is protected by the legislation on intellectual property rights.
    - d) In no case, the specialized audits may imply impairment to managers' autonomy, in accordance with legal and bylaw powers.
    - e) The working documents of the special auditor will subject to reserve and must be conserved for a time no less than five (5) years, as of the date of elaboration.
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- f) The request to carry out specialized audits will be submitted in writing to the Shareholder and Investor Attention Service Office, stating the reasons why they are to be carried out, the facts and operations to be audited, and the duration. The persons hired to perform the specialized audits must be qualified professionals, recognized as such in accordance with the law, and they shall comply with the requirements set out by the law and these Bylaws for being a Statutory Auditor of the Company. The external auditor will be chosen in accordance with procedures that ensure their objective selection and independence.
  - g) The Shareholder and Investor Attention Service Office must process the request in question in an expeditious and efficient manner, facilitating the activities of the auditor, in coordination with the Company's units that must cooperate in order for the audit to be possible.
  - h) The results of the specialized audit will first be reported to the President of the Company, who has thirty (30) business days to comment. These results and the comments from the President will be shared with the Board of Directors and with the appropriate control and oversight administrative entities. In the event there is a breach of law, matters will be transferred to the competent authorities.
- 10) Submit proposals related to the proper progress of the Company to the Board of Directors, with other shareholders, provided that they represent at least five percent (5%) of the subscribed shares. The proposals must indicate the address and name of the person to whom the response to the request will be sent, and with whom the Board will act, if deemed necessary. In any case, the topics of such proposals may not be related to industrial secrets or information that is strategic to the Company's development. These requests must be submitted in writing to the Shareholder and Investor Service Office or the department that acts as such. In turn, this Office must submit them to the Board or to the relevant institutional committee for its examination and potential approval by the Board of Directors. In order to give answer to these requests, the Board of Directors must abstain from supplying information that is confidential or place Ecopetrol's business at risk, or affects the rights of third parties or that, if disclosed, may be used to the detriment of the Company.
  - 11) When they deem that a rule of the Corporate Governance Code has been ignored or breached, they may contact the Company's Board of Directors in writing, stating the reasons and facts on which they base their claim, indicating their name, citizenship card number, address, telephone number and city, in order to guarantee that it will be possible to answer their request. The Secretary General, or the person acting as such, will send the above request to the Board of Directors. The Board will evaluate the request, give the response they consider, and take the necessary measures so that the relevant provisions are not breached. The Board of Directors may exercise this duty by appointing a committee to review such request.
  - 12) Shareholders may exercise their exit rights in accordance with the terms and conditions established by law, and if such is the case, avail themselves with the conditions that the Nation will establish in the Declaration of the Majority Shareholder.
  - 13) All rights granted by the law and these Bylaws.
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**PARAGRAPH ONE: FAIR TREATMENT TO SHAREHOLDERS AND INVESTORS.**- In order to guarantee the full exercise of Shareholders rights and obligations that the Company has towards its investors and shareholders, the Company will give them equal treatment regarding requests, claims, and information, regardless of the value of their investment or the number of shares that they represent.

All shareholders of the Company will be treated fairly, considering that each shareholder has the same rights according to the number and class of shares held.

**PARAGRAPH TWO: DISPUTE SETTLEMENT MECHANISMS.**- Any disputes between the Company and its shareholders will be resolved by means of a direct settlement, which will start with the reception of the notification of disagreement. If no agreement is reached within sixty (60) business days, the parties can choose to resolve the disagreement either through the ordinary jurisdiction or through the Superintendence of Companies.

**ARTICLE ELEVEN. INDIVISIBILITY OF THE SHARES.**- Shares will belong individually to the shareholders, as a result, when by any legal disposition or by agreement, one or more shares belong to a plural number of individuals, the Company will registry of the shares in favor of all joint owners, who must designate a common representative that will exercise the rights that correspond to them as Shareholders of the Company.

The appointment of this representative will be made in accordance with the provisions of Article 378 of the Commercial Code or the standard that amends or replaces it.

**ARTICLE TWELVE. REPRESENTATION AND VOTE UNITY.** - Each shareholder, whether an individual or legal entity, may only appoint a single representative to act before the General Shareholders Assembly, regardless of the number of shares held by it.

The representative or agent of a shareholder may not split the vote of their principal, which means that they are not allowed to vote with one or several shares held by the represented party in a certain sense or for certain individuals, and use other share(s) to vote differently or for other individuals. However, this individuality of the vote does not prevent a representative of several shareholders from voting in each case following the separate instructions issued by each shareholder, or each represented group or principal.

#### **CHAPTER IV: CORPORATE BODIES**

**ARTICLE THIRTEEN. CORPORATE BODIES.**- The Company will have the following main bodies:

- a) General Shareholders Assembly.
  - b) Board of Directors, and
  - c) President, who provides General Legal Representation. However, the Company will also have other legal representatives.
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**PARAGRAPH:** The Company will have a Secretary of the General Shareholders Assembly and a Secretary of the Board of Directors.

The Secretary, or whoever replaces him in his absolute or temporary absences, will be responsible for keeping the minute books and attesting before third parties regarding what is contained therein. This will be in addition to the duties set out in these Bylaws, the Regulations of the Company, and those assigned by the General Shareholders Assembly, the Board of Directors and the President.

The Secretary, or whoever replaces him in his absolute or temporary absences, will take special care to maintain the confidentiality that corresponds to the Company's books and documents according to the Law and commercial practices.

**CHAPTER V:  
GENERAL SHAREHOLDERS ASSEMBLY**

**ARTICLE FOURTEEN. COMPOSITION OF THE GENERAL SHAREHOLDERS ASSEMBLY.-** The General Shareholders Assembly is comprised by the representatives of the shares with the necessary quorum, and under the terms prescribed in these Bylaws and in the law.

**ARTICLE FIFTEEN. DUTIES OF THE GENERAL SHAREHOLDERS ASSEMBLY.-** The General Shareholders Assembly will exercise the following duties, both in ordinary meetings and in special meetings:

- a) Appoint the person who will be the chair of the meeting.
  - b) Examine, approve or reject the end-of-year financial statements and the accounts that the Managers must submit.
  - c) Appoint and remove the members of the Board of Directors.
  - d) Appoint and remove the Statutory Auditor, and set their fees.
  - e) In accordance with the law, order the distribution of profits resulting from the financial statements, determining the amount of profits to be distributed, and the term and the methods for payment of the dividends. The General Shareholders Assembly may determine that the amounts available at any time for dividend distribution be fully or partially capitalized, and that their value be distributed in Company shares among the shareholders, pro rata with those held at the time of capitalization.
  - f) Define how the way to cancel loses if there were any to offset losses, if any.
  - g) Authorize the issuance and placement of shares in reserve, provided that this is done without being subject to the right of preference, likewise with the issuance of convertible bonds.
  - h) Authorize any issuance of preferred or dividend right shares and order the reduction or elimination of preferences.
  - i) Determine the reserves that must be established, in addition to statutory reserves.
  - j) Order the repurchase of own shares and their subsequent sale.
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- k) Adopt all measures required for compliance with these Bylaws or required in the interests of the Company.
- l) Study and approve the amendments to the Bylaws, in accordance with the rules that govern the matter.
- m) Approve the valuation of the contributions in goods received by the Company in payment for the subscription of shares, after the date of their issuance.
- n) Consider and approve, as appropriate, the reports from the managers regarding the state of company business, as well as the report from the statutory auditor, if applicable.
- o) Approve all mergers, spin-offs or transformations.
- p) Approve authorized capital increases.
- q) Issue its own regulations.
- r) All others assigned by law or these Bylaws.

**PARAGRAPH:** The Nation undertakes, in accordance with its shareholding, that the disposal of assets of which its amount is equal to or greater than 15% of the market capitalization of Ecopetrol, will be discussed and decided within the General Shareholders Assembly, and the Nation may only vote in a favorable way if the vote of the minority shareholders is equal to or greater than 2% of the shares subscribed by shareholders other than the Nation.

Notwithstanding the foregoing, if the established majority referred to in this paragraph is not achieved, the Nation may request that a new Shareholders Assembly be held under the terms established in these Bylaws, and at said meeting such decisions may be taken with the majority provided in the Law or in these Bylaws.

**ARTICLE SIXTEEN. ORDINARY MEETINGS.-** The ordinary meetings of the General Shareholders Assembly will be held at the registered office of the company's domicile within the first three months of each year, on the date and at the time indicated in the notice. The notice will be issued by the President thirty (30) calendar days prior to the scheduled date for the meeting, by publishing the notice on the Company's website [www.ecopetrol.com.co](http://www.ecopetrol.com.co), or whichever site takes its place, as well as in a newspaper that is widely circulated nationwide.

In the ordinary meetings, the General Shareholders Assembly must deal with the following issues, in addition to those assigned by Law:

- a) Examine the position of the Company.
  - b) Elect members of the Board of Directors and the Company's auditor.
  - c) Determine the economic guidelines of the Company.
  - d) Analyze the accounts and financial statements for the last fiscal year.
  - e) Decide on the disposal and distribution of profits.
  - f) Approve all measures aimed at ensuring compliance with the corporate purpose.
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**PARAGRAPH ONE:** Additionally, Ecopetrol will implement the following corporate governance best practices: (i) on the Sunday prior to the date of the ordinary meeting of the Shareholders Assembly, it will issue a reminder, by means of a notice published in a newspaper that is widely circulated nationwide, and on the website [www.ecopetrol.com.co](http://www.ecopetrol.com.co), or whichever site takes its place, regarding the date, time and place of the meeting, (ii) and at least three (3) calendar days prior to the date of the ordinary meeting it will use the website [www.ecopetrol.com.co](http://www.ecopetrol.com.co), or whichever site takes its place, to publish the agenda for the meeting of the Shareholders Assembly and the proposals from management.

**PARAGRAPH TWO:** If it is not duly summoned, the General Shareholders Assembly will be legally entitled to hold such meeting on the first business day of the month of April, at 10:00 a.m. at the offices of the main domicile where the Company's management operates.

**ARTICLE SEVENTEEN. EXTRAORDINARY MEETINGS.-** The General Shareholders Assembly may be called to extraordinary meetings when required on account of unforeseen or urgent needs of the Company, following notice from the President, the Board of Directors or the Statutory Auditor, such notice must include the agenda, date, time and place where it will take place.

Likewise, an extraordinary meeting maybe called by order or directly summoned by the Superintendent, or whomever has its duties, when so requested by a plural number of shareholders representing at least five percent (5%) of the total subscribed shares.

Calls to extraordinary meetings will be made by the President with fifteen (15) calendar days in advance of the date set for holding the meeting by means of a publication on the Company's website of the announcement of the meeting, [www.ecopetrol.com.co](http://www.ecopetrol.com.co) or whichever website functions in its places, as well as on a newspaper of wide and national circulation

The notice will indicate the matters on the Agenda to be considered by the General Shareholders Assembly in its extraordinary meeting.

**PARAGRAPH:** Additionally, Ecopetrol will implement the following corporate governance best practices: (i) on the Sunday prior to the date of the extraordinary meeting of the General Shareholders Assembly, it will issue a reminder, by means of a notice published in a newspaper of wide and national circulation, and on the website [www.ecopetrol.com.co](http://www.ecopetrol.com.co), or whichever site takes its place, regarding the agenda, date, time and place of the meeting, and (ii) at least three (3) calendar days prior to the date of the special meeting, it will use the website [www.ecopetrol.com.co](http://www.ecopetrol.com.co), or whichever site takes its place, to publish the agenda for the General Shareholders Assembly and the proposals from the management.

The Nation agrees to use its vote to support initiatives that are made in order to include additional issues to those mentioned in the agenda for the extraordinary meetings of the General Shareholders Assembly, provided that such initiatives are submitted by one or more shareholders representing at least two percent (2%) of the subscribed shares.

**ARTICLE EIGHTEEN. UNIVERSAL MEETING.-** Notwithstanding the provisions of these Bylaws regarding the convening to ordinary and extraordinary meetings, the General Shareholders Assembly may meet, without prior notice, at any place, if there is a will to do so, when the totality of the subscribed shares is represented. It may deal with any matter, unless the law establishes otherwise.

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**ARTICLE NINETEEN. QUORUM.**- The General Shareholders Assembly shall deliberate with a plural number of shareholders that represent, at least half plus one of the subscribed shares. Decisions will always be taken by the majority of votes present, unless the law establishes special majorities.

**PARAGRAPH:** If the General Shareholders Assembly is summoned to a meeting and it is not held due to a lack of quorum, a new meeting will be summoned and it will meet and decide validly with one or several shareholders, regardless of the number of shares represented. The new meeting must be held no sooner than ten (10) business days and no later than thirty (30) business days counted from the date set for the initial meeting. When the Shareholders Assembly gathers in an ordinary session in its own right on the first business day of the month of April, it may also validly deliberate and make decisions under the terms of this article.

#### **CHAPTER VI: BOARD OF DIRECTORS**

**ARTICLE TWENTY. BOARD OF DIRECTORS.** - The Board of Directors of the Company will have nine (9) principal members with no alternates, who will be elected by the General Shareholders Assembly using the electoral quotient system, for periods of two (2) years, being possible that such members be re-elected for an indefinite period. The elected persons may not be replaced in partial elections without proceeding to a new election using the electoral quotient system, unless the vacancies are decided unanimously.

At least three (3) members will generally be maintained on the slate of candidates presented for consideration of the General Shareholders' Assembly.

The appointment to the Board of Directors of the Company, may be carried out in personal capacity or as the holder of a specific public office. If there is no new elections of Board members it will be understood that the appointment has been extended until a new appointment is made. The Board of Directors will be subject to the inabilities and incompatibilities that the law may establish.

**PARAGRAPH ONE: INDEPENDENT MEMBERS OF THE BOARD OF DIRECTORS.**- The majority of the members of the Board of Directors shall be independent. The election of the independent members of the Board of Directors will be performed in accordance with the criteria provided in Paragraph Two of the Article 44 of Law 964 of 2005 and in accordance with the procedure established in Decree 3923 of 2006, or any provision that governs, amends, replaces or adds to these.

The members of the Board of Directors who are elected as independent, will commit in writing, upon accepting the position, to maintain their standing as independent members during the performance of their duties. If, for any reason, they lose such condition, they must resign from the position and the President of Ecopetrol will be able to call an extraordinary meeting of the General Shareholders Assembly, so that they can be replaced.

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**PARAGRAPH TWO:** The Nation agrees that, in the meetings of the General Shareholders Assembly in which the members of the Board of Directors will be elected, the list of candidates that The Nation presents will include (for lines eight and nine) individuals proposed by the Hydrocarbon-Producing Departments in which Ecopetrol operates, and individuals proposed by the minority shareholders, as follows:

- a) In applying the provisions of paragraph one, Article 5, Law 1118 of 2006, regarding line eight, the Nation's list of candidates for members of the Board of Directors shall include a person nominated by the Governors of the Hydrocarbon-Producing Departments operated by Ecopetrol. The name of the respective candidate must be chosen by the Governors of said Departments by simple majority, through a prior vote. The result of this must be sent to the Ministry of Finance and Public Credit no later than ten (10) days prior to when the respective meeting will be held. In the event that, for any reason, the name of the candidate is not submitted within the established timeframe, the Nation's list of candidates for members of the Board of Directors shall include one of the persons that has been designated by the Governors, who, in any case, must meet the requirements established in this paragraph.

Hydrocarbon-Producing Departments operated by Ecopetrol shall be understood according to Law 1530 of 2012, article 4, paragraph 1 or any law that additions, modify or replace this law.

- b) In line nine, the Nation's list of candidates for members of the Board of Directors shall include a person designated by the ten (10) minority shareholders with the largest shareholding. The name of the respective candidate must be chosen by simple majority, through a prior vote. The result of this must be sent to the Ministry of Finance and Public Credit no later than ten (10) days prior to when the respective meeting will be held. If such minority shareholders fail to reach an agreement, the Nation's list will include the person designated by the five (5) minority shareholders with the largest shareholding. If such shareholders do not reach an agreement prior to the date of the meeting in which the respective election is to be carried out, the Nation will be able to propose a candidate who must, in any case, meet the requirements established in this paragraph.

For the purpose of sections a) and b) of this paragraph, it shall be understood that the Nation's commitment to vote for candidates proposed by the minority shareholders of Ecopetrol and the Hydrocarbon-Producing Departments operated by Ecopetrol, shall be subject to the condition that each proposed candidate meets the following conditions:

- (i) That the profiles conform to those defined for members of the Board of Directors of Ecopetrol, in accordance with the provisions set forth in these Bylaws.
  - (ii) The members comply with the requirements of an independent member, at least, in accordance with the definition of independence established in the paragraph of Article 44, Law 964 of 2005 or any provision that governs or amends it.
  - (iii) The Nation's agreement established in section b) of this article, shall no longer be valid at the moment in which the minority shareholders can, in accordance with their shareholding, appoint a member of the Board of Directors of Ecopetrol in their own right. The foregoing is without prejudice to the validity of the Declaration of the Nation, in its capacity as majority shareholder of Ecopetrol, signed on February 16, 2018.
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**PARAGRAPH THREE:** The fees for members of the Board of Directors will be set by the General Shareholders Assembly and paid by the Company for attendance at the meetings of the Board of Directors and the Committees. This compensation shall be set in accordance with the nature of the Company, the responsibility inherent to the position and market guidelines. This information will be disclosed on the website [www.ecopetrol.com.co](http://www.ecopetrol.com.co), or whichever site takes its place.

**PARAGRAPH FOUR:** The members of the Board of Directors will be evaluated in accordance with the mechanism defined by the Board itself.

At each ordinary meeting, the Board of Directors shall provide the General Shareholders Assembly with a report on the operation of the Board of Directors, which shall take into account the attendance at the meetings of the Board and its Committees, performance and participation therein, and the results of the Board's assessment. The results of the assessments for the Board of Directors will be published on the Company's website [www.ecopetrol.com.co](http://www.ecopetrol.com.co), or whichever site takes its place.

**PARAGRAPH FIVE:** The rules on the appointment and functions of the Chairman of the Board of Directors and the Secretary are contemplated in the Internal Regulations of the Board of Directors that is published on the website of The Company [www.ecopetrol.com.co](http://www.ecopetrol.com.co).

**ARTICLE TWENTY-ONE. PROFILES OF THE MEMBERS OF THE BOARD OF DIRECTORS.**- The members of the Board of Directors will be committed to the Company's corporate vision and must at least meet the following requirements: (i) have knowledge and experience in the activities inherent to the Company's corporate purpose and/or have knowledge and experience in the field of industrial and/or commercial, financial, stock market, administrative, legal or related science activities, have more than 15 years of professional experience; (iii) enjoy a good reputation and be recognized for their professional competence and integrity, and (iv) not belonging simultaneously to more than five (5) boards of directors of corporations (*Sociedades Anónimas*), including Ecopetrol's Board.

The profiles of the members of the Board of Directors will be reviewed and updated by the Board of Directors or the institutional committee that the Board decides.

**ARTICLE TWENTY-TWO. MEETINGS.**- The Board of Directors will hold ordinary meetings at least eight (8) times a year at the offices of the Company or at the place indicated by it, on the date and time that it establishes and, in a special capacity, when summoned by itself, the President of Ecopetrol or its Board of Directors, the Statutory Auditor or two (2) of its members.

The summon to meetings, both ordinary and extraordinary, will be made by means of a communication sent to each of the members, at least five (5) calendar days in advance. Such communication may be sent through any suitable means, such as fax or email.

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The deliberations of the Board of Directors may be suspended and then resumed as many times as decided by the majority of the members present at the meeting.

The Board of Directors shall elect its Chairperson and Vice Chair from its members, and their role will be to chair and direct the ordinary and extraordinary meetings of the Board of Directors and they shall be elected for periods of two (2) years. At the sessions in which both the Chairperson and Vice Chair are absent, the attendees may appoint the person who will chair the respective meeting from among their members.

The Secretary General, or their delegate, will act as secretary of the Board of Directors. In meetings where they are absent, attendees may appoint (from among its members) the person who will assume the duties of the Board's Secretary.

**PARAGRAPH ONE: QUORUM.**- The Board of Directors shall deliberate with a number equal to or greater than five of its members. Decisions shall be made through a majority of the votes from the members present.

**PARAGRAPH TWO: UNIVERSAL MEETINGS OF THE BOARD OF DIRECTORS.**-The Board of Directors may meet validly at any date, time and place, without prior notice, when:

- (i) All members of the Board of Directors are present.
- (ii) They decide to declare the session as convened.

During the universal meetings, the Board of Directors may deal with any type of matter that relates to its duties, unless the law establishes otherwise.

**ARTICLE TWENTY-THREE. DUTIES.**- The Board of Directors will have the following duties:

- 1) Appoint, evaluate and remove the President of Ecopetrol; set its compensation in accordance with the responsibility of the position and market guidelines.
  - 2) Issue its own regulations.
  - 3) Authorize, the following decisions or activities, and all others that require its authorization in accordance with these Bylaws:
    - a) The incorporation, capital contribution or liquidation of all kind of companies, including sole proprietorships, direct subsidiaries and indirect subsidiaries, as well as the opening and closing of branches and agencies, both in Colombia and abroad, when it deems appropriate.
    - b) Participation with individuals or legal entities, national or foreign, governed by public or private law, in Colombia or abroad in the establishment of companies, partnerships, corporations and foundations that have an equal, similar, related or supplementary purpose, or a purpose that is necessary or useful to the implementation of the corporate purpose of Ecopetrol.
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- c) The acquisition of interests and rights in previously incorporated companies that have the same, similar, connected or complimentary purpose, and such acquisition is required because it is useful and it is appropriate for the proper development of the corporate purpose of Ecopetrol. This, in addition to participating in partnerships, corporations or non-profit organizations that have been previously incorporated, or withdrawing from them.
  - d) The disposal of shares, interests, contractual positions and rights in companies in which it has an interest.
  - e) The execution and early termination of deals for the acquisition, sale or assignment of exploration and/or production rights relating to hydrocarbons.
  - f) Encumber, dispose of or limit the right of ownership over assets owned by Ecopetrol, other than hydrocarbons, their byproducts, and refined or petrochemical products.
- 4) Approve the Company's budget and investment plan.
  - 5) Examine and approve the reports that the President must submit on the work carried out by the Company.
  - 6) Establish the size of personnel plant, the compensation policy, and approve the top-level organizational structure. For purposes of these Bylaws, those forming part of the first level dependencies shall be construed as those who, as part of their duties, report directly to the President.
  - 7) Appoint and remove the employees who lead the first level areas of the Company.
  - 8) Implement the decisions adopted by the General Shareholders Assembly related to the repurchase of shares of the Company.
  - 9) Intervene in any activities for which the purpose, in its judgement, is to better pursue the Company's activities through requests for reports from Company workers.
  - 10) Propose to the General Shareholders Assembly the approval of reserve funds beyond the legal reserves.
  - 11) When considered necessary, examine the Company's documents and ledgers.
  - 12) Together with the President of the Company, present for approval of the General Shareholders' Assembly the Company's management report, financial statements for each year, planned distribution of earnings and other documents stipulated in Article 446 of the Commercial Code and Law 222 of 1995, or in provisions that replace, regulate, amend or supplement them as set forth therein.
  - 13) Together with the chair, present to the General Shareholders' Assembly a special report expressing the closeness of existing economic relations between the parent company and its affiliates or subsidiaries, pursuant to Article 29 of Law 222 of 1995.
  - 14) Fulfill the provisions of Article 447 of the Commercial Code or any provisions that regulate or amend it, on the right of inspection.
  - 15) Serve as an advisory body for all matters that the President of the Company requires.
  - 16) Approve the Corporate Governance Code, the Code of Ethics and its amendments.
  - 17) Grant permits or licenses to the President of the Company, and appoint a person in charge in the event that the President's alternates are absent.
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- 18) Adopt specific measures regarding the governance of the Company, its conduct and its information, in order to ensure respect for the rights of those who invest in its shares or any other securities that it issues, in accordance with the parameters set by market regulation bodies, while also ensuring the proper management of its affairs and public knowledge of its work.
  - 19) Together with the President of the Company, submit a report to the General Shareholders Assembly describing the matters set forth in section 16 above.
  - 20) Verify the effectiveness and transparency of the Company's accounting systems and submit regular reports to shareholders on the financial and governance position of the Company.
  - 21) Ensure that Ecopetrol's economic relations with its shareholders (including the majority shareholder and its subsidiaries companies) fall within the limits and conditions established by law and regulations on the prevention, management and settlement of conflicts of interest established in these Bylaws and, in any case, under market conditions.
  - 22) Establish the mechanisms necessary to ensure that when an Ecopetrol employee discloses (either to the Audit and Risks Committee of the Board of Directors or to their immediate superiors) information of which they have knowledge regarding a potential conflict of interest within the Company or irregularities regarding accounting or financial information, they will not suffer discrimination or negative consequences, and in general, will be protected from any retaliation resulting from this.
  - 23) Request the President of the Company to hire the external advisors chosen by the Board of Directors, when deemed necessary in order to perform their duties, or as additional support for the Committees of the Board of Directors, in accordance with the terms and conditions established in the Internal Regulations of the Board of Directors.
  - 24) Comply with the duties assigned to it by law in terms of the prevention and control of money laundering and terrorist financing laws that are valid and applicable, at a national and international level.
  - 25) Regulate and implement the issuance and placement of shares and bonds convertible into shares. Likewise, authorize and implement the issuance and placement of non-convertible bonds in shares, as well as other debt securities that allow the financing of the Company. In any case, the Board of Directors may entrust the President of the Company with the approval of the subscription regulations, the prospectus of issuance and all other documents related to the issue and placement of securities.
  - 26) Authorize the execution of loans and financing operations that have a term greater than one (1) year, from entities that are legally authorized for such purpose, as well as the granting of the guarantees that may be applicable.
  - 27) Appoint and remove the legal representatives of the Company and their respective alternates.
  - 28) Approve the granting of guarantees to third parties within the course of the Company's business and within the framework of its corporate purpose, in accordance with the provisions of these Bylaws.
  - 29) Ensure the effectiveness of the internal control and risk management systems.
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- 30) The Board of Directors of the Company, in its capacity as the strategic guiding body, will have the following duties:
- a) Approve the strategy and business plan for Ecopetrol group.
  - b) Approve the budget and investment plan for Ecopetrol group and issue the rules for their elaboration and execution.
  - c) Approve the consolidated objectives and targets Ecopetrol group.
  - d) Issue compensation guidelines for Ecopetrol and its subsidiaries companies.
  - e) Approve the consolidated financial statements.
  - f) Approve the guidelines for retaining, transferring and mitigating financial risks, including insurance for the Ecopetrol group.
  - g) Approve the new business of Ecopetrol group.
  - h) Approve the corporate governance model applicable to Ecopetrol group.
- 31) All others assigned by Law and these By-Laws.

**PARAGRAPH ONE:** The Board of Directors may order the President to perform some of the functions assigned to it, except for those that by law expressly must be exercised by the Board of Directors.

**PARAGRAPH TWO:** The Board of Directors establish commissions for special work or studies within the Board itself.

**ARTICLE TWENTY-FOUR. COMMITTEES OF THE BOARD OF DIRECTORS.**- The Board of Directors may have institutional committees in accordance with the law, or those established by the Board itself, composed of members of the Board of Directors, appointed by the Board itself. At least one (1) member of each Committee shall be independent. The foregoing is without prejudice to the minimum number of independent members that the Audit and Risks Committee must comprise by law.

For its operation, in addition to the provisions of current regulations that are applicable, the Committees will have Internal Regulations that establish their objectives, duties and responsibilities.

#### **CHAPTER VII: GENERAL REGULATIONS FOR THE SHAREHOLDERS MEETING AND THE BOARD OF DIRECTORS**

**ARTICLE TWENTY-FIVE. MINUTES FOR PERSONAL ATTENDANCE MEETINGS.**- The minutes must comply with the provisions of Articles 189 and 431 of the Commercial Code, as applicable, and with the regulations or circulars that govern, amend or replace these. The minutes will be registered when said formality is necessary by legal mandate.

**ARTICLE TWENTY-SIX. MEETINGS OF THE GENERAL SHAREHOLDERS ASSEMBLY OR THE BOARD OF DIRECTORS WITH NO PERSONAL ATTENDANCE.**- In addition to the face-to-face meetings that are regulated in other sections of these Bylaws, the General Shareholders Assembly or the Board of Directors may meet remotely if all members can deliberate and decide through simultaneous or sequential communications using any technological mean with no personal attendance required when the provisions of article 19 of Law 222 of 1995 are complied with or the rules that replace or modify it.

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Thus, there will be a meeting of the General Shareholders Assembly and of the Board of Directors when, by any means, all the shareholders or directors can discuss and decide through simultaneous or successive communication. In the latter case, the successive communication must occur immediately, as per the means employed.

Therefore, there will be General Shareholders Assembly or Board of Directors when through any mean all the shareholders or members can deliberate and decide through simultaneous or consecutive communication. In the latter case, the communications must be immediately received according to the method used.

**ARTICLE TWENTY-SEVEN. DECISION-MAKING MECHANISM.**- In accordance with the provisions of Article 20, Law 222 of 1995, or the rules that replace or amend it, the decisions of the General Shareholders Assembly or the Board of Directors shall be valid when all shareholders or directors express their voting decision in writing. In this event, the respective majority will be calculated based on the total shares in circulation or the members of the Board of Directors, as the case may be. If the shareholders or members have expressed their vote in separate documents, these must be received within a maximum period of one month, counted from the first communication received. The legal representative will inform the General Shareholders Assembly or the Board of Directors (as applicable) regarding the outcome of the decision, within five (5) business days following the receipt of the documents in which the vote is expressed.

**ARTICLE TWENTY-EIGHT. MINUTES.**- With regard to meetings where there is no personal attendance, or when there are decisions made through the mechanism established in the previous section, the corresponding minutes shall be prepared and recorded in the respective book within thirty (30) days following the date on which the decision was made. The Legal Representative and the Secretary of the Company, will sign the minutes. In the absence of the latter, any of the shareholders or members of the Board of Directors (as applicable) will sign the minutes for meetings in which there is no personal attendance.

With regard to meetings where there is no personal attendance, decisions will be void and null when adopted without the participation of a shareholder or member of the Board of Directors in the simultaneous or consecutive communications. Regarding decision-making through a written vote mechanism, the decisions adopted when the shareholders or members of the Board do not express the meaning of their vote or exceed the term mentioned in the previous article for the mailing of the vote by the end of one month, the decisions made will be ineffective.

**ARTICLE TWENTY-NINE. CONFLICT OF AUTHORITY.**- Any doubt or conflict regarding the duties or authority of the Board of Directors and the President will always be settled in favor of the Board of Directors. Conflicts between the duties of the Board of Directors and the General Shareholders Assembly will be settled in favor of the General Shareholders Assembly.

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**CHAPTER VIII:  
THE PRESIDENT**

**ARTICLE THIRTY. PRESIDENT.**- The management and General Legal Representation of Ecopetrol will be the responsibility of the President, who will be appointed by the Board of Directors.

The President shall be appointed for a two (2) year-term counted from its election, but may be re-elected for the same term more than once or removed freely from the position before expiration of the term. In cases where the Board does not appoint the President at the corresponding time, the previous President will continue to hold office until a new appointment is made. The election of the President will be carried out in accordance with criteria of suitability, knowledge, experience and leadership.

The Board of Directors must approve any change regarding the manner in which the President's work shall be evaluated, and such change must be approved by of a simple majority. Once the respective amendment comes into effect, the Board of Directors' Secretary will communicate this to all managers and the new system will be disclosed to all interested citizens through the Shareholder and Investor Service Office and through Ecopetrol's website [www.ecopetrol.com.co](http://www.ecopetrol.com.co), or whichever site takes its place.

**PARAGRAPH:** The evaluation of senior executives will be performed in accordance with the objectives defined by the Board of Directors. The Board of Directors must approve any change to the evaluation scheme described herein.

**ARTICLE THIRTY-ONE. DUTIES OF THE PRESIDENT.**-The President's will have the following duties:

- 1) Execute the strategy and business plan approved by the Board of Directors.
  - 2) Direct, coordinate, monitor, control and evaluate the execution and fulfillment of the objectives, duties, policies, plans, programs and projects inherent to the corporate purpose of Ecopetrol.
  - 3) Adopt the decisions and determine the appropriate acts in order to fulfill the Company's corporate purpose and duties, within the limits set out by law and in the bylaws.
  - 4) Implement the compensation policy, and present the Board of Directors with initiatives aimed at amending, supplementing or adjusting said policies.
  - 5) Execute and enforce all acts, operations, and authorizations comprised within the corporate purpose.
  - 6) Together with the Board of Directors, present to the General Shareholders Assembly the Company's management report, certified financial statements for each fiscal year, planned distribution of earnings and other documents listed in Article 446 of the Commercial Code and Law 222 of 1995, or any provisions that replace, regulate, amend or supplement them, as set forth therein.
  - 7) Together with the Board of Directors, present to the General Shareholders' Assembly a special report expressing the closeness of economic relations existing between the parent company and its affiliates or subsidiaries, pursuant to Article 29 of Law 222 of 1995.
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- 8) Fulfill the legal provisions concerning the right of inspection set forth in Article 447 of the Commercial Code or any standards that replace, regulate or amend it
  - 9) Submit the following documents to the Board of Directors:
    - a) The budget and investment plan for the Company and its subsidiaries companies.
    - b) Amendments to the budget and investment plan, in accordance with the provisions set out by the rules for its preparation, issued by the Board of Directors.
    - c) A quarterly analysis of budget execution, supplemented by the corresponding test balances and the approximate calculation of profit and loss, as well as information on costs and prices for products in domestic and foreign markets.
    - d) Annually, the financial reports, the financial statements, a report on the progress of the Company, the status of new works or expansion, the results for the exploration, drilling and operations carried out by the Company and its contractors, the initiatives, work plans, and all instructions and suggestions aimed at the improvement and rationalization of the Company's industrial and administrative systems.
    - e) All other information requested by the Board of Directors for the fulfillment of the duties assigned to it.
  - 10) Execute the budget and investment plan, consistent with the standards for its execution, as set by the Board of Directors.
  - 11) Comply with and enforce the decisions of the Board of Directors.
  - 12) Exercise the commercial and legal representation of Ecopetrol, without prejudice to the powers and rights conferred to the Legal Representatives for Judicial and Extrajudicial Affairs and the Legal Representative for the Provision of Goods and Services.
  - 13) Direct Ecopetrol's employment relations and appoint, remove and hire Company personnel in accordance with the legal, regulatory and statutory standards, and consistent with the provisions of Section 6), Article 23 of these Bylaws.
  - 14) Make proposals to the Board of Directors on the appointment or removal of employees from the first level dependencies and, if necessary, remove any of these employees and appoint a temporary replacement (this situation must be reported to the Board of Directors).
  - 15) Represent the shares, participations or interests that Ecopetrol has in companies, partnerships, foundations, or any other type of association.
  - 16) Summon the Board of Directors and the General Shareholders Assembly to ordinary and extraordinary meetings.
  - 17) Present the Board of Directors with and ensure ongoing fulfillment of the specific measures regarding the governance of the Company, its conduct and its information, in order to ensure respect for the rights of those who invest in its shares or in any other securities it issues, while also ensuring proper management of its affairs and public knowledge of its work.
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- 18) Treat all shareholders fairly.
- 19) Provide the market with timely, complete and accurate information about the Company's financial statements and its business and administrative conduct, without prejudice to the provisions of Articles 23 and 48, Law 222 of 1995, or the rules that replace or amend these.
- 20) Present a Corporate Governance Code and the Code of Ethics to the Board of Directors for approval.
- 21) Avoid and reveal disclose potential conflicts of interest between them and the Company, or with shareholders, suppliers or contractors, reporting their existence to the members of the Board of Directors and, if applicable, to the General Shareholders Assembly, though refraining from deliberating or issuing their opinion on the contentious issue, according with the law and the procedure established within the Company.
- 22) Establish and maintain the Company's Internal Control System.
- 23) Fulfill the duties assigned to it by current and applicable regulations, with regard to the prevention and control of money laundering and the financing of terrorism.
- 24) Appoint the employees of the Company in the Boards of directors of the Companies in which Ecopetrol has a participation as a shareholder has participation in Colombia or abroad.
- 25) Execute and develop corporate governance guidelines applicable to Ecopetrol group.
- 26) Perform all other duties established by Law.

**PARAGRAPH:** The President will organize the government of the Company for which, without the authorization of another body, will be able to assign other workers of the Company to carry out some of their functions, except those that by legal mandate, must be exercised directly by the President.

When for the development of the assigned faculties, the worker requires legal capacity in order to carry out agreements that are binding to the Company, the assignment of the President must be accompanied by the respective act of representation, which may be revoked at any time.

**ARTICLE THIRTY-TWO. LEGAL REPRESENTATION OF THE COMPANY.-** The President is the general legal representative of the Company, who shall exercise the commercial and legal representation of Ecopetrol for all purposes and will have at least two (2) personal alternates. The alternates of the President will be appointed by the Board of Directors, for two-year periods and may be freely re-elected or removed at any time. If the Board of Directors fails to choose the alternates when needed, the previous ones shall remain in their position until such time as a new appointment is effected.

However, for more efficiency in the ordinary course of business, the Company will have, additionally, a Legal Representative for Judicial Affairs, and a Legal Representative for Purposes of the Supply of Goods and Services.

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**LEGAL REPRESENTATIVE FOR JUDICIAL AND OUT-OF-COURT AFFAIRS.-** The Company will have one (1) legal representative for Judicial and Out-of-Court Affairs, who will have one (1) personal alternate who will replace it during its temporary, absolute or accidental absences, and such alternate will have identical powers.

The legal representative for Judicial and Out-of-Court Affairs will represent the Company in the following matters: a) Receive all kinds of notifications regarding actions and administrative investigations and lawsuits filed or initiated against the Company in any kind of judicial, out-of-court, administrative or police action or proceedings. b) Represent the Company in all kind of judicial, administrative, police, arbitration or out-of-court proceedings, in which the Company is a party. For this purpose, the Legal Representative for Judicial and Out-of-Court Affairs or its alternate will be fully authorized to receive, withdraw, settle and conciliate on behalf of the Company. c) Respond on behalf of the Company, all kinds of judicial and out-of-court questions that may be directed to the Company. d) Represent the Company in all kinds of administrative actions initiated by or against it, before any administrative, police or judicial authority. e) Initiating and carrying out, on behalf of the Company, all kinds of requests, petitions or procedures before any administrative, police or judicial authority, including the power to file any appeal on behalf of the Company. f) Granting, on behalf of the Company, powers of attorney to the lawyers who will exercise representation and legal status in all kinds of judicial, police or administrative proceedings in which the Company is a party. For this purpose, the Representative or their alternate may confer powers of attorney to receive, withdraw, settle and conciliate on behalf of the Company. They may revoke the granted powers of attorney at any time.

The legal representative for Judicial and Out-of-Court Affairs and its alternate will be appointed by the Board of Directors for periods of two (2) years and may be re-elected indefinitely or freely removed at any time. The Legal Representative for Judicial and Out-of-Court Affairs and its alternate will continue in their positions until such time that the Board of Directors appoints another person in their place.

**LEGAL REPRESENTATIVE FOR PURPOSES OF THE SUPPLY OF GOODS AND SERVICES.-** The Company will have one Legal Representative for Purposes of the Supply of Goods and Services, who will have one (1) personal alternate who will replace it during their temporary, absolute or accidental absences, and such alternate shall have identical powers.

The Legal Representative for Purposes of the Supply of Goods and Services and its alternate will be appointed by the Board of Directors for periods of two (2) years and may be re-elected indefinitely or freely removed at any time. During their temporary, absolute or accidental absences, an alternate with identical power will replace them. The Legal Representative for Purposes of the Supply of Goods and Services and their alternate will continue in their positions until such time that the Board of Directors appoints another person in their place.

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## CHAPTER IX: STATUTORY AUDITOR

**ARTICLE THIRTY-THREE. STATUTORY AUDITOR.-** The Company will have a Statutory Auditor along with their respective alternate, who will replace them during their absolute, temporary or accidental absences, both of whom shall be elected by the General Shareholders Assembly.

In terms of electing the people who are going to occupy the position of Statutory Auditor or their alternate, the Company may only elect individuals or legal entities duly registered in the Register for the Central Board of Accountants and who meet the requirements established in Law 43 of 1990 or in the standards that govern, amend or replace it, or whichever standards are applicable.

The election of the Statutory Auditor will be carried out based on an objective and transparent pre-selection carried out by the Audit and Risks Committee of the Board of Directors.

The Audit Committee of the Board of Directors will do the election of the External Auditor through an objective and transparent pre selection of candidates.

The Audit and Risks Committee of the Board of Directors will evaluate the candidates and present a recommendation to the General Shareholders Assembly, during which an order of eligibility will be established, based on criteria of experience, service, costs and knowledge of the sector.

The shareholders may propose additional candidates for Statutory Auditor to the Audit and Risks Committee, provided that their profiles comply with the provisions of the law and these Bylaws. They may also express any dissatisfaction with the current Statutory Auditor to the Shareholder and Investor Service Office, being the Audit and Risks Committee the one who will evaluate the case, so that it can be brought to the General Shareholders Assembly, which will make the decision on the matter.

**PARAGRAPH ONE:** In the event that the Statutory Auditor is a legal entity, it must appoint a public accountant to carry out the duties of statutory auditor so that the role can be performed personally, under the terms of Article 215 of the Commercial Code or the rules that replace or amend it. In the event that the person appointed is absent, the alternates will act in their place

**PARAGRAPH TWO:** The Statutory Auditor will receive the payment indicated by the General Shareholders Assembly, in accordance with criteria such as suitability, professional experience in auditing similar companies, and market guidelines.

**PARAGRAPH THREE:** In accordance with the provisions of Article 206 of the Commerce Code, or the rules that replace or amend it, the Statutory Auditor's term will be equal to that of the Board of Directors, but in any case, they may be removed at any time by the General Shareholders Assembly through a vote representing half plus one of the shares present at the relevant meeting.

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**ARTICLE THIRTY-FOUR. DUTIES OF THE STATUTORY AUDITOR.**- Without prejudice to the duties indicated by laws and regulations, the responsibilities of the Statutory Auditor are as follows:

- 1) Verify that the transactions that are concluded or carried out on behalf of the Company comply with the requirements of these Bylaws, the decisions of the General Shareholders Assembly and the Board of Directors.
  - 2) Examine all transactions, inventories, minutes, books, correspondence, account vouchers and business relating to the Company.
  - 3) Verify the cash count on the occasions that the Statutory Auditor deems appropriate.
  - 4) Verify of all the Company's securities, as well as the others that it has in safekeeping.
  - 5) Inspect the assets of the Company and verify that measures are taken for the conservation and security thereof.
  - 6) Report (expressly and in writing) the irregularities noted in the Company's minutes of the Shareholders Assembly, the Audit and Risks Committee, the Board of Directors or the President, as appropriate.
  - 7) Authorize the Company's financial statements by means of their signature.
  - 8) Summon the General Shareholders Assembly to special meetings, in accordance with the provisions of Article 17 of these Bylaws.
  - 9) Comply with the provisions of Article 447 of the Commerce Code or the legal provisions that govern or amend it.
  - 10) Cooperate with the competent authority for the inspection and monitoring of the Company, and provide it with any reports that may be required or requested.
  - 11) Act in the deliberations of the General Shareholders Assembly and those of the Board of Directors, when summoned to them, with the right to speak but not to vote.
  - 12) Fulfill all other duties indicated by law and these Bylaws, as well as those that are entrusted to them by the Audit and Risks Committee and the General Shareholders Assembly (provided such duties are compatible with the law and Bylaws).
  - 13) Verify that management complies with the specific duties established by the monitoring bodies, especially those related to the duties of information and the Corporate Governance Code.
  - 14) Report relevant findings to the Company's bodies, to the authorities and to the market, when requested.
  - 15) Be aware of the complaints filed for breach of the rights of shareholders and investors, as well as the results of these investigations, which will be conveyed to the Board of Directors and made known to the General Shareholders Assembly.
  - 16) Verify that the Company's accounts and the minutes for sessions of the General Shareholders Assembly and the Board of Directors are kept regularly, and that the Company's correspondence and account vouchers are duly kept, issuing the necessary instructions for such purposes.
  - 17) All others indicated in Article 207 of the Commerce Code or other legal provisions
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**PARAGRAPH ONE:** The Statutory Auditor will not have the authority to intervene in Ecopetrol's administrative activities. They may only perform the administrative duties inherent to the role of Statutory Auditor.

**PARAGRAPH TWO:** In order to communicate the material findings, the Statutory Auditor must:

- 1) Report any irregularities that occur in Ecopetrol's operation and in the implementation of its business, in writing and in a timely manner, to the Board of Directors, the General Shareholders Assembly, the Audit and Risks Committee or the President, as appropriate in accordance with the competence of the body and the magnitude of the finding in the judgment of the Statutory Auditor.
- 2) Summon extraordinary meetings of the General Shareholders Assembly when necessary.
- 3) Inform the legal representative of securities holders, when deemed necessary, in the event there are debt securities.

**PARAGRAPH THREE:** On a permanent basis, management will use Ecopetrol's website [www.ecopetrol.com.co](http://www.ecopetrol.com.co) or whichever site takes its place (available to the market and shareholders) to publish the latest report from the Statutory Auditor, together with its annexes and the details of the findings and qualifications presented.

**ARTICLE THIRTY-FIVE. DISQUALIFICATIONS FOR THE POSITION OF STATUTORY AUDITOR.**- In addition to the disqualifications and incompatibilities established in law, Ecopetrol's Statutory Auditor may not be anyone who has received income from the Company and/or its subsidiaries, where such income represents twenty-five percent (25%) or more of their latest annual income from the immediately preceding year, or persons who perform or exercise (in the Company and/or its subsidiaries companies, directly or through third parties) services other than those of Statutory Auditor, thereby compromising their independence for exercising the position. The Statutory Auditor will be appointed for periods of two (2) years and may be reelected consecutively for two (2) periods, and it may once again be hired after one (1) period away from the position.

#### **CHAPTER X: FINANCIAL STATEMENTS, PROFIT DISTRIBUTION, AND RESERVE FUNDS**

**ARTICLE THIRTY-SIX: FINANCIAL STATEMENTS.**- On the thirty-first (31st) of December of each year the accounts will be closed and the financial statements of the Company will be produced.

**ARTICLE THIRTY-SEVEN: FUTURE EXPENSES.**- In order to calculate the income statement, funds must be appropriated in advance to cover future-but-certain expenses, such as company benefits, depreciation, amortization, and taxes, among others.

**ARTICLE THIRTY- EIGHT. PROFITS.**- Of the net profits calculated in accordance with Article 39 of these Bylaws, ten percent (10%) will be taken for the statutory reserve, until it is equal to half of the subscribed capital. When this limit is reached, the Company will not be obliged to continue carrying this ten percent (10%) to this account, unless the General Shareholders Assembly so provides. However, if it decreases, the same ten percent (10%) of the profits will be appropriated until the reserve once again reaches the limit of fifty percent (50%) of the subscribed capital.

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**ARTICLE THIRTY-NINE. DIVIDENDS.**- For purposes of the distribution of profits as provided in Articles 155 and 454 of the Commercial Code or the rules that replace or amend them, net profits shall be considered as those resulting from the application of the following procedure:

- 1) The profits made by the Company are based on the real and reliable Financial Statements for each year, and from this value only the items corresponding to the following are subtracted: (i) Financing the losses from previous years that affect the capital, i.e. when as a consequence thereof the net equity is reduced below the subscribed capital (if any); (ii) The statutory reserve and bylaw-related reserves (if any), and (iii) Appropriations for the payment of income and ancillary taxes.
- 2) Using the balance thus determined, the percentages to be distributed shall be applied in accordance with the provisions of the Law. This value shall be the minimum amount to be distributed as a dividend in each period.
- 3) The amounts resulting after having distributed the minimum dividends will be available so that the General Shareholders Assembly can establish incidental reserves or so that they can be distributed as dividends in addition to the minimum dividends established in number 2) above.

**ARTICLE FORTY. LOSSES.**- Losses, if any, will be cancelled using the reserves allocated for that purpose and, failing that, using the legal reserve. Reserves whose purpose is to absorb certain losses cannot be used to cover other losses, unless the General Shareholders Assembly so decides. If the statutory reserve is insufficient to cancel the losses, the company's profits for the following years will be applied to this end, until the loss is extinguished, and during such time it shall not be possible to allocate the profits differently. The meeting may adopt or order measures leading to the restoration of net equity when losses arise that have placed such equity below fifty percent (50%) of the subscribed capital of the Company, e.g. measures such as the sale of valued company assets, the reduction of subscribed capital (carried out in accordance with the law), or the issuance of new shares. Any of these measures must be taken within eighteen (18) months following the determination of the loss. Failing this, the Company must be dissolved.

#### **CHAPTER XI: DISSOLUTION AND LIQUIDATION**

**ARTICLE FORTY-ONE. DISSOLUTION.**- The Company will only be dissolved due to the causes provided in Article 457 of the Commercial Code or the rules that replace or amend them.

**ARTICLE FORTY-TWO. LIQUIDATION.**- If the Company is dissolved, its liquidation will commence immediately. To this end, it should be taken into account that:

- 1) Excluding the event of an express legal exception, any act that deviates from this purpose will result in the unlimited, joint and several liability of the Liquidator or Liquidators and the Statutory Auditor who failed to intervene.
-

- 2) The following words must be added to the company name: UNDER LIQUIDATION. If this requirement is ignored, the Liquidator or Liquidators and the Statutory Auditor who failed to intervene shall be liable in an unlimited, joint and several manner for the damage and losses that may occur.

**PARAGRAPH:** In the event of liquidation, in-kind contributions will be returned to the person who provided them, in the corresponding proportion, once Article 240 of the Commercial Code and the other applicable legal provisions in such case have been applied.

**ARTICLE FORTY-THREE. LIQUIDATOR.-** The liquidation of the Company shall be performed by the person appointed by the General Shareholders Assembly and in accordance with Article 228 of the Commercial Code, or the provisions that supplement, govern or amend it. The Liquidator will execute any action under its exclusive liability.

**ARTICLE FORTY-FOUR. POWERS OF THE LIQUIDATOR.-** The President, in their capacity as liquidator, or the liquidators appointed by the General Shareholders Assembly, have the obligations and powers conferred to them by Articles 232, 233 and 238 of the Commercial Code.

**ARTICLE FORTY-FIVE. POWERS OF THE GENERAL SHAREHOLDERS ASSEMBLY.-** During the liquidation, the powers of the General Shareholders Assembly will remain as they were during the existence of the Company, with the only limitations being those that the liquidation status imposes.

## **CHAPTER XII: FINAL REGULATIONS**

**ARTICLE FORTY-SIX. TRANSPARENCY.-** Ecopetrol group, its managers, employees and beneficiaries have expressly adopted a zero-tolerance policy against fraud, bribery, corruption, any violations to the Foreign Corrupt Practices Act ("FCPA"), money laundering and terrorist financing. Furthermore, they manifestly reject any behavior that may constitute a breach of the Colombian Constitution, local or foreign law, as applicable. Likewise, they reject all conducts infringing or not acknowledging the content of the Code of Ethics and the internal regulation. Based on this, the Company undertakes to:

- 1) Refrain from participating in events considered compliance risks (fraud, bribery, violations to FCPA, money laundering and terrorist financing).
  - 2) Promote, maintain and strengthen the Compliance Program, the Internal Control System and an ethics and transparency culture in the Company to prevent and mitigate the materialization of compliance risks.
  - 3) Have in place tools to identify the risks of the Company and that include means of control to mitigate such risks.
  - 4) Reject and penalize behaviors involving the materialization of any of the risks set forth in this article.
  - 5) Zero-tolerance of acts of favoritism or nepotism in selection processes.
  - 6) Have in place adequate and confidential channels to receive and manage complaints, dilemmas and enquiries submitted by employees and people interested in the transparency of the Company.
-

- 7) Cooperate with national and foreign authorities in carrying out any inquiry and/or investigation involving Ecopetrol Group, its employees, contractors, suppliers, partners or allies.
- 8) Have within its organizational structure, an independent unit that ensures the adoption and management of the Compliance Program, the Internal Control System, and fosters its enforcement and articulation in Ecopetrol and the companies of Ecopetrol Group. This unit will have functional reporting to the Audit and Risks Committee of the Board of Directors.

**ARTICLE FORTY-SEVEN. DUTIES AND RESPONSIBILITIES OF MANAGERS.-** The duties and responsibilities of Ecopetrol will be those included in managers shall relate to those established in Article 23 of, Law 222 of 1995 and Article 200 of the Commerce Code, and in the legal provisions that govern, amend or replace these, or that are applicable.

**ARTICLE FORTY-EIGHT. INCOMPATIBILITIES INHABILITES AND DUTY OF CONFIDENTIALITY.-**

- 1) The members of the Board of Directors and the employees of Ecopetrol will be subject to the inabilities and incompatibilities set out in the Political Constitution, the law, and the provisions contained in these Bylaws on such issues and on conflicts of interest, as well as the rules that govern, amend or replace these.
- 2) No member of the Board of Directors or employee of the Company may reveal disclose to third parties (to third parties) the Company's operations, plans or initiatives, or communicate any technical procedure or the results for the explorations exploration or activities of conducted by Ecopetrol, except with such unless there is an instruction or order in this regard from a competent state authority.

**PARAGRAPH ONE:** The foregoing does not prevent the members of the Board of Directors or employees at any level from acquiring the goods or services that the Company supplies to the public under conditions common to all those who request them.

**PARAGRAPH TWO:** Ecopetrol workers may be members of the boards of directors of the companies in which Ecopetrol holds an equity stake, which shall not imply a conflict of interest between that duty and the exercise of duties within the Company.

**ARTICLE FORTY-NINE. CONFLICTS OF INTEREST.-** Among others, a conflict of interest shall be deemed to exist when:

- a) There are opposing interests between a Manager or any employee of the Company and the interests of Ecopetrol, which may lead them to making decisions or acting for their own benefit or the benefit of third parties and to the detriment of the interests of the Company, or
-

- b) When there is any circumstance that may diminish independence, fairness or objectivity in the actions of a Manager or any employee of Ecopetrol, and this may be detrimental to the interests of the Company.

For these purposes, Managers shall be construed as the persons defined as such in Article 22, Law 222 of 1995 or any rule that adds to, amends or replaces it.

**PARAGRAPH TWO: DISCLOSURE OF CONFLICTS IN THE COMPANY.**- The President members of the Board of Directors and all of Ecopetrol employees must disclose any conflict between their personal interests and the interests of Ecopetrol when dealing with its main shareholder and its subsidiaries companies, customers, suppliers, contractors and any person who conducts or intends to conduct business with the Company or with companies in which it has a shareholding or interests (direct or indirect).

**PARAGRAPH THREE: MANAGEMENT OF CONFLICTS OF INTEREST.**- In order to resolve situations involving conflicts of interest, the following procedure will be followed:

- a) In the event that the conflict of interest involves an employee of the Company, other than Managers at the Company they must inform their line manager in writing so that the latter may decide on the matter, and if they deem that the conflict of interest exists, such line manager will appoint someone to replace the person involved in the conflict of interest.
- b) In the event that the conflict of interest involves a Manager at Ecopetrol, matters shall proceed as provided in Section 7, Article 23, Law 222 of 1995 or the rules that ~~may~~ add to, amend or replace it.

**ARTICLE FIFTY. ECOPETROL S.A. APPLICABLE LAW.**- The legal system applicable to the Company will be that indicated in law, which, for the legal acts, agreements and actions necessary to manage and implement the corporate purpose, is exclusively Private Law.

**ARTICLE FIFTY-ONE.**- Ecopetrol, its managers and employees undertake the obligation to comply with the corporate governance practices, which have been voluntarily adopted by the Company

**ARTICLE FIFTY-TWO. SUPPLEMENTARY RULES.**- In matters not provided for in these Bylaws, the relevant legal provisions shall apply.

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## Subsidiaries of Ecopetrol S.A.

The following table sets forth our subsidiaries, their respective countries of incorporation, our percentage ownership in each (both directly and indirectly through other subsidiaries) at March 31, 2019.

COMPANY	COUNTRY OF INCORPORATION	OWNERSHIP
ANDEAN CHEMICALS LIMITED	Bermuda	100.00%
BLACK GOLD RE LIMITED	Bermuda	100.00%
CENIT TRANSPORTE Y LOGÍSTICA DE HIDROCARBUROS S.A.S.	Colombia	100.00%
ECOPETROL CAPITAL AG	Switzerland	100.00%
ECOPETROL GLOBAL ENERGY S.L.U.	Spain	100.00%
ECOPETROL GLOBAL CAPITAL S.L.U. ***	Spain	100.00%
EQUION ENERGÍA LIMITED	United Kingdom	51.00%
HOCOL PETROLEUM LIMITED	Bermuda	100.00%
BIOENERGY S.A.S.**	Colombia	99.35%
BIOENERGY ZONA FRANCA S.A.S.**	Colombia	99.35%
COLOMBIA PIPELINES LIMITED**	United Kingdom	51.00%
COMPOUNDING AND MASTERBATCHING INDUSTRY LTDA - COMAI**	Colombia	100.00%
ECOPETROL AMERICA INC**	United States	100.00%
ECOPETROL DEL PERU S.A.**	Peru	100.00%
ECOPETROL OLEO & GAS DO BRASIL LTDA**	Brazil	100.00%
ECP OIL AND GAS GERMANY GMBH**	Germany	100.00%
HOCOL S.A.**	Cayman Islands	100.00%
OLEODUCTO BICENTENARIO DE COLOMBIA S.A.S.**	Colombia	55.97%
OLEODUCTO CENTRAL S.A. - OCENSA**	Colombia	72.65%
OLEODUCTO DE COLOMBIA S.A. - ODC**	Colombia	73.00%
OLEODUCTO DE LOS LLANOS ORIENTALES S.A.**	Panama	65.00%
REFINERIA DE CARTAGENA S.A. *	Colombia	100.00%
PROFILCO S.A.*	Colombia	100.00%
SANTIAGO OIL COMPANY**	Cayman Islands	51.00%
ESENTTIA RESINAS DEL PERU SAC**	Peru	100.00%
ECP HIDROCARBUROS DE MÉXICO **	Mexico	100.00%
ECOPETROL ENERGÍA SAS ESP **	Colombia	100.00%
ECOPETROL COSTA AFUERA COLOMBIA S.A.S.**	Colombia	100.00%

\* Direct and indirect participation.

\*\* Solely indirect participation through other subsidiaries or affiliates.

\*\*\* Ecopetrol Global Capital S.L.U. was liquidated on April 4, 2018.

## CERTIFICATION

I, Felipe Bayón Pardo, certify that:

1. I have reviewed this annual report on Form 20-F of Ecopetrol S.A.;
2. Based on my knowledge, this report does not contain any untrue statement of a material fact or omit to state a material fact necessary to make the statements made, in light of the circumstances under which such statements were made, not misleading with respect to the period covered by this report;
3. Based on my knowledge, the financial statements, and other financial information included in this report, fairly present in all material respects the financial condition, results of operations and cash flows of the company as of, and for, the periods presented in this report;
4. The company's other certifying officer(s) and I are responsible for establishing and maintaining disclosure controls and procedures (as defined in Exchange Act Rules 13a-15(e) and 15d-15(e)) and internal control over financial reporting (as defined in Exchange Act Rules 13a-15(f) and 15d-15(f)) for the company and have:
  - (a) Designed such disclosure controls and procedures, or caused such disclosure controls and procedures to be designed under our supervision, to ensure that material information relating to the company, including its consolidated subsidiaries, is made known to us by others within those entities, particularly during the period in which this report is being prepared;
  - (b) Designed such internal control over financial reporting, or caused such internal control over financial reporting to be designed under our supervision, to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles;
  - (c) Evaluated the effectiveness of the company's disclosure controls and procedures and presented in this report our conclusions about the effectiveness of the disclosure controls and procedures, as of the end of the period covered by this report based on such evaluation; and
  - (d) Disclosed in this report any change in the company's internal control over financial reporting that occurred during the period covered by the annual report that has materially affected, or is reasonably likely to materially affect, the company's internal control over financial reporting; and
5. The company's other certifying officer(s) and I have disclosed, based on our most recent evaluation of internal control over financial reporting, to the company's auditors and the audit committee of the company's board of directors (or persons performing the equivalent functions):
  - (a) All significant deficiencies and material weaknesses in the design or operation of internal control over financial reporting which are reasonably likely to adversely affect the company's ability to record, process, summarize and report financial information; and
  - (b) Any fraud, whether or not material, that involves management or other employees who have a significant role in the company's internal control over financial reporting.

Dated: April 5, 2019

By: /s/ Felipe Bayón Pardo  
Name: Felipe Bayón Pardo  
Title: Chief Executive Officer

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## CERTIFICATION

I, Jaime Caballero Uribe, certify that:

1. I have reviewed this annual report on Form 20-F of Ecopetrol S.A.;
2. Based on my knowledge, this report does not contain any untrue statement of a material fact or omit to state a material fact necessary to make the statements made, in light of the circumstances under which such statements were made, not misleading with respect to the period covered by this report;
3. Based on my knowledge, the financial statements, and other financial information included in this report, fairly present in all material respects the financial condition, results of operations and cash flows of the company as of, and for, the periods presented in this report;
4. The company's other certifying officer(s) and I are responsible for establishing and maintaining disclosure controls and procedures (as defined in Exchange Act Rules 13a-15(e) and 15d-15(e)) and internal control over financial reporting (as defined in Exchange Act Rules 13a-15(f) and 15d-15(f)) for the company and have:
  - (a) Designed such disclosure controls and procedures, or caused such disclosure controls and procedures to be designed under our supervision, to ensure that material information relating to the company, including its consolidated subsidiaries, is made known to us by others within those entities, particularly during the period in which this report is being prepared;
  - (b) Designed such internal control over financial reporting, or caused such internal control over financial reporting to be designed under our supervision, to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles;
  - (c) Evaluated the effectiveness of the company's disclosure controls and procedures and presented in this report our conclusions about the effectiveness of the disclosure controls and procedures, as of the end of the period covered by this report based on such evaluation; and
  - (d) Disclosed in this report any change in the company's internal control over financial reporting that occurred during the period covered by the annual report that has materially affected, or is reasonably likely to materially affect, the company's internal control over financial reporting; and
5. The company's other certifying officer(s) and I have disclosed, based on our most recent evaluation of internal control over financial reporting, to the company's auditors and the audit committee of the company's board of directors (or persons performing the equivalent functions):
  - (a) All significant deficiencies and material weaknesses in the design or operation of internal control over financial reporting which are reasonably likely to adversely affect the company's ability to record, process, summarize and report financial information; and
  - (b) Any fraud, whether or not material, that involves management or other employees who have a significant role in the company's internal control over financial reporting.

Dated: April 5, 2019

By: /s/ Jaime Caballero Uribe  
Name: Jaime Caballero Uribe  
Title: Chief Financial Officer

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**Certification**  
**Pursuant to Section 906 of the Sarbanes-Oxley Act of 2002**  
**(Subsections (a) and (b) of Section 1350, Chapter 63 of Title 18, United States Code)**

Pursuant to section 906 of the Sarbanes-Oxley Act of 2002 (subsections (a) and (b) of section 1350, chapter 63 of title 18, United States Code), each of the undersigned officers of Ecopetrol S.A. (the "Company"), does hereby certify, to such officer's knowledge, that:

The annual report on Form 20-F for the fiscal year ended December 31, 2018 (the "Form 20-F") of the Company fully complies with the requirements of section 13(a) or 15(d) of the Securities Exchange Act of 1934 and information contained in the Form 20-F fairly presents, in all material respects, the financial condition and results of operations of the Company.

Dated: April 5, 2019

By: /s/ Felipe Bayón Pardo  
Name: Felipe Bayón Pardo  
Title: Chief Executive Officer

Dated: April 5, 2019

By: /s/ Jaime Caballero Uribe  
Name: Jaime Caballero Uribe  
Title: Chief Financial Officer

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**Consent of Independent Registered Public Accounting Firm**

We consent to the incorporation by reference in the Registration Statement (Form F-3 No. 333-225381) of Ecopetrol S.A. and in the related Prospectus of our reports dated April 5, 2019, with respect to the consolidated financial statements of Ecopetrol S.A., and the effectiveness of internal control over financial reporting of Ecopetrol S.A., included in this Annual Report (Form 20-F) for the year ended December 31, 2018.

/s/ Ernst & Young Audit S.A.S.

Bogotá, Colombia

April 5, 2019

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**RYDER SCOTT COMPANY**  
**PETROLEUM CONSULTANTS**  
TBPE REGISTERED ENGINEERING FIRM F-1580  
1100 LOUISIANA STREET SUITE 4600

HOUSTON, TEXAS 77002-5294

FAX (713) 651-0849  
TELEPHONE (713) 651-9191

**Consent of Ryder Scott Company, L.P.**

Ryder Scott Company, L.P. ("Ryder Scott") consents to the references to our firm and our report dated March 1, 2019 (our "Report") included in Ecopetrol S.A.'s annual report on Form 20-F for the year ended December 31, 2018 (the "Annual Report"), the inclusion of our Report as Exhibit 99.1 to the Annual Report and references to and information derived from our Report in the Annual Report, as well as to the incorporation by reference of the consent and our Report into Ecopetrol's S.A.'s registration statement on Form F-3 filed with the United States Securities and Exchange Commission on June 1, 2018 (the "Registration Statement"). Ryder Scott further consents to the references to Ryder Scott as set forth in the Registration Statement under the heading "Experts".

/s/ RYDER SCOTT COMPANY, L.P.

**RYDER SCOTT COMPANY, L.P.**  
TBPE Firm Registration No. F-1580

Houston, Texas  
April 4, 2019

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621 17TH STREET, SUITE 1550

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DENVER, COLORADO 80293-1501

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TEL (303) 623-9147

FAX (403) 262-2790  
FAX (303) 623-4258

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Ref.: 4377.70952

April 4, 2019

Ecopetrol S.A.  
Calle 35 No. 7-21 Piso 1  
Bogotá, D.C. Colombia

**Re: Consent of Independent Petroleum Engineer**

We refer to our report, entitled "Evaluation of Certain P&NG Reserves of Hocol S.A. in Colombia (As of December 31, 2018)" dated February 15, 2019 (the "Report").

We hereby consent to the references to Sproule International Limited ("Sproule") and to the inclusion of and information derived from Sproule's Report in Ecopetrol S.A.'s ("the Company") in the Company's annual report Form 20-F for the year ended December 31, 2018 (the "Annual Report"), the inclusion of our Report as Exhibit 99.2 to the Annual Report, as well as to the incorporation by reference of this consent and our Report into Ecopetrol S.A.'s registration statement on Form F-3 filed with the United States Securities and Exchange Commission on June 1, 2018 (the "Registration Statement"). Sproule's reserves estimates for Colombia as prepared for Hocol S.A. and contained in the Annual Report have been combined with estimates of reserves prepared by other petroleum consultants and Sproule is therefore unable to verify the accuracy of the reserves estimates contained in the Annual Report other than those contained in the Report.

Sincerely,

**SPROULE INTERNATIONAL LIMITED**  
Alberta Permit to Practice number P06151

/s/ Nora Stewart

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Nora Stewart, P.Eng  
Senior VP, Consulting Services



140 Fourth Avenue SW, Suite 900  
Calgary, AB, Canada T2P 3N3  
Sproule.com  
T +1 403 294 5500 F +1 403 294 5590 TF +1 877 777 6135

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**DEGOLYER AND MACNAUGHTON**  
5001 SPRING VALLEY ROAD  
SUITE 800 EAST  
DALLAS, TEXAS 75244

April 4, 2019

Board of Directors  
Ecopetrol S.A.  
Calle 35 No. 7-21 Piso 1

Bogota, D.C. Colombia

Ladies and Gentlemen:

We hereby consent to the references to DeGolyer and MacNaughton and to the inclusion of and information derived from our report of third party dated March 1, 2019, containing our opinions regarding our estimates, as of December 31, 2018, of the proved oil, condensate, natural gas liquids, gas, and oil equivalent reserves of certain selected properties that Ecopetrol S.A. has represented that it holds in Colombia and Peru as set forth under the headings “3. Business Overview—3.4 Exploration and Production—3.4.3 Reserves,” “8. Financial Statements,” and “10. Exhibits” and as Exhibit No. 99.3 in the Annual Report on Form 20-F of Ecopetrol S.A. for the year ended December 31, 2018 (the Annual Report), and to the incorporation by reference of this consent and our report of third party into Ecopetrol S.A.’s registration statement on Form F-3 filed with the United States Securities and Exchange Commission on June 1, 2018 (the Registration Statement). We further consent to the references to DeGolyer and MacNaughton as set forth in the Registration Statement under the heading “Experts,” provided, however, that we are necessarily unable to verify the accuracy of the reserves estimates contained in the Annual Report because our estimates of reserves have been combined with estimates of reserves prepared by other petroleum consultants.

Very truly yours,

/s/ DeGOLYER and MacNAUGHTON  
\_\_\_\_\_  
DeGOLYER and MacNAUGHTON  
Texas Registered Engineering Firm F-716

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Gaffney, Cline & Associates, Inc.

5555 San Felipe Street  
Suite 550  
Houston, TX 77056, USA  
Telephone: +1 713 850 9955

[www.gaffney-cline.com](http://www.gaffney-cline.com)

April 4, 2019

Board of directors  
**Ecopetrol**  
Calle 13 No. 36 -34  
Bogotá, D.C.  
Colombia

**CONSENT OF GAFFNEY, CLINE & ASSOCIATES**

Dear Sirs,

As independent reserve engineers for Ecopetrol S.A.(Ecopetrol), Gaffney, Cline & Associates (GCA) hereby confirms that it has granted and not withdrawn its consent to (i) the references to GCA and to the inclusion of information contained in our third-party letter report entitled “Reserve Certification for Sixty Four Fields in Colombia as of December 31, 2018”, dated April 1, 2019, prepared for Ecopetrol, and to the annexation of our report as an exhibit in Ecopetrol’s annual report on Form 20-F for the year ended December 31, 2018 , and (ii) incorporation by reference of this consent and our report into Ecopetrol S.A.’s registration statement on Form F-3 filed with the United States Securities and Exchange Commission on June 1, 2018 (the “Registration Statement”).

Yours faithfully,

**GAFFNEY, CLINE & ASSOCIATES, INC.**

/s/ Fabio Chiarandini

Project Manager  
Fabio Chiarandini, *Principal Advisor*

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**RYDER SCOTT COMPANY**  
**PETROLEUM CONSULTANTS**

TBPE REGISTERED ENGINEERING FIRM F-1580  
 1100 LOUISIANA SUITE 4600

HOUSTON, TEXAS 77002-5294

FAX (713) 651-0849  
 TELEPHONE (713) 651-9191

March 1, 2019

Ecopetrol  
 Cra. 13 No. 36-24  
 Edificio Principal, Piso 7  
 Bogotá, D.C., Colombia

Gentlemen:

At the request of Ecopetrol, Ryder Scott Company, L.P. (Ryder Scott) has prepared a certification (study) of the proved reserves attributable to certain properties of Ecopetrol, as of December 31, 2018. The subject properties are located in the country of Colombia and the United States of America. Ryder Scott estimated the reserves based on the definitions and disclosure guidelines of the United States Securities and Exchange Commission (SEC) contained in Title 17, Code of Federal Regulations, Modernization of Oil and Gas Reporting, Final Rule released January 14, 2009 in the Federal Register (SEC Regulations). Our third party certification, completed on January 21, 2019 and presented herein, was prepared for public disclosure by Ecopetrol in filings made with the SEC in accordance with the disclosure requirements set forth in the SEC regulations.

The properties evaluated by Ryder Scott account for a portion of Ecopetrol's total net proved reserves as of December 31, 2018. Based on information provided by Ecopetrol, the third party estimate conducted by Ryder Scott addresses 76 percent of the total proved developed net liquid hydrocarbon reserves and 85 percent of the total proved undeveloped net liquid hydrocarbon reserves, of Ecopetrol. The Ryder Scott evaluation also addresses 81 percent of the total proved developed net gas reserves and 57 percent of the total proved undeveloped net gas reserves, of Ecopetrol.

The estimated reserve amounts presented in this report, as of December 31, 2018, are related to hydrocarbon prices. The hydrocarbon prices used in the preparation of this report are based on the average prices during the 12-month period prior to the "as of date" of this report, determined as the unweighted arithmetic averages of the prices in effect on the first-day-of-the-month for each month within such period, unless prices were defined by contractual arrangements, as required by the SEC regulations. Actual future prices may vary significantly from the prices required by SEC regulations; therefore, volumes of reserves actually recovered may differ significantly from the estimated quantities presented in this report. The results of Ryder Scott's estimates are summarized as follows.

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 TEL (303) 623-9147

FAX (403) 262-2790  
 FAX (303) 623-4258

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**SEC PARAMETERS**  
 Estimated Net Reserves  
 Certain Interests of  
**ECOPETROL**  
 As of December 31, 2018

	<b>Proved</b>		<b>Total Proved</b>
	<b>Developed</b>	<b>Undeveloped</b>	
<b><i>Net Reserves</i></b>			
Oil/Condensate - MBarrels	622,224	250,509	872,733
Plant Products - MBarrels	46,350	21,466	67,816
Sales Gas - MMCF	2,100,657	65,520	2,166,177
Fuel Oil - MBarrels	13,627	0	13,627
Fuel Gas - MMCF	232,731	6,407	239,138

Liquid hydrocarbons are expressed in thousand standard 42 U.S. gallon barrels. All gas volumes are reported on an “as sold” basis expressed in millions of cubic feet (MMCF) at the official temperature and pressure bases of the areas in which the gas reserves are located. Furthermore, the net reserves shown above include Ecopetrol’s participation interest in properties operated by Ecopetrol America Incorporated, Equion Energía Ltd. and Hocol Petroleum Ltd. The proved liquid hydrocarbon reserves volumes are exclusive of royalties. The net gas reserves volumes include certain gas royalty volumes paid in cash.

***Reserves Included in This Report***

The proved reserves included herein conform to the definition as set forth in the Securities and Exchange Commission’s Regulations Part 210.4-10(a). An abridged version of the SEC reserves definitions from 210.4-10(a) entitled “PETROLEUM RESERVES DEFINITIONS” is included as an attachment to this report.

The various reserves status categories are defined under the attachment entitled “PETROLEUM RESERVES STATUS DEFINITIONS AND GUIDELINES” in this report.

No attempt was made to quantify or otherwise account for any accumulated gas production imbalances that may exist. The proved gas volumes included herein do not attribute gas consumed in operations as reserves. Non-hydrocarbon or inert gas volumes have been excluded from the reserves reported herein.

Reserves are those “estimated remaining quantities of petroleum that are anticipated to be economically producible, as of a given date, by application of development projects to known accumulations.” All reserves estimates involve an assessment of the uncertainty relating the likelihood that the actual remaining quantities recovered will be greater or less than the estimated quantities determined as of the date the estimate is made. The uncertainty depends chiefly on the amount of reliable geologic and engineering data available at the time of the estimate and the interpretation of these data. The relative degree of uncertainty may be conveyed by placing reserves into one of two principal classifications, either proved or unproved. Unproved reserves are less certain to be recovered than proved reserves, and may be further sub-classified as probable and possible reserves to denote progressively increasing uncertainty in their recoverability. At Ecopetrol’s request, this report addresses only the proved reserves attributable to the properties evaluated herein.

Proved oil and gas reserves are “those quantities of oil and gas which, by analysis of geoscience and engineering data, can be estimated with reasonable certainty to be economically producible from a given date forward.” The proved reserves included herein were estimated using deterministic methods. When deterministic methods are used, the SEC has defined reasonable certainty for proved reserves as a “high degree of confidence that the quantities will be recovered.”

Proved reserves estimates will generally be revised only as additional geologic or engineering data become available or as economic conditions change. For proved reserves, the SEC states that “as changes due to increased availability of geoscience (geological, geophysical, and geochemical), engineering, and economic data are made to the estimated ultimate recovery (EUR) with time, reasonably certain EUR is much more likely to increase or remain constant than to decrease.” Moreover, estimates of proved reserves may be revised as a result of future operations, effects of regulation by governmental agencies or geopolitical or economic risks. Therefore, the proved reserves included in this report are estimates only and should not be construed as being exact quantities, and if recovered, the revenues therefrom, and the actual costs related thereto, could be more or less than the estimated amounts.

The proved reserves reported herein are limited to the period prior to expiration of current contracts providing the legal rights to produce, or a revenue interest in such production, unless evidence indicates that contract renewal is reasonably certain. Furthermore, properties in the different countries may be subjected to substantially varying contractual fiscal terms that affect the net revenue to Ecopetrol for the production of these volumes. The prices and economic return received for these net volumes can vary materially based on the terms of these contracts. Therefore, when applicable, Ryder Scott reviewed the fiscal terms of such contracts and discussed with Ecopetrol the net economic benefit attributed to such operations for the determination of the net hydrocarbon volumes and income thereof. Ryder Scott has not conducted an exhaustive audit or verification of such contractual information. Neither our review of such contractual information nor our acceptance of Ecopetrol’s representations regarding such contractual information should be construed as a legal opinion on this matter.

Ryder Scott did not evaluate the country and geopolitical risks in the countries where Ecopetrol operates or has interests. Ecopetrol’s operations may be subject to various levels of governmental controls and regulations. These controls and regulations may include, but may not be limited to, matters relating to land tenure and leasing, the legal rights to produce hydrocarbons including the granting, extension or termination of contracts, the fiscal terms of various contracts, drilling and production practices, environmental protection, marketing and pricing policies, royalties, various taxes and levies including income tax, and foreign trade and investment and are subject to change from time to time. Such changes in governmental regulations and policies may cause volumes of proved reserves actually recovered and amounts of proved income actually received to differ significantly from the estimated quantities.

The estimates of proved reserves presented herein were based upon a detailed study of the properties in which Ecopetrol owns an interest; however, we have not made any field examination of the properties. No consideration was given in this report to potential environmental liabilities that may exist nor were any costs included for potential liabilities to restore and clean up damages, if any, caused by past operating practices.



**Estimates of Reserves**

The estimation of reserves involves two distinct determinations. The first determination results in the estimation of the quantities of recoverable oil and gas and the second determination results in the estimation of the uncertainty associated with those estimated quantities in accordance with the definitions set forth by the Securities and Exchange Commission's Regulations Part 210.4-10(a). The process of estimating the quantities of recoverable oil and gas reserves relies on the use of certain generally accepted analytical procedures. These analytical procedures fall into three broad categories or methods: (1) performance-based methods; (2) volumetric-based methods; and (3) analogy. These methods may be used individually or in combination by the reserves evaluator in the process of estimating the quantities of reserves. Reserves evaluators must select the method or combination of methods which in their professional judgment is most appropriate given the nature and amount of reliable geoscience and engineering data available at the time of the estimate, the established or anticipated performance characteristics of the reservoir being evaluated and the stage of development or producing maturity of the property.

In many cases, the analysis of the available geoscience and engineering data and the subsequent interpretation of this data may indicate a range of possible outcomes in an estimate, irrespective of the method selected by the evaluator. When a range in the quantity of reserves is identified, the evaluator must determine the uncertainty associated with the incremental quantities of the reserves. If the reserves quantities are estimated using the deterministic incremental approach, the uncertainty for each discrete incremental quantity of the reserves is addressed by the reserves category assigned by the evaluator. Therefore, it is the categorization of reserves quantities as proved, probable and/or possible that addresses the inherent uncertainty in the estimated quantities reported. For proved reserves, uncertainty is defined by the SEC as reasonable certainty wherein the "quantities actually recovered are much more likely than not to be achieved." The SEC states that "probable reserves are those additional reserves that are less certain to be recovered than proved reserves but which, together with proved reserves, are as likely as not to be recovered." The SEC states that "possible reserves are those additional reserves that are less certain to be recovered than probable reserves and the total quantities ultimately recovered from a project have a low probability of exceeding proved plus probable plus possible reserves." All quantities of reserves within the same reserves category must meet the SEC definitions as noted above.

Estimates of reserves quantities and their associated reserves categories may be revised in the future as additional geoscience or engineering data become available. Furthermore, estimates of reserves quantities and their associated reserves categories may also be revised due to other factors such as changes in economic conditions, results of future operations, effects of regulation by governmental agencies or geopolitical economic risks as previously noted herein.

The proved reserves for the properties included herein were estimated by performance methods, the volumetric method, or a combination of performance, analogy, and volumetric methods. The following table summarizes the approximate percent of reserves estimated by each of these methods.

**Approximate Percent Proved Reserves Estimated by the Various Methods**

Method	Gas		Liquid Hydrocarbons	
	Developed	Undeveloped	Developed	Undeveloped
Volumetric	4.1%	12.5%	0.8%	4.1%
Performance	79.4%	0%	91.8%	0%
Analogy	0%	0%	0%	0%
Combination	16.5%	87.5%	7.4%	95.9%

These performance methods include, but may not be limited to, decline curve analysis, which utilized extrapolations of historical production and pressure data available through November 2018 in those cases where such data were considered to be definitive. The data utilized in this analysis were supplied to Ryder Scott by Ecopetrol and were considered sufficient for the purpose thereof. The volumetric method was used where there were inadequate historical performance data to establish a definitive trend and where the use of production performance data as a basis for the reserve estimates was considered to be inappropriate. The volumetric analysis utilized pertinent well and seismic data supplied to Ryder Scott by Ecopetrol that were available through November 2018. The data utilized from the well and seismic data incorporated into our volumetric analysis were considered sufficient for the purpose thereof.

To estimate economically recoverable proved oil and gas reserves and related future net cash flows, we consider many factors and assumptions including, but not limited to, the use of reservoir parameters derived from geological, geophysical and engineering data which cannot be measured directly, economic criteria based on current costs and SEC pricing requirements, and forecasts of future production rates. Under the SEC regulations 210.4-10(a)(22)(v) and (26), proved reserves must be anticipated to be economically producible from a given date forward based on existing economic conditions including the prices and costs at which economic producibility from a reservoir is to be determined. While it may reasonably be anticipated that the future prices received for the sale of production and the operating costs and other costs relating to such production may increase or decrease from those under existing economic conditions, such changes were, in accordance with rules adopted by the SEC, omitted from consideration in making this evaluation.

Ecopetrol has informed us that they have furnished us all of the material accounts, records, geological and engineering data, and reports and other data required for this investigation. In preparing our forecast of future proved production and income, we have relied upon data furnished by Ecopetrol with respect to property interests owned, production and well tests from examined wells, normal direct costs of operating the wells, leases, or contract areas, other costs such as transportation and/or processing fees, ad valorem and production taxes, recompletion and development costs, development plans, abandonment costs after salvage, product prices based on the SEC regulations, adjustments or differentials to product prices, geological structural and isochore maps, well logs, core analyses, and pressure measurements. Ryder Scott reviewed such factual data for its reasonableness; however, we have not conducted an independent verification of the data furnished by Ecopetrol. We consider the factual data used in this report appropriate and sufficient for the purpose of preparing the estimates of reserves herein.

In summary, we consider the assumptions, data, methods and analytical procedures used in this report appropriate for the purpose hereof, and we have used all such methods and procedures that we consider necessary and appropriate to prepare the estimates of reserves herein. The proved reserves included herein were determined in conformance with the United States Securities and Exchange Commission (SEC) Modernization of Oil and Gas Reporting; Final Rule, including all references to Regulation S-X and Regulation S-K, referred to herein collectively as the "SEC Regulations." In our opinion, the proved reserves presented in this report comply with the definitions, guidelines and disclosure requirements as required by the SEC regulations.

#### ***Future Production Rates***

For wells currently on production, our forecasts of future production rates are based on historical performance data. If no production decline trend has been established, future production rates were held constant, or adjusted for the effects of curtailment where appropriate, until a decline in ability to produce was anticipated. An estimated rate of decline was then applied to depletion of the reserves. If a decline trend has been established, this trend was used as the basis for estimating future production rates.

Test data and other related information were used to estimate the anticipated initial production rates for those wells or locations that are not currently producing. For reserves not yet on production, sales were estimated to commence at an anticipated date furnished by Ecopetrol. Wells or locations that are not currently producing may start producing earlier or later than anticipated in our estimates due to unforeseen factors causing a change in the timing to initiate production. Such factors may include delays due to weather, the availability of rigs, the sequence of drilling, completing and/or recompleting wells and/or constraints set by regulatory bodies.

The future production rates from wells currently on production or wells or locations that are not currently producing may be more or less than estimated because of changes including, but not limited to, reservoir performance, operating conditions related to surface facilities, compression and artificial lift, pipeline capacity and/or operating conditions, producing market demand and/or allowables or other constraints set by regulatory bodies.

#### ***Hydrocarbon Prices***

The hydrocarbon prices used herein are based on SEC price parameters using the average prices during the 12-month period prior to the “as of date” this report, determined as the unweighted arithmetic averages of the prices in effect on the first-day-of-the-month for each month within such period, unless prices were defined by contractual arrangements. For hydrocarbon products sold under contract, the contract prices, including fixed and determinable escalations, exclusive of inflation adjustments, were used until expiration of the contract. Upon contract expiration, the prices were adjusted to the 12-month unweighted arithmetic average as previously described.

Ecopetrol furnished us with the above mentioned average prices in effect on December 31, 2018. These initial SEC hydrocarbon prices were determined using the 12-month average first-day-of-the-month benchmark prices appropriate to the geographic area where the hydrocarbons are sold. These benchmark prices are prior to the adjustments for differentials as described herein. The table below summarizes the “benchmark prices” and “price reference” used for the geographic areas included in this report. In certain geographic areas, the price reference and benchmark prices may be defined by contractual arrangements. In cases where there are numerous contracts or price references within the same geographic area, the benchmark price is represented by the unweighted arithmetic average of the initial 12-month average first-day-of-the-month benchmark prices used.

The product prices that were actually used to determine the future gross revenue for each property reflect adjustments to the benchmark prices for gravity, quality, local conditions and/or distance from market, referred to herein as “differentials.” The differentials used in the preparation of this report were furnished to us by Ecopetrol. The differentials furnished to us were accepted as factual data and reviewed by us for their reasonableness; however, we have not conducted an independent verification of the data used by Ecopetrol to determine these differentials.

In addition, the following table summarizes the net volume weighted benchmark prices adjusted for differentials and referred to herein as the “average realized prices.” The average realized prices shown in the table below were determined from the total future gross revenue before production taxes and the total net reserves for the geographic area and presented in accordance with SEC disclosure requirements for each of the geographic areas included in the report.

<b>Geographic Area</b>	<b>Product</b>	<b>Price Reference</b>	<b>Average Benchmark Prices</b>	<b>Average Realized Prices</b>
North and South America	Oil/Condensate	Brent	\$ 72.20/Bbl	\$ 61.88/Bbl
	NGLs	Brent	\$ 72.20/Bbl	\$ 38.91/Bbl
	Gas	Contract	Contract	\$ 4.16/MCF

The liquid prices shown above, as provided by Ecopetrol, used the ICE Brent published by Bloomberg as reference. The effects of derivative instruments designated as price hedges of oil and gas quantities are not reflected in our individual property evaluations. For the properties reviewed by Ryder Scott, approximately 86 percent of the future gross income is derived from the sale of liquid hydrocarbons and 14 percent from gas sales.

**Costs**

Operating costs for the leases and contract areas and wells in this report were furnished by Ecopetrol and are based on the operating expense reports of Ecopetrol and include only those costs directly applicable to the contract areas or wells. The operating costs include a portion of general and administrative costs allocated directly to the leases, contract areas and wells. For operated properties, the operating costs include an appropriate level of corporate general administrative and overhead costs. The operating costs furnished to us were accepted as factual data and reviewed by us for their reasonableness; however, we have not conducted an independent verification of the operating cost data used by Ecopetrol. No deduction was made for loan repayments, interest expenses, or exploration and development prepayments that were not charged directly to the leases, contract areas or wells.

Development costs were furnished to us by Ecopetrol and are based on authorizations for expenditure for the proposed work or actual costs for similar projects. The development costs furnished to us were accepted as factual data and reviewed by us for their reasonableness; however, we have not conducted an independent verification of these costs. The estimated net cost of abandonment after salvage was included for properties where abandonment costs net of salvage were material. The estimates of the net abandonment costs furnished by Ecopetrol were accepted without independent verification.

The proved developed non-producing and undeveloped reserves in this report have been incorporated herein in accordance with Ecopetrol's plans to develop these reserves as of December 31, 2018. The implementation of Ecopetrol's development plans as presented to us and incorporated herein is subject to the approval process adopted by Ecopetrol's management. As the result of our inquiries during the course of preparing this report, Ecopetrol has informed us that the development activities included herein have been subjected to and received the internal approvals required by Ecopetrol's management at the appropriate local, regional and/or corporate level. In addition to the internal approvals as noted, certain development activities may still be subject to specific partner AFE processes, Joint Operating Agreement (JOA) requirements or other administrative approvals external to Ecopetrol. Ecopetrol has provided written documentation supporting their commitment to proceed with the development activities as presented to us. Additionally, Ecopetrol has informed us that they are not aware of any legal, regulatory or political obstacles that would significantly alter their plans. While these plans could change from those under existing economic conditions as of December 31, 2018, such changes were, in accordance with rules adopted by the SEC, omitted from consideration in making this evaluation.

According to Item 1203 (d) of the SEC Regulations, an explanation should be included for the reasons "...why material amounts of proved undeveloped reserves ... remain undeveloped for five years or more after disclosure as proved undeveloped reserves." A material amount of proved undeveloped reserves in this report is forecast to be developed beyond the five-year period. A five-year period for converting undeveloped reserves to developed reserves was adopted by the SEC, "unless specific circumstances justify a longer time frame." In this report, Ryder Scott made an exception to the 5-year rule for the proved category in the Caño Sur Este, Rubiales and Rydberg fields, which were assigned proved undeveloped reserves beyond the 5-year limit. The field development plan for Caño Sur Este Field, which has heavy crude oil and therefore lower sales price, requires a strategic development for economic reasons because with smaller treating facilities the field becomes economic under this price environment and is able to maintain a longer plateau that increases the rate of return and present value and serves as a cost containment plan and more efficient use of future assets. In the case of Rubiales, the field has facilities constrains in water handling capacity which requires the scheduling of the entry of the new wells based on spare capacity of the plant. In our opinion, these facilities issues are considered a reasonable justification for an exception to the 5-year rule. The Rydberg field is part of Shell's large deep-water Appomattox development, which includes the Appomattox, Vicksburg, Rydberg, and Ft. Sumter fields. Ecopetrol provided Ryder Scott with materials including the Suspension of Production (SOP) approval documents from the Bureau of Safety and Environmental Enforcement (BSEE) and a signed Operating Services Agreement between the Appomattox hub owners and Rydberg partners, which details the time frame and supports the longer than five-year time frame for this long-term, high cost project. For this reason we consider the proved category of reserves as appropriate for the project.

Current costs used by Ecopetrol were held constant throughout the life of the properties.

#### ***Standards of Independence and Professional Qualification***

Ryder Scott is an independent petroleum engineering consulting firm that has been providing petroleum consulting services throughout the world since 1937. Ryder Scott is employee-owned and maintains offices in Houston, Texas; Denver, Colorado; and Calgary, Alberta, Canada. We have approximately eighty engineers and geoscientists on our permanent staff. By virtue of the size of our firm and the large number of clients for which we provide services, no single client or job represents a material portion of our annual revenue. We do not serve as officers or directors of any privately-owned or publicly-traded oil and gas company and are separate and independent from the operating and investment decision-making process of our clients. This allows us to bring the highest level of independence and objectivity to each engagement for our services.

Ryder Scott actively participates in industry-related professional societies and organizes an annual public forum focused on the subject of reserves evaluations and SEC regulations. Many of our staff have authored or co-authored technical papers on the subject of reserves related topics. We encourage our staff to maintain and enhance their professional skills by actively participating in ongoing continuing education.

Prior to becoming an officer of the Company, Ryder Scott requires that staff engineers and geoscientists have received professional accreditation in the form of a registered or certified professional engineer's license or a registered or certified professional geoscientist's license, or the equivalent thereof, from an appropriate governmental authority or a recognized self-regulating professional organization.

We are independent petroleum engineers with respect to Ecopetrol. Neither we nor any of our employees have any financial interest in the subject properties and neither the employment to do this work nor the compensation is contingent on our estimates of reserves for the properties which were reviewed.

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The results of this study, presented herein, are based on technical analysis conducted by teams of geoscientists and engineers from Ryder Scott. The professional qualifications of the undersigned, the technical person primarily responsible for overseeing, reviewing and approving the evaluation of the reserves information discussed in this report, are included as an attachment to this letter.

***Terms of Usage***

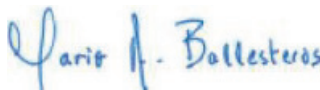
The results of our third party study, presented in report form herein, were prepared in accordance with the disclosure requirements set forth in the SEC regulations and intended for public disclosure as an exhibit in filings made with the SEC by Ecopetrol.

We have provided Ecopetrol with a digital version of the original signed copy of this report letter. In the event there are any differences between the digital version included in filings made by Ecopetrol and the original signed report letter, the original signed report letter shall control and supersede the digital version.

The data and work papers used in the preparation of this report are available for examination by authorized parties in our offices. Please contact us if we can be of further service.

Very truly yours,

**RYDER SCOTT COMPANY, L.P.**  
TBPE Firm Registration No. F-1580



Mario A. Ballesteros, P.E.  
TBPE License No. 107132  
Managing Senior Vice President



MAB (GR)/pl

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### **Professional Qualifications of Primary Technical Person**

The conclusions presented in this report are the result of technical analysis conducted by teams of geoscientists and engineers from Ryder Scott Company, L.P. Mario A. Ballesteros was the primary technical person responsible for overseeing the independent estimation of reserves, future production and income to render the audit conclusions of the report presented herein.

Mr. Ballesteros, an employee of Ryder Scott Company, L.P. (Ryder Scott) since 2006, is a Managing Senior Vice President and also serves as an Engineering Group Leader responsible for coordinating and supervising staff and consulting engineers of the company in ongoing reservoir evaluation studies worldwide. Before joining Ryder Scott, Mr. Ballesteros served in a number of engineering positions with Chevron. For more information regarding Mr. Ballesteros geographic and job specific experience, please refer to the Ryder Scott Company website at [www.ryderscott.com/Company/Employees](http://www.ryderscott.com/Company/Employees).

Mr. Ballesteros earned a Bachelor of Science degree in Mechanical Engineering in 1991 and a Masters of Petroleum Engineering degree in 1993 from the University of Tulsa. He also earned a Masters in Finance in 2000 from the Meta University in Colombia. He is a registered Professional Engineer in the State of Texas.

In addition to gaining experience and competency through prior work experience, the Texas Board of Professional Engineers requires a minimum of fifteen hours of continuing education annually, including at least one hour in the area of professional ethics, which Mr. Ballesteros fulfills. Mr. Ballesteros has attended formalized training and conferences including dedicated to the subject of the definitions and disclosure guidelines contained in the United States Securities and Exchange Commission Title 17, Code of Federal Regulations, Modernization of Oil and Gas Reporting, Final Rule released January 14, 2009 in the Federal Register.

Based on his educational background, professional training and more than 21 years of practical experience in the estimation and evaluation of petroleum reserves, Mr. Ballesteros has attained the professional qualifications as a Reserves Estimator and Reserves Auditor set forth in Article III of the "Standards Pertaining to the Estimating and Auditing of Oil and Gas Reserves Information" promulgated by the Society of Petroleum Engineers as of February 19, 2007.

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## PETROLEUM RESERVES DEFINITIONS

**As Adapted From:  
RULE 4-10(a) of REGULATION S-X PART 210  
UNITED STATES SECURITIES AND EXCHANGE COMMISSION (SEC)**

### **PREAMBLE**

On January 14, 2009, the United States Securities and Exchange Commission (SEC) published the “Modernization of Oil and Gas Reporting; Final Rule” in the Federal Register of National Archives and Records Administration (NARA). The “Modernization of Oil and Gas Reporting; Final Rule” includes revisions and additions to the definition section in Rule 4-10 of Regulation S-X, revisions and additions to the oil and gas reporting requirements in Regulation S-K, and amends and codifies Industry Guide 2 in Regulation S-K. The “Modernization of Oil and Gas Reporting; Final Rule”, including all references to Regulation S-X and Regulation S-K, shall be referred to herein collectively as the “SEC regulations”. The SEC regulations take effect for all filings made with the United States Securities and Exchange Commission as of December 31, 2009, or after January 1, 2010. Reference should be made to the full text under Title 17, Code of Federal Regulations, Regulation S-X Part 210, Rule 4-10(a) for the complete definitions (direct passages excerpted in part or wholly from the aforementioned SEC document are denoted in italics herein).

*Reserves are estimated remaining quantities of oil and gas and related substances anticipated to be economically producible, as of a given date, by application of development projects to known accumulations.* All reserve estimates involve an assessment of the uncertainty relating the likelihood that the actual remaining quantities recovered will be greater or less than the estimated quantities determined as of the date the estimate is made. The uncertainty depends chiefly on the amount of reliable geologic and engineering data available at the time of the estimate and the interpretation of these data. The relative degree of uncertainty may be conveyed by placing reserves into one of two principal classifications, either proved or unproved. Unproved reserves are less certain to be recovered than proved reserves and may be further sub-classified as probable and possible reserves to denote progressively increasing uncertainty in their recoverability. Under the SEC regulations as of December 31, 2009, or after January 1, 2010, a company may optionally disclose estimated quantities of probable or possible oil and gas reserves in documents publicly filed with the SEC. The SEC regulations continue to prohibit disclosure of estimates of oil and gas resources other than reserves and any estimated values of such resources in any document publicly filed with the SEC unless such information is required to be disclosed in the document by foreign or state law as noted in §229.1202 Instruction to Item 1202.

Reserves estimates will generally be revised only as additional geologic or engineering data become available or as economic conditions change.

Reserves may be attributed to either natural energy or improved recovery methods. Improved recovery methods include all methods for supplementing natural energy or altering natural forces in the reservoir to increase ultimate recovery. Examples of such methods are pressure maintenance, natural gas cycling, waterflooding, thermal methods, chemical flooding, and the use of miscible and immiscible displacement fluids. Other improved recovery methods may be developed in the future as petroleum technology continues to evolve.

Reserves may be attributed to either conventional or unconventional petroleum accumulations. Petroleum accumulations are considered as either conventional or unconventional based on the nature of their in-place characteristics, extraction method applied, or degree of processing prior to sale.



Examples of unconventional petroleum accumulations include coalbed or coalseam methane (CBM/CSM), basin-centered gas, shale gas, gas hydrates, natural bitumen and oil shale deposits. These unconventional accumulations may require specialized extraction technology and/or significant processing prior to sale.

Reserves do not include quantities of petroleum being held in inventory.

Because of the differences in uncertainty, caution should be exercised when aggregating quantities of petroleum from different reserves categories.

#### **RESERVES (SEC DEFINITIONS)**

Securities and Exchange Commission Regulation S-X §210.4-10(a)(26) defines reserves as follows:

**Reserves.** *Reserves are estimated remaining quantities of oil and gas and related substances anticipated to be economically producible, as of a given date, by application of development projects to known accumulations. In addition, there must exist, or there must be a reasonable expectation that there will exist, the legal right to produce or a revenue interest in the production, installed means of delivering oil and gas or related substances to market, and all permits and financing required to implement the project.*

**Note to paragraph (a)(26):** *Reserves should not be assigned to adjacent reservoirs isolated by major, potentially sealing, faults until those reservoirs are penetrated and evaluated as economically producible. Reserves should not be assigned to areas that are clearly separated from a known accumulation by a non-productive reservoir (i.e., absence of reservoir, structurally low reservoir, or negative test results). Such areas may contain prospective resources (i.e., potentially recoverable resources from undiscovered accumulations).*

#### **PROVED RESERVES (SEC DEFINITIONS)**

Securities and Exchange Commission Regulation S-X §210.4-10(a)(22) defines proved oil and gas reserves as follows:

**Proved oil and gas reserves.** *Proved oil and gas reserves are those quantities of oil and gas, which, by analysis of geoscience and engineering data, can be estimated with reasonable certainty to be economically producible—from a given date forward, from known reservoirs, and under existing economic conditions, operating methods, and government regulations—prior to the time at which contracts providing the right to operate expire, unless evidence indicates that renewal is reasonably certain, regardless of whether deterministic or probabilistic methods are used for the estimation. The project to extract the hydrocarbons must have commenced or the operator must be reasonably certain that it will commence the project within a reasonable time.*

(i) *The area of the reservoir considered as proved includes:*

(A) *The area identified by drilling and limited by fluid contacts, if any, and*

(B) *Adjacent undrilled portions of the reservoir that can, with reasonable certainty, be judged to be continuous with it and to contain economically producible oil or gas on the basis of available geoscience and engineering data.*

*(ii) In the absence of data on fluid contacts, proved quantities in a reservoir are limited by the lowest known hydrocarbons (LKH) as seen in a well penetration unless geoscience, engineering, or performance data and reliable technology establishes a lower contact with reasonable certainty.*

*(iii) Where direct observation from well penetrations has defined a highest known oil (HKO) elevation and the potential exists for an associated gas cap, proved oil reserves may be assigned in the structurally higher portions of the reservoir only if geoscience, engineering, or performance data and reliable technology establish the higher contact with reasonable certainty.*

*(iv) Reserves which can be produced economically through application of improved recovery techniques (including, but not limited to, fluid injection) are included in the proved classification when:*

*(A) Successful testing by a pilot project in an area of the reservoir with properties no more favorable than in the reservoir as a whole, the operation of an installed program in the reservoir or an analogous reservoir, or other evidence using reliable technology establishes the reasonable certainty of the engineering analysis on which the project or program was based; and*

*(B) The project has been approved for development by all necessary parties and entities, including governmental entities.*

*(v) Existing economic conditions include prices and costs at which economic producibility from a reservoir is to be determined. The price shall be the average price during the 12-month period prior to the ending date of the period covered by the report, determined as an unweighted arithmetic average of the first-day-of-the-month price for each month within such period, unless prices are defined by contractual arrangements, excluding escalations based upon future conditions.*

## PETROLEUM RESERVES STATUS DEFINITIONS AND GUIDELINES

As Adapted From:  
RULE 4-10(a) of REGULATION S-X PART 210  
UNITED STATES SECURITIES AND EXCHANGE COMMISSION (SEC)

and

2018 PETROLEUM RESOURCES MANAGEMENT SYSTEM (SPE-PRMS)

Sponsored and Approved by:  
SOCIETY OF PETROLEUM ENGINEERS (SPE)  
WORLD PETROLEUM COUNCIL (WPC)  
AMERICAN ASSOCIATION OF PETROLEUM GEOLOGISTS (AAPG)  
SOCIETY OF PETROLEUM EVALUATION ENGINEERS (SPEE)  
SOCIETY OF EXPLORATION GEOPHYSICISTS (SEG)  
SOCIETY OF PETROPHYSICISTS AND WELL LOG ANALYSTS (SPWLA)  
EUROPEAN ASSOCIATION OF GEOSCIENTISTS & ENGINEERS (EAGE)

Reserves status categories define the development and producing status of wells and reservoirs. Reference should be made to Title 17, Code of Federal Regulations, Regulation S-X Part 210, Rule 4-10(a) and the SPE-PRMS as the following reserves status definitions are based on excerpts from the original documents (direct passages excerpted from the aforementioned SEC and SPE-PRMS documents are denoted in italics herein).

### **DEVELOPED RESERVES (SEC DEFINITIONS)**

Securities and Exchange Commission Regulation S-X §210.4-10(a)(6) defines developed oil and gas reserves as follows:

*Developed oil and gas reserves are reserves of any category that can be expected to be recovered:*

- (i) Through existing wells with existing equipment and operating methods or in which the cost of the required equipment is relatively minor compared to the cost of a new well; and*
- (ii) Through installed extraction equipment and infrastructure operational at the time of the reserves estimate if the extraction is by means not involving a well.*

### **Developed Producing (SPE-PRMS Definitions)**

While not a requirement for disclosure under the SEC regulations, developed oil and gas reserves may be further sub-classified according to the guidance contained in the SPE-PRMS as Producing or Non-Producing.

#### **Developed Producing Reserves**

*Developed Producing Reserves are expected quantities to be recovered from completion intervals that are open and producing at the effective date of the estimate.*

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*Improved recovery reserves are considered producing only after the improved recovery project is in operation.*

**Developed Non-Producing**

*Developed Non-Producing Reserves include shut-in and behind-pipe Reserves.*

**Shut-In**

*Shut-in Reserves are expected to be recovered from:*

- (1) completion intervals that are open at the time of the estimate but which have not yet started producing;*
- (2) wells which were shut-in for market conditions or pipeline connections; or*
- (3) wells not capable of production for mechanical reasons.*

**Behind-Pipe**

*Behind-pipe Reserves are expected to be recovered from zones in existing wells that will require additional completion work or future re-completion before start of production with minor cost to access these reserves.*

*In all cases, production can be initiated or restored with relatively low expenditure compared to the cost of drilling a new well.*

**UNDEVELOPED RESERVES (SEC DEFINITIONS)**

Securities and Exchange Commission Regulation S-X §210.4-10(a)(31) defines undeveloped oil and gas reserves as follows:

*Undeveloped oil and gas reserves are reserves of any category that are expected to be recovered from new wells on undrilled acreage, or from existing wells where a relatively major expenditure is required for recompletion.*

*(i) Reserves on undrilled acreage shall be limited to those directly offsetting development spacing areas that are reasonably certain of production when drilled, unless evidence using reliable technology exists that establishes reasonable certainty of economic producibility at greater distances.*

*(ii) Undrilled locations can be classified as having undeveloped reserves only if a development plan has been adopted indicating that they are scheduled to be drilled within five years, unless the specific circumstances, justify a longer time.*

*(iii) Under no circumstances shall estimates for undeveloped reserves be attributable to any acreage for which an application of fluid injection or other improved recovery technique is contemplated, unless such techniques have been proved effective by actual projects in the same reservoir or an analogous reservoir, as defined in paragraph (a)(2) of this section, or by other evidence using reliable technology establishing reasonable certainty.*



March 6, 2019

Ecopetrol S.A.  
Cra. 13 No. 36-24  
Edificio Principal, Piso 7  
Bogotá, D.C., Colombia

Dear Sirs:

Sproule International Limited ("Sproule") has been engaged by Hocol S.A ("Hocol" or the "Company") to evaluate the proved, probable, and possible reserves in 14 blocks in Colombia, as of December 31, 2018, and to prepare a report as to its findings (the "Report"). The Report is compliant with the United States Securities Exchange Commission (SEC) definitions and disclosure guidelines. Hocol S.A. is a wholly owned subsidiary of Ecopetrol S.A. The Report, completed on February 15, 2019 and presented herein, was prepared for public disclosure by Ecopetrol S.A. in filings made with the SEC in accordance with the disclosure requirements set forth in the SEC regulations.

Ecopetrol S.A. has represented that the properties evaluated by Sproule for Hocol account for one (1) percent of Ecopetrol's net total Barrel of Oil Equivalent ("BOE") proved reserves as of December 31, 2018.

**Reserves Certification**

Reserves certification included in this report are expressed as net oil reserves. Net oil reserves are defined as the portion of the gross reserves to be produced from the 14 blocks evaluated by Sproule after December 31, 2018 attributable to the interests owned by Ecopetrol after deducting all interests owned by others, including royalties in kind. As regulated by the ANH, all royalties associated to the properties reported herein were considered as a cash payment and not deducted from the net gas reserves.

140 Fourth Avenue SW, Suite 900  
Calgary, AB, Canada T2P 3N3  
Sproule.com  
T +1 403 294 5500 F +1 403 294 5590 TF +1 877 777 6135



The reserves estimates for the properties contained herein were obtained using a variety of estimation methods: volumetric, performance, analogy or a combination of performance and volumetric methods. The following table summarizes the approximate percentage of the net reserves estimated by each of these methods.

**Approximate Percent of Net Proved Reserves Estimated by Method**

Method	Gas		Liquid Hydrocarbons	
	Developed	Undeveloped	Developed	Undeveloped
Volumetric	0	0	0	0
Performance	100	0	100	0
Analogy	0	0	0	0
Combination	0	100	0	100

Sproule's estimates of Ecopetrol S.A.'s net proved reserves, attributable to the properties contained in this report, were based on the definitions of proved reserves as promulgated by the SEC and are summarized as follows, expressed in millions of barrels (MMbbl) and millions of cubic feet (MMcf):

**Estimates of Ecopetrol S.A.'s Net Reserves by Sproule As of December 31, 2018**

	Proved		
	Developed	Undeveloped	Total Proved
<b>Net Remaining Reserves</b>			
Light and Medium Crude Oil (Mbbbl)	10,099.7	5,457.1	15,556.8
Conventional Natural Gas (Solution Gas) (MMcf)	1,016	0	1,016
Gas Consumed in Operations (MMcf)	9,442	6,197	15,639

**Accuracy and Reliance on Data**

All historical production, revenue and expense data, product prices, and other data that were obtained from the Company were accepted as represented, without further investigation by Sproule. According to the contract, the Company provided all the information required, such as the needed information and documents to ensure that Sproule would be able to complete the consulting services. Sproule is not responsible for the veracity and integrity of the information provided by the Company to execute the consultancy, which has been used in the generation of the evaluation results.

The accuracy of reserves estimates and associated economic analysis is, in part, a function of the quality and quantity of available data and of engineering and geological interpretation and judgment.

Given the data provided at the time this letter was prepared, the estimates presented herein are considered reasonable. However, they should be accepted with the understanding that reservoir and financial performance subsequent to the date of the estimates may necessitate revision. These revisions may be material.

Maintenance, capital, abandonment, decommissioning and reclamation ("ADR") cost estimates, as supplied by the Company, were accepted by Sproule as represented. No further investigation was undertaken by Sproule.

#### **Evaluation Standards**

This report has been prepared by Sproule using current geological and engineering knowledge, techniques and computer software. It has been prepared within the Code of Ethics of the Association of Professional Engineers and Geoscientists of Alberta ("APEGA"). This report was prepared in accordance with the guidelines and standards of the PRMS and the SEC regulations.

#### **Hydrocarbon Prices**

Constant prices were used in the economic evaluation and are based on the unweighted arithmetic average of the first-day-of-the month price for each of the 12 months preceding the effective date, as per SEC price parameters guidance. Hocol provided to Sproule the prices to be used in the evaluation. The benchmark prices used in this evaluation are as follows:

Oil:	Brent	72.20 USO/bbl
------	-------	---------------

Gas:	Henry Hub	3.05 USD/MMBtu
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Appropriate adjustments have been made to the constant oil prices to account for quality and transportation. These adjustments have been made and are presented at the field level.

Gas prices are based on gas sales contracts, and only applies to the sales gas volumes. A summary of the realized prices used in the evaluation was provided in the detailed final report.

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**Forward-Looking Statements**

The evaluation process involves modeling to reasonably predict future outcomes. Inherent in the modeling process however are limitations which may indirectly affect the forecast of future events.

This report contains forward-looking statements including expectations of future production revenues and capital expenditures. Information concerning reserves may also be deemed to be forward-looking as estimates involve the implied assessment that the reserves described can be profitably produced in the future. These statements are based on current expectations that involve a number of risks and uncertainties, which could cause actual results to differ from those anticipated. These risks include, but are not limited to: the underlying risks of the oil and gas industry (i.e., corporate commitment, regulatory approval, operational risks in development, exploration and production); potential delays or changes in plans with respect to exploration or development projects or capital expenditures; the uncertainty of reserves estimations; the uncertainty of estimates and projections relating to production; costs and expenses; health, safety and environmental factors; commodity prices; and exchange rate fluctuation.

**Standards of Independence and Professional Qualifications**

Sproule is an independent petroleum engineering consulting firm that has been providing petroleum engineering consulting services in Canada and throughout the world since 1950. Our head office is located in Calgary, Alberta, Canada. In addition to having a technical office in Mexico City, Mexico, we also have commercial representation offices in The Hague, Netherlands and Rio de Janeiro, Brazil.

Sproule does not have any financial interest, including stock ownership, in Ecopetrol S.A. The fees paid by the Company to Sproule, nor the award of the contract to complete this work, were not contingent on the results of the evaluation.

---



The professional qualifications of the technical person primarily responsible for reviewing and approving the reserves evaluation of the properties contained herein, are included as an attachment to this letter.



Sincerely,

**SPROULE INTERNATIONAL LIMITED**  
Alberta Permit to Practice number P06151

A handwritten signature in blue ink, appearing to read "Nora Stewart".

Nora T. Stewart, P.Eng.  
Senior VP, Reserves Certification and Director



## Professional Qualifications of Primary Technical Person

The conclusions presented in this report are the result of technical analysis conducted by teams of geoscientists and engineers from Sproule International Limited. Nora T. Stewart was the primary technical person responsible for overseeing the independent estimation of reserves, future production and income to render the audit conclusions of the report presented herein.

Ms. Stewart, an employee of Sproule International Limited since 1989 is the Senior VP, Reserves Certification and Director and also serves as an Engineering Group Leader responsible for coordinating and supervising staff and consulting engineers of the company in ongoing reservoir evaluation studies worldwide.

Ms. Stewart earned a Bachelor of Science degree in Civil Engineering in 1976. She is a registered Professional Engineer and Responsible Member with the Association of Professional Engineers and Geoscientists of Alberta (APEGA), and a member of Professional Engineers Ontario (PEO), and Society of Petroleum Evaluation Engineers (SPEE).

In addition to gaining experience and competency through prior work experience, APEGA requires a minimum amount of professional work hours, attendance at industry conferences, as well as professional development courses and seminars, and mentoring of junior staff in order to maintain Professional Engineer status.

Based on her educational background, professional training, and more than 30 years of practical experience in the estimation and evaluation of petroleum reserves, Ms. Stewart has attained the professional qualifications as a Reserves Estimator and Reserves Auditor set forth in the Petroleum Resources Management System (latest revision June 2018).



Sincerely,

**SPROULE INTERNATIONAL LIMITED**  
APEGA P06151

Nora T. Stewart, P.Eng.  
Senior VP, Reserves Certification and Director

**DEGOLYER AND MACNAUGHTON**  
**5001 SPRING VALLEY ROAD**  
**SUITE 800 EAST**  
**DALLAS, TEXAS 75244**

**March 1, 2019**

Board of Directors  
Ecopetrol S.A.  
Calle 35 No. 7-21 Piso 1  
Bogota, D.C.  
Colombia

Ladies and Gentlemen:

Pursuant to your request, this report of third party presents an independent evaluation, as of December 31, 2018, of the extent of the estimated net proved hydrocarbon reserves of certain properties in Colombia and Peru in which Ecopetrol S.A. has represented it holds an interest. These interests are held by Ecopetrol S.A. and through its ownership interest in Savia Peru S.A. (collectively, "ECOPETROL"). This evaluation was completed on March 1, 2019. ECOPETROL has represented that these properties account for 12 percent on a net equivalent barrel basis of ECOPETROL's net proved reserves as of December 31, 2018. ECOPETROL has also represented that these properties account for 12 percent of ECOPETROL's total proved developed net liquid hydrocarbon (oil, condensate, and natural gas liquids (NGL)) reserves, 16 percent of its total proved developed net gas reserves, 6 percent of its total proved undeveloped net liquid reserves, and 3 percent of its total proved undeveloped net gas reserves. The net proved reserves estimates have been prepared in accordance with the reserves definitions of Rules 4-10(a) (1)-(32) of Regulation S-X of the Securities and Exchange Commission (SEC) of the United States. This report was prepared in accordance with guidelines specified in Item 1202 (a)(8) of Regulation S-K and is to be used for inclusion in certain SEC filings by ECOPETROL.

Reserves estimates included herein are expressed as net reserves. Gross reserves are defined as the total estimated petroleum remaining to be produced from these properties after December 31, 2018. Net reserves are defined as that portion of the gross reserves attributable to the interests held by ECOPETROL after deducting all interests held by others, including royalties paid in kind. ECOPETROL has advised that in September 2013, Resolución n° 877 was enacted by the Government of Colombia, requiring that oil and condensate royalties be paid in kind and gas and NGL royalties be paid in cash. Based on this legislation, and at the request of ECOPETROL, royalties associated with gas and NGL reserves have been considered as a cash payment and are therefore included in the net gas and NGL reserves estimated herein. ECOPETROL has also advised that for the properties in Peru evaluated herein, all royalties are paid in kind.

Estimates of reserves should be regarded only as estimates that may change as further production history and additional information become available. Not only are such estimates based on that information which is currently available, but such estimates are also subject to the uncertainties inherent in the application of judgmental factors in interpreting such information.

Information used in the preparation of this report was obtained from ECOPETROL. In the preparation of this report we have relied, without independent verification, upon information furnished by ECOPETROL with respect to the property interests being evaluated, production from such properties, current costs of operation and development, current prices for production, agreements relating to current and future operations and sale of production, and various other information and data that were accepted as represented. A field examination of the properties was not considered necessary for the purposes of this report.

### **Definition of Reserves**

Petroleum reserves estimated in this report are classified as proved. Only proved reserves have been evaluated for this report. Reserves classifications used by us in this report are in accordance with the reserves definitions of Rules 4–10(a) (1)–(32) of Regulation S–X of the SEC. Reserves are judged to be economically producible in future years from known reservoirs under existing economic and operating conditions and assuming continuation of current regulatory practices using conventional production methods and equipment. In the analyses of production-decline curves, reserves were estimated only to the limit of economic rates of production under existing economic and operating conditions using prices and costs consistent with the effective date of this report, including consideration of changes in existing prices provided only by contractual arrangements but not including escalations based upon future conditions. The petroleum reserves are classified as follows:

*Proved oil and gas reserves* – Proved oil and gas reserves are those quantities of oil and gas, which, by analysis of geoscience and engineering data, can be estimated with reasonable certainty to be economically producible—from a given date forward, from known reservoirs, and under existing economic conditions, operating methods, and government regulations—prior to the time at which contracts providing the right to operate expire, unless evidence indicates that renewal is reasonably certain, regardless of whether deterministic or probabilistic methods are used for the estimation. The project to extract the hydrocarbons must have commenced or the operator must be reasonably certain that it will commence the project within a reasonable time.

(i) The area of the reservoir considered as proved includes:

(A) The area identified by drilling and limited by fluid contacts, if any, and (B) Adjacent undrilled portions of the reservoir that can, with reasonable certainty, be judged to be continuous with it and to contain economically producible oil or gas on the basis of available geoscience and engineering data.

(ii) In the absence of data on fluid contacts, proved quantities in a reservoir are limited by the lowest known hydrocarbons (LKH) as seen in a well penetration unless geoscience, engineering, or performance data and reliable technology establishes a lower contact with reasonable certainty.

(iii) Where direct observation from well penetrations has defined a highest known oil (HKO) elevation and the potential exists for an associated gas cap, proved oil reserves may be assigned in the structurally higher portions of the reservoir only if geoscience, engineering, or performance data and reliable technology establish the higher contact with reasonable certainty.

(iv) Reserves which can be produced economically through application of improved recovery techniques (including, but not limited to, fluid injection) are included in the proved classification when:

(A) Successful testing by a pilot project in an area of the reservoir with properties no more favorable than in the reservoir as a whole, the operation of an installed program in the reservoir or an analogous reservoir, or other evidence using reliable technology establishes the reasonable certainty of the engineering analysis on which the project or program was based; and (B) The project has been approved for development by all necessary parties and entities, including governmental entities.

(v) Existing economic conditions include prices and costs at which economic producibility from a reservoir is to be determined. The price shall be the average price during the 12-month period prior to the ending date of the period covered by the report, determined as an unweighted arithmetic average of the first-day-of-the-month price for each month within such period, unless prices are defined by contractual arrangements, excluding escalations based upon future conditions.

*Developed oil and gas reserves* – Developed oil and gas reserves are reserves of any category that can be expected to be recovered:

(i) Through existing wells with existing equipment and operating methods or in which the cost of the required equipment is relatively minor compared to the cost of a new well; and

(ii) Through installed extraction equipment and infrastructure operational at the time of the reserves estimate if the extraction is by means not involving a well.

*Undeveloped oil and gas reserves* – Undeveloped oil and gas reserves are reserves of any category that are expected to be recovered from new wells on undrilled acreage, or from existing wells where a relatively major expenditure is required for recompletion.

(i) Reserves on undrilled acreage shall be limited to those directly offsetting development spacing areas that are reasonably certain of production when drilled, unless evidence using reliable technology exists that establishes reasonable certainty of economic producibility at greater distances.

(ii) Undrilled locations can be classified as having undeveloped reserves only if a development plan has been adopted indicating that they are scheduled to be drilled within five years, unless the specific circumstances justify a longer time.

(iii) Under no circumstances shall estimates for undeveloped reserves be attributable to any acreage for which an application of fluid injection or other improved recovery technique is contemplated, unless such techniques have been proved effective by actual projects in the same reservoir or an analogous reservoir, as defined in [section 210.4–10 (a) Definitions], or by other evidence using reliable technology establishing reasonable certainty.

**Methodology and Procedures**

Estimates of reserves were prepared by the use of appropriate geologic, petroleum engineering, and evaluation principles and techniques that are in accordance with practices generally recognized by the petroleum industry as presented in the publication of the Society of Petroleum Engineers entitled "Standards Pertaining to the Estimating and Auditing of Oil and Gas Reserves Information (Revision as of February 19, 2007)." The method or combination of methods used in the analysis of each reservoir was tempered by experience with similar reservoirs, stage of development, quality and completeness of basic data, and production history.

Based on the current stage of field development, production performance, the development plans provided by ECOPETROL, and analyses of areas offsetting existing wells with test or production data, reserves were classified as proved.

ECOPETROL has represented that its senior management is committed to the development plan provided by ECOPETROL and that ECOPETROL has the financial capability to execute the development plan, including the drilling and completion of wells and the installation of equipment and facilities.

When applicable, the volumetric method was used to estimate the original oil in place (OOIP) and original gas in place (OGIP). Structure maps were prepared to delineate each reservoir, and isopach maps were constructed to estimate reservoir volume. Electrical logs, radioactivity logs, core analyses, and other available data were used to prepare these maps as well as to estimate representative values for porosity and water saturation. When adequate data were available and when circumstances justified, material-balance methods were used to estimate OOIP and OGIP.

Estimates of ultimate recovery were obtained after applying recovery factors to OOIP and OGIP. These recovery factors were based on consideration of the type of energy inherent in the reservoirs, analyses of the petroleum, the structural positions of the properties, and the production histories. When applicable, material balance and other engineering methods were used to estimate recovery factors based on an analysis of reservoir performance, including production rate, reservoir pressure, and reservoir fluid properties.

For depletion-type reservoirs or those whose performance disclosed a reliable decline in producing-rate trends or other diagnostic characteristics, reserves were estimated by the application of appropriate decline curves or other performance relationships. In the analyses of production-decline curves, reserves were estimated to the limits of economic production as defined under the Definition of Reserves heading of this report or the expiration date of the contract or production license, whichever occurs first.

In certain cases, reserves were estimated by incorporating elements of analogy with similar wells or reservoirs for which more complete data were available.

In the evaluation of undeveloped reserves, type-well analysis was performed using well data from analogous reservoirs for which more complete historical performance data were available.

Data provided by ECOPETROL from wells drilled through December 31, 2018, and made available for this evaluation have been used to prepare the reserves estimates herein. These reserves estimates were based on consideration of monthly production data available for certain properties only through September, October, or November 2018. Estimated cumulative production, as of December 31, 2018, was deducted from the estimated gross ultimate recovery to estimate gross reserves. This required that production be estimated for up to 3 months.

Oil and condensate reserves estimated herein are to be recovered by normal field separation. NGL reserves estimated herein include propane, butane, and pentanes and heavier fractions (C<sub>5+</sub>). NGL reserves are the result of low-temperature plant processing. Oil, condensate, and NGL reserves reported herein are expressed in millions of barrels (10<sup>6</sup> bbl). In these estimates, 1 barrel equals 42 United States gallons. For reporting purposes, oil and condensate reserves have been estimated separately and are presented herein as a summed quantity.

Gas quantities estimated herein are expressed as marketable gas, fuel gas, and sales gas. Marketable gas is defined as the total gas produced from the reservoir after reduction for shrinkage resulting from field separation; processing, including removal of the nonhydrocarbon gas to meet pipeline specifications; and flare and other losses but not from fuel usage. Fuel gas is defined as that portion of the gas consumed in field operations. Sales gas is defined as the total gas to be produced from the reservoirs, measured at the point of delivery, after reduction for fuel usage, flare, gas injection, and shrinkage resulting from field separation and before and after low-temperature separation in consideration of separate gas sales agreements that take gas before and after processing for sales. Gas reserves estimated herein are expressed at a temperature base of 60 degrees Fahrenheit (°F) and at a pressure base of 14.7 pounds per square inch absolute (psia). Gas reserves presented in this report are expressed in millions of cubic feet (10<sup>6</sup> ft<sup>3</sup>).

Gas quantities are identified by the type of reservoir from which the gas will be produced. Nonassociated gas is gas at initial reservoir conditions with no oil present in the reservoir. Associated gas is both gas-cap gas and solution gas. Gas-cap gas is gas at initial reservoir conditions and is in communication with an underlying oil zone. Solution gas is gas dissolved in oil at initial reservoir conditions. Gas quantities estimated herein include both associated and nonassociated gas.

At the request of ECOPETROL, marketable gas reserves estimated herein were converted to oil equivalent using an energy equivalent factor of 5,700 cubic feet of gas per 1 barrel of oil equivalent. This conversion factor was provided by ECOPETROL.

The proved reserves for the properties evaluated herein were estimated by the performance method, the volumetric method, or a combination of performance and volumetric methods. The following table summarizes the approximate percentage of net reserves estimated by each of these methods.

Method	Percent Net Proved Reserves Estimated by Method			
	Sales Gas		Liquid Hydrocarbons	
	Developed (percent)	Undeveloped (percent)	Developed (percent)	Undeveloped (percent)
Volumetric	0	0	0	0

Method	Percent Net Proved Reserves Estimated by Method			
	Sales Gas		Liquid Hydrocarbons	
	Developed (percent)	Undeveloped (percent)	Developed (percent)	Undeveloped (percent)
Performance	2	100	98	100
Combination	98	0	2	0

#### Primary Economic Assumptions

This report has been prepared using initial prices, expenses, and costs provided by ECOPETROL in United States dollars (U.S.\$). Future prices were estimated using guidelines established by the SEC and the Financial Accounting Standards Board (FASB). The following economic assumptions were used for estimating the reserves reported herein:

##### *Oil, Condensate, and NGL Prices*

ECOPETROL has represented that the oil, condensate, and NGL prices were based on a 12-month average price, calculated as the unweighted average of the first-day-of-the-month price for each month within the 12-month period prior to the end of the reporting period. The volume-weighted average adjusted product prices attributable to estimated proved reserves for the properties in Colombia evaluated herein were U.S.\$66.10 per barrel for oil and condensate and U.S.\$71.90 per barrel for NGL, based on a 12-month average Brent reference price of U.S.\$72.20 per barrel. ECOPETROL supplied differentials by field to the Brent reference price. The average adjusted product prices attributable to estimated proved reserves for the properties in Peru evaluated herein were U.S.\$71.23 per barrel for oil and condensate and U.S.\$61.41 per barrel for NGL, based on a 12-month average Brent reference price of U.S.\$72.20 per barrel. These prices were held constant for the lives of the properties.

##### *Sales Gas Prices*

ECOPETROL has represented that the sales gas prices for the properties in Colombia evaluated herein are defined by contractual agreements based on specific market conditions. The volume-weighted average adjusted product price attributable to estimated proved reserves was U.S.\$3.74 per thousand cubic feet. ECOPETROL has also represented that the sales gas prices for the properties in Peru evaluated herein are defined by contractual agreements based on specific market conditions, and the average adjusted product price attributable to estimated proved reserves was U.S.\$1.41 per thousand cubic feet. These prices were held constant for the lives of the properties.



*Operating Expenses, Capital Costs, and Abandonment Costs*

Estimates of operating expenses, provided by ECOPETROL and based on current expenses, were held constant for the lives of the properties. Future capital expenditures were estimated using 2018 values, provided by ECOPETROL, and were not adjusted for inflation. In certain cases, future expenditures, either higher or lower than current expenditures, may have been used because of anticipated changes in operating conditions, but no general escalation that might result from inflation was applied. Abandonment costs, which are those costs associated with the removal of equipment, plugging of the wells, and reclamation and restoration associated with the abandonment, were provided by ECOPETROL for all properties. Estimates of operating expenses, capital costs, and abandonment costs were considered, as appropriate, in determining the economic viability of the undeveloped reserves estimated herein.

In our opinion, the information relating to estimated proved reserves of oil, condensate, natural gas liquids, and gas contained in this report has been prepared in accordance with Paragraphs 932-235-50-4, 932-235-50-6, 932-235-50-7, and 932-235-50-9 of the Accounting Standards Update 932-235-50, *Extractive Industries – Oil and Gas (Topic 932): Oil and Gas Reserve Estimation and Disclosures* (January 2010) of the Financial Accounting Standards Board and Rules 4–10(a) (1)–(32) of Regulation S–X and Rules 302(b), 1201, 1202(a) (1), (2), (3), (4), (8), and 1203(a) of Regulation S–K of the Securities and Exchange Commission; provided, however, that estimates of proved developed and proved undeveloped reserves are not presented at the beginning of the year.

To the extent the above-enumerated rules, regulations, and statements require determinations of an accounting or legal nature, we, as engineers, are necessarily unable to express an opinion as to whether the above-described information is in accordance therewith or sufficient therefor.

**Summary of Conclusions**

The estimated net proved reserves, as of December 31, 2018, of the properties evaluated herein were based on the definition of proved reserves of the SEC and are summarized as follows, expressed in millions of barrels (10<sup>6</sup>bbl), millions of cubic feet (10<sup>6</sup>ft<sup>3</sup>), and millions of barrels of oil equivalent (10<sup>6</sup>boe):

**Estimated by DeGolyer and MacNaughton  
Net Proved Reserves  
as of December 31, 2018**

	<b>Oil and Condensate (10<sup>6</sup>bbl)</b>	<b>NGL (10<sup>6</sup>bbl)</b>	<b>Marketable Gas (10<sup>6</sup>ft<sup>3</sup>)</b>	<b>Fuel Gas (10<sup>6</sup>ft<sup>3</sup>)</b>	<b>Sales Gas (10<sup>6</sup>ft<sup>3</sup>)</b>	<b>Oil Equivalent (10<sup>6</sup>boe)</b>
South America						
Proved Developed	103.072	2.897	463,076.829	37,480.554	425,596.275	187.210
Proved Undeveloped	19.070	0.001	3,641.202	2,016.241	1,624.961	19.710
<b>Total Proved</b>	<b>122.142</b>	<b>2.898</b>	<b>466,718.031</b>	<b>39,496.795</b>	<b>427,221.236</b>	<b>206.920</b>

## Notes:

- Totals may vary due to rounding.
- Marketable gas reserves estimated herein were converted to oil equivalent using an energy equivalent factor of 5,700 cubic feet of gas per 1 barrel of oil equivalent.

While the oil and gas industry may be subject to regulatory changes from time to time that could affect an industry participant's ability to recover its reserves, we are not aware of any such governmental actions which would restrict the recovery of the December 31, 2018, estimated reserves.

DeGolyer and MacNaughton is an independent petroleum engineering consulting firm that has been providing petroleum consulting services throughout the world since 1936. DeGolyer and MacNaughton does not have any financial interest, including stock ownership, in ECOPETROL. Our fees were not contingent on the results of our evaluation. This report has been prepared at the request of ECOPETROL. DeGolyer and MacNaughton has used all assumptions, data, procedures, and methods that it considers necessary and appropriate to prepare this report.

Submitted,

/s/DeGolyer and MacNaughton  
DeGOLYER and MacNAUGHTON  
Texas Registered Engineering Firm F-716

/s/Thomas C. Pence, P.E.  
Thomas C. Pence, P.E.  
Senior Vice President  
DeGolyer and MacNaughton

**CERTIFICATE of QUALIFICATION**

I, Thomas C. Pence, Petroleum Engineer with DeGolyer and MacNaughton, 5001 Spring Valley Road, Suite 800 East, Dallas, Texas, 75244 U.S.A, hereby certify:

1. That I am a Senior Vice President of DeGolyer and MacNaughton, which firm did prepare the report of third party addressed to ECOPETROL dated March 1, 2019, and that I, as Senior Vice President, was responsible for the preparation of this report of third party.
2. That I attended Texas A&M University, and that I graduated with a Bachelor of Science degree in Petroleum Engineering in 1982; that I am a Registered Professional Engineer in the State of Texas; that I am a member of the Society of Petroleum Engineers and that I have in excess of 36 years of experience in oil and gas reservoir studies and reserves evaluations.

/s/Thomas C. Pence, P.E.  
\_\_\_\_\_  
Thomas C. Pence, P.E.  
Senior Vice President  
DeGolyer and MacNaughton

**Gaffney,  
Cline &  
Associates**

Gaffney, Cline & Associates, Inc.

5555 San Felipe St., Suite 550  
Houston, TX 77056  
Telephone: +1 713 850 9955

[www.gaffney-cline.com](http://www.gaffney-cline.com)

April 01, 2019

Julio Herrera  
CFO Upstream  
**Ecopetrol S.A.**  
Calle 13 No. 36 -34  
Bogotá, D.C.  
Colombia

[Julio.Herrera@ecopetrol.com.co](mailto:Julio.Herrera@ecopetrol.com.co)

Dear Julio,

**SEC Reserves Statement  
for Sixty Four Fields in Colombia  
as of December 31, 2018**

This Proved reserves statement has been prepared by Gaffney, Cline & Associates (GCA) and issued on March 01, 2019 at the request of Ecopetrol S.A. (Ecopetrol, or “the Client”), operator and interest participant in 64 fields in the Lower, Middle and Upper Magdalena Valley, Catatumbo, and Llanos Orientales Basins, Colombia. This report is intended for use in conjunction with Ecopetrol’s December 31, 2018 filing obligations with the US Securities and Exchange Commission (SEC).

This report relates specifically and solely to the subject matter as defined in the scope of work in the Proposal for Services and is conditional upon the assumptions described herein. The report must be considered in its entirety and must only be used for the purpose for which it was intended.

FDS/jls/AB-18-2021.00  
Ecopetrol S.A.

GCA has conducted an independent certification examination, as of December 31, 2018, of the hydrocarbon liquids and natural gas reserves of the fields indicated in the following Table 1:

**Table 1: Assets and Fields Reviewed by GCA**

AREA	FIELD	BASIN	AREA	FIELD	BASIN
ARRAYAN	ARRAYAN	Upper Magdalena Valley	DINA CRETACEO	PALOGRANDE	Upper Magdalena Valley
BALCON	BALCON	Upper Magdalena Valley		DINA CRETACEO	Upper Magdalena Valley
CAGUAN	ESPINO	Upper Magdalena Valley	DINA NORTE	DINA TERCIARIO ECP	Upper Magdalena Valley
	RIO CEIBAS	Upper Magdalena Valley	ESTACION VIGIA	VIGIA	Llanos
CARACARA	CARACARA SUR A	Llanos		VIGIA SUR	Llanos
	CARACARA SUR B-C	Llanos	HOBO	YAGUARA	Upper Magdalena Valley
	UNUMA	Llanos	LAS MONAS	CORAZON	Middle Magdalena Valley
CARACARA_JAGUAR	ELIZITA	Llanos		CORAZON WEST	Middle Magdalena Valley
	PEGUITA	Llanos		LA SALINA	Middle Magdalena Valley
	PEGUITA II	Llanos		PAYOA	Middle Magdalena Valley
	PEGUITA III	Llanos	LISAMA	LISAMA	Middle Magdalena Valley
	PEGUITA SOUTH WEST	Llanos		NUTRIA	Middle Magdalena Valley
CARACARA_TORO	RANCHO QUEMADO	Llanos		TESORO	Middle Magdalena Valley
SENTADO	TORO SENTADO	Llanos	NEIVA CPI	DINA TERCIARIO	Upper Magdalena Valley
	TORO SENTADO WEST	Llanos	ORIPAYA	ORIPAYA	Catatumbo
CHIPIRON	ARAGUATO	Llanos	PROVINCIA	AULLADOR	Middle Magdalena Valley
	BAYONERO	Llanos		BONANZA	Middle Magdalena Valley
	CHIPIRON	Llanos		PROVINCIA	Middle Magdalena Valley
	GALEMBO	Llanos	RONDON	CAÑO RONDON	Llanos
	JIBA UNIFICADO	Llanos		CARICARE	Llanos
	MACANA	Llanos	SAN FRANCISCO	SAN FRANCISCO	Upper Magdalena Valley
COSECHA	CANAGUEY (COSECHA Y)	Llanos	SAN ROQUE	SAN ROQUE	Middle Magdalena Valley
	GOLONDRINA (COSECHA V)	Llanos	SANTA CLARA	PALERMO	Upper Magdalena Valley
	MORROCOY	Llanos		SANTA CLARA	Upper Magdalena Valley
	REX	Llanos	TELLO	LA JAGUA	Upper Magdalena Valley
	REX NE	Llanos		TELLO	Upper Magdalena Valley
	TERECAY (COSECHA G)	Llanos	TEMPRANILLO	TEMPRANILLO	Upper Magdalena Valley
CRAVO NORTE	CAÑO LIMON	Llanos		TEMPRANILLO NORTE	Upper Magdalena Valley
	CAÑO YARUMAL	Llanos	TIBU	TIBU	Catatumbo
	REDONDO	Llanos	TISQUIRAMA	TISQUIRAMA	Middle Magdalena Valley
	TONINA	Llanos	TISQUIRAMA ASOCIACION	LOS ANGELES	Middle Magdalena Valley
DINA CRETACEO	CEBU	Upper Magdalena Valley		QUERUBIN	Middle Magdalena Valley

On the basis of technical and other information made available to GCA concerning these property units, GCA hereby provides the reserves statement in the following table 2:

**Table 2: Statement of Hydrocarbon Reserves Volumes  
64 Fields, Colombia  
as of December 31, 2018**

Reserves	Reserves Net to Ecopetrol's Interest				
	Oil/Condensate, NGL and Gas sales			Consumed in Operations	
	Oil/Cond. (Thousands of Barrels)	NGL (Thousands of Barrels)	Gas Sales (Millions of Cubic Feet)	Fuel Oil (Thousands of Barrels)	Fuel gas (Millions of Cubic Feet)
Developed	77,760	1,988	43,545	2,226	29,914
Producing	72,857	1,970	42,397	2,202	29,269
Non-Producing	4,904	18	1,148	24	645
Undeveloped	19,805	1,075	35,041	102	2,303
<b>Total Proved</b>	<b>97,565</b>	<b>3,063</b>	<b>78,586</b>	<b>2,327</b>	<b>32,217</b>

Notes:

- Oil and condensate reserves net to Ecopetrol's interest represent volumes after the deduction of royalties under the concessions that govern the assets, based on Ecopetrol's working interest.
- Gas and NGL reserves net to Ecopetrol's working interest include gas and NGL royalty volumes that are required to be paid in cash according to Resolutions 877 and 351 from ANH and the corresponding clarification note from ANH# 20146240188522.
- Net oil, Net NGL and Net sales gas reserves exclude volumes consumed in operations (fuel gas or fuel oil), which are reported separately.
- Fuel oil and fuel gas represent working interest volumes consumed in operations.
- The above Reserves include production:
  - until the economic limit when contracts are solely operated by Ecopetrol.
  - beyond the end of the current license period in concession contracts that include an expiry date. It was assumed that those licenses would revert to Ecopetrol as the sole license holder at the expiry of the contract and based on information provided by Ecopetrol normally include a 12% increase in the royalty rate at contract expiry.

Hydrocarbon liquid volumes represent crude oil and condensate, natural gasoline and LPG estimated to be recovered during field separation and plant processing and are reported in thousands of stock tank barrels. The volumes reported as gas represent expected gas sales and are reported in millions of standard cubic feet at standard conditions of 14.7 psia and 60 degrees Fahrenheit. The sales gas volumes have been reduced for fuel usage in the field and shrinkage because of processing.

Gas reserves sales volumes are based on firm and existing gas contracts, or on the reasonable expectation of a contract or on the reasonable expectation that any such existing gas sales contracts will be renewed on similar terms in the future.

Ecopetrol has advised GCA that these Proved volumes represent 7% of Ecopetrol's total Proved reserves on an oil-equivalent basis. GCA is not in a position to verify this statement as it was not requested to review Ecopetrol's other oil and gas assets.

Descriptions of the fields are included in the separate technical reports.

### **Reserves Assessment**

This certification examination was based on reserves estimates and other information provided by Ecopetrol to GCA through December 2018, and included such tests, procedures and adjustments as were considered necessary. Field data and information provided by Ecopetrol varies from field to field. Ecopetrol provided production data sets up to September 2018. All questions that arose during the course of the certification process were resolved to our satisfaction.

Technical information and comments related to the methodology followed to certification the reserves volumes for each one of the fields is presented in separate individual field reports. As these reports are quite extensive and detailed, the significant points of the work performed are summarized below.

Recoverable volume estimates as derived from profiles of expected future performance were checked for consistency with the development plans provided by Ecopetrol. These were further verified on the basis of individual well decline analysis, typical well performance models, material balance calculations, reservoir simulation results, analogies, etc. as appropriate to the available information and category of the reserves. Gross reserves and those net to Ecopetrol's interests were verified on the basis of the fiscal and contractual terms applicable for each field.

In order to confirm estimates of petroleum initially in place, the structural and stratigraphic descriptions of the accumulations, various reservoir limits, petrophysical rock parameters and reservoir fluid properties were reviewed, checked for reasonableness and/or modified as appropriate based on information and data supplied by Ecopetrol. Reservoir and individual well performance were analyzed in order to assess the predominant reservoir drive mechanisms currently active in the fields and those expected to affect the future production performance.

The economic tests for the December 31, 2018 reserve volumes were based on a prior twelve-month first-day-of-the-month average reference price for Brent crude of US\$72.20/Bbl, corrected for location and quality to a weighted average wellhead price of US\$71.34/Bbl. Sales gas and plant product prices were advised by Ecopetrol according to existing contracts and/or regulations. No price escalation has been included, other than as provided for in existing contracts. The following tables include additional details of these prices:

**Oil and Condensate Prices**

Note	Price US\$/Bbl
12 month average price for Brent Crude used as reference for the crude prices in Colombia.	72.20
Weighted average of the prices adjusted for location and quality used to derive proved oil and condensate proved reserves for the different fields in Colombia	71.34

**Product Plant Prices (NGL)**

Note	Zone	Price US\$/Bbl
NGL prices used in cash flows	Barranca	34.46
	Dina	31.67
Weighted average price adjusted for location to determine proved reserves in Colombia assets		33.86

**GAS PRICES**

Note	Price US\$/MMBTU
Based on firm and existing gas contracts	Varies by field based on information provided by Ecopetrol.
Weighted average price based on current contracts used to derive proved reserves in Colombia assets	6.28

Future capital costs for operated and non-operated fields were provided by Ecopetrol.

Recent historical operating expense data were used as the basis for operating cost projections. GCA has found that sufficient capital investments and operating expenses have been projected to produce the estimated volumes.

It is GCA's opinion that the estimates of total remaining recoverable hydrocarbon liquids and gas volumes at December 31, 2018 are, in the aggregate, reasonable and the reserves classification and categorization is appropriate and consistent with the SEC definitions and guidelines for reserves.

GCA concludes that the methodologies employed by Ecopetrol in the derivation of the volume estimates are appropriate and that the quality of the data relied upon, the depth and thoroughness of the estimation process are adequate. GCA is not aware of any potential changes in regulations applicable to these fields that could affect the ability of Ecopetrol to produce the estimated reserves.



## Basis of Opinion

This document reflects GCA's informed professional judgment based on accepted standards of professional investigation and, as applicable, the data and information provided by the Client, the limited scope of engagement, and the time permitted to conduct the evaluation.

In line with those accepted standards, this document does not in any way constitute or make a guarantee or prediction of results, and no warranty is implied or expressed that actual outcome will conform to the outcomes presented herein. GCA has not independently verified any information provided by or at the direction of the Client, and has accepted the accuracy and completeness of these data. GCA has no reason to believe that any material facts have been withheld from it, but does not warrant that its inquiries have revealed all of the matters that a more extensive examination might otherwise disclose.

The opinions expressed herein are subject to and fully qualified by the generally accepted uncertainties associated with the interpretation of geoscience and engineering data and do not reflect the totality of circumstances, scenarios and information that could potentially affect decisions made by the report's recipients and/or actual results. The opinions and statements contained in this report are made in good faith and in the belief that such opinions and statements are representative of prevailing physical and economic circumstances.

In the preparation of this report GCA has used Part 210 Rule 4-10(a) of Regulation S-X of the United States Securities and Exchange Commission (see Appendix II)

There are numerous uncertainties inherent in estimating reserves and in projecting future production, development expenditures, operating expenses and cash flows. Oil and gas reserves assessments must be recognized as a subjective process of estimating subsurface accumulations of oil and gas that cannot be measured in an exact way. Estimates of oil and gas reserves prepared by other parties may differ, perhaps materially, from those contained within this report.

The accuracy of any reserves estimate is a function of the quality of the available data and of engineering and geological interpretation. Results of drilling, testing and production that post-date the preparation of the estimates may justify revisions, some or all of which may be material. Accordingly, reserves estimates are often different from the quantities of oil and gas that are ultimately recovered, and the timing and cost of those volumes that are recovered may vary from that assumed.

GCA's review and certification involved reviewing pertinent facts, interpretations and assumptions made by Ecopetrol or others in preparing estimates of reserves. GCA performed procedures necessary to enable it to render an opinion on the appropriateness of the methodologies employed, adequacy and quality of the data relied on, depth and thoroughness of the reserves and resources estimation process, classification and categorization of reserves and resources appropriate to the relevant definitions used, and reasonableness of the estimates.

## Definition of Reserves

Reserves are estimated remaining quantities of oil and gas and related substances anticipated to be economically producible, as of a given date, by application of development projects to known accumulations. In addition, there must exist, or there must be a reasonable expectation that there will exist, the legal right to produce, or a revenue interest in, the production, installed means of delivering oil and gas or related substances to market, and all permits and financing required to implement the project.

Reserves are further categorized in accordance with the level of certainty associated with the estimates and may be sub-classified based on project maturity and/or characterized by development and production status. The proved reserves volumes quoted herein have been derived within the context of an economic limit test (ELT) assessment (pre-tax and exclusive of accumulated depreciation amounts).

GCA has not undertaken a site visit and inspection because it was not included in the scope of work. As such, GCA is not in a position to comment on the operations or facilities in place, their appropriateness and condition, or whether they are in compliance with the regulations pertaining to such operations. Further, GCA is not in a position to comment on any aspect of health, safety, or environment of such operation. Nevertheless, GCA was informed about the disposal of Cravo Norte Area's produced water into the PF2 Estero La Conquista and PF2 Estero Agua Verde; this was approved by the environmental authority until November 25, 2021. Ecopetrol guarantees that the environmental permit will be renewed during the first quarter of 2021 under current Colombia Law (art 50 decreto 3930). If not granted, Ecopetrol may need to implement a costlier alternative of injecting such water, which may have an impact in the economic limit and in consequence in the estimated reserves volumes for the fields in such area.

This report has been prepared based on GCA's understanding of the effects of petroleum legislation and other regulations that currently apply to these properties. However, GCA is not in a position to attest to property title or rights, conditions of these rights (including environmental and abandonment obligations), or any necessary licenses and consents (including planning permission, financial interest relationships, or encumbrances thereon for any part of the appraised properties).

## Qualifications

In performing this study, GCA is not aware that any conflict of interest has existed. As an independent consultancy, GCA is providing impartial technical, commercial, and strategic advice within the energy sector. GCA's remuneration was not in any way contingent on the contents of this report.

In the preparation of this document, GCA has maintained, and continues to maintain, a strict independent consultant-client relationship with Ecopetrol. Furthermore, the management and employees of GCA have no interest in any of the assets evaluated or related with the analysis performed as part of this report. The qualifications of the technical person primarily responsible for overseeing this certification are provided in Appendix I.

Staff members who prepared this report hold appropriate professional and educational qualifications and have the necessary levels of experience and expertise to perform the work.

**Notice**

This report was prepared for public disclosure in its entirety by Ecopetrol S.A. in conjunction with its reporting obligations to the SEC. Ecopetrol S.A. will obtain GCA's prior written approval for any other use of any results, statements or opinions expressed to Ecopetrol S.A. in this report that are attributed to GCA.

Yours sincerely,

**Gaffney, Cline & Associates**



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Project Manager  
Fabio Chiarandini, *Principal Advisor*



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Reviewed by  
Rawdon Seager, *Technical Director*

**Appendices**

Appendix I      Technical Qualifications of Person Primarily Responsible for Certification  
Appendix II      SEC Reserves definition

Ecopetrol S.A.  
April 01, 2019

**Appendix I**  
**Technical Qualifications of Person Primarily Responsible for Certification**

Ecopetrol S.A.  
April 01, 2019

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**Fabio David Chiarandini**

The certification of certain of Ecopetrol's interests prepared by Gaffney, Cline & Associates (GCA), the results of which are presented in this report, was carried out by engineers and geoscientists under the direction of Mr. Fabio David Chiarandini.

Mr. Chiarandini is a Principal Advisor at GCA and is responsible for preparing reserves certifications and field evaluations. He has more than 25 years of experience in petroleum engineering with at least 9 years being in responsible charge of the estimation and evaluation of oil and gas reserves. Mr. Chiarandini holds a Bachelor degree in Petroleum Engineering from the Universidad de Buenos Aires, and a Master's Degree in International Business from the University Nacional de Cuyo and Ecole Nationale Des Ponts et Chaussées(France). He also holds an Associate's Degree in Renewable Energy from UCEMA.

Before joining GCA, Mr. Chiarandini worked for Chevron, including as the qualified reserves engineer for the Latin American and Appalachian business units. His prior experience also includes the development of onshore and offshore operations in Brazil, Colombia, Thailand and Indonesia.

He is a member in good standing of the Society of Petroleum Engineers (SPE). He belongs to the board of directors commission.

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April 01, 2019

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**Appendix II**  
**SEC Reserves Definitions**

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April 01, 2019

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U.S. SECURITIES AND EXCHANGE COMMISSION (SEC)  
MODERNIZATION OF OIL AND GAS REPORTING<sup>1</sup>

Oil and Gas Reserves Definitions and Reporting

**(a) Definitions**

(1) Acquisition of properties. Costs incurred to purchase, lease or otherwise acquire a property, including costs of lease bonuses and options to purchase or lease properties, the portion of costs applicable to minerals when land including mineral rights is purchased in fee, brokers' fees, recording fees, legal costs, and other costs incurred in acquiring properties.

(2) Analogous reservoir. Analogous reservoirs, as used in resources assessments, have similar rock and fluid properties, reservoir conditions (depth, temperature, and pressure) and drive mechanisms, but are typically at a more advanced stage of development than the reservoir of interest and thus may provide concepts to assist in the interpretation of more limited data and estimation of recovery. When used to support proved reserves, an "analogous reservoir" refers to a reservoir that shares the following characteristics with the reservoir of interest:

- (i) Same geological formation (but not necessarily in pressure communication with the reservoir of interest);
- (ii) Same environment of deposition;
- (iii) Similar geological structure; and
- (iv) Same drive mechanism.

Instruction to paragraph (a)(2): Reservoir properties must, in the aggregate, be no more favorable in the analog than in the reservoir of interest.

(3) Bitumen. Bitumen, sometimes referred to as natural bitumen, is petroleum in a solid or semi-solid state in natural deposits with a viscosity greater than 10,000 centipoise measured at original temperature in the deposit and atmospheric pressure, on a gas free basis. In its natural state it usually contains sulfur, metals, and other non-hydrocarbons.

(4) Condensate. Condensate is a mixture of hydrocarbons that exists in the gaseous phase at original reservoir temperature and pressure, but that, when produced, is in the liquid phase at surface pressure and temperature.

(5) Deterministic estimate. The method of estimating reserves or resources is called deterministic when a single value for each parameter (from the geoscience, engineering, or economic data) in the reserves calculation is used in the reserves estimation procedure.

(6) Developed oil and gas reserves. Developed oil and gas reserves are reserves of any category that can be expected to be recovered:

- (i) Through existing wells with existing equipment and operating methods or in which the cost of the required equipment is relatively minor compared to the cost of a new well; and

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<sup>1</sup> Extracted from 17 CFR Parts 210, 211, 229, and 249 [Release Nos. 33-8995; 34-59192; FR-78; File No. S7-15-08] RIN 3235-AK00].

- (ii) Through installed extraction equipment and infrastructure operational at the time of the reserves estimate if the extraction is by means not involving a well.

(7) Development costs. Costs incurred to obtain access to proved reserves and to provide facilities for extracting, treating, gathering and storing the oil and gas. More specifically, development costs, including depreciation and applicable operating costs of support equipment and facilities and other costs of development activities, are costs incurred to:

- (i) Gain access to and prepare well locations for drilling, including surveying well locations for the purpose of determining specific development drilling sites, clearing ground, draining, road building, and relocating public roads, gas lines, and power lines, to the extent necessary in developing the proved reserves.
- (ii) Drill and equip development wells, development-type stratigraphic test wells, and service wells, including the costs of platforms and of well equipment such as casing, tubing, pumping equipment, and the wellhead assembly.
- (iii) Acquire, construct, and install production facilities such as lease flow lines, separators, treaters, heaters, manifolds, measuring devices, and production storage tanks, natural gas cycling and processing plants, and central utility and waste disposal systems.
- (iv) Provide improved recovery systems.

(8) Development project. A development project is the means by which petroleum resources are brought to the status of economically producible. As examples, the development of a single reservoir or field, an incremental development in a producing field, or the integrated development of a group of several fields and associated facilities with a common ownership may constitute a development project.

(9) Development well. A well drilled within the proved area of an oil or gas reservoir to the depth of a stratigraphic horizon known to be productive.

(10) Economically producible. The term economically producible, as it relates to a resource, means a resource which generates revenue that exceeds, or is reasonably expected to exceed, the costs of the operation. The value of the products that generate revenue shall be determined at the terminal point of oil and gas producing activities as defined in paragraph (a)(16) of this section.

(11) Estimated ultimate recovery (EUR). Estimated ultimate recovery is the sum of reserves remaining as of a given date and cumulative production as of that date.

(12) Exploration costs. Costs incurred in identifying areas that may warrant examination and in examining specific areas that are considered to have prospects of containing oil and gas reserves, including costs of drilling exploratory wells and exploratory-type stratigraphic test wells. Exploration costs may be incurred both before acquiring the related property (sometimes referred to in pail as prospecting costs) and after acquiring the property. Principal types of exploration costs, which include depreciation and applicable operating costs of support equipment and facilities and other costs of exploration activities, are:

- (i) Costs of topographical, geographical and geophysical studies, rights of access to properties to conduct those studies, and salaries and other expenses of geologists, geophysical crews, and others conducting those studies. Collectively, these are sometimes referred to as geological and geophysical or "G&G" costs.



- (ii) Costs of carrying and retaining undeveloped properties, such as delay rentals, ad valorem taxes on properties, legal costs for title defense, and the maintenance of land and lease records.
- (iii) Dry hole contributions and bottom hole contributions.
- (iv) Costs of drilling and equipping exploratory wells.
- (v) Costs of drilling exploratory-type stratigraphic test wells.

(13) Exploratory well. An exploratory well is a well drilled to find a new field or to find a new reservoir in a field previously found to be productive of oil or gas in another reservoir. Generally, an exploratory well is any well that is not a development well, an extension well, a service well, or a stratigraphic test well as those items are defined in this section.

(14) Extension well. An extension well is a well drilled to extend the limits of a known reservoir.

(15) Field. An area consisting of a single reservoir or multiple reservoirs all grouped on or related to the same individual geological structural feature and/or stratigraphic condition. There may be two or more reservoirs in a field which are separated vertically by intervening impervious strata, or laterally by local geologic barriers, or by both. Reservoirs that are associated by being in overlapping or adjacent fields may be treated as a single or common operational field. The geological terms "structural feature" and "stratigraphic condition" are intended to identify localized geological features as opposed to the broader terms of basins, trends, provinces, plays, areas-of-interest, etc.

(16) Oil and gas producing activities.

- (i) Oil and gas producing activities include:
  - (A) The search for crude oil, including condensate and natural gas liquids, or natural gas ("oil and gas") in their natural states and original locations;
  - (B) The acquisition of property rights or properties for the purpose of further exploration or for the purpose of removing the oil or gas from such properties;
  - (C) The construction, drilling, and production activities necessary to retrieve oil and gas from their natural reservoirs, including the acquisition, construction, installation, and maintenance of field gathering and storage systems, such as:
    - (1) Lifting the oil and gas to the surface; and
    - (2) Gathering, treating, and field processing (as in the case of processing gas to extract liquid hydrocarbons); and
  - (D) Extraction of saleable hydrocarbons, in the solid, liquid, or gaseous state, from oil sands, shale, coalbeds, or other nonrenewable natural resources which are intended to be upgraded into synthetic oil or gas, and activities undertaken with a view to such extraction.

Instruction 1 to paragraph (a)(16)(i): The oil and gas production function shall be regarded as ending at a “terminal point”, which is the outlet valve on the lease or field storage tank. If unusual physical or operational circumstances exist, it may be appropriate to regard the terminal point for the production function as:

- a. The first point at which oil, gas, or gas liquids, natural or synthetic, are delivered to a main pipeline, a common carrier, a refinery, or a marine terminal; and
- b. In the case of natural resources that are intended to be upgraded into synthetic oil or gas, if those natural resources are delivered to a purchaser prior to upgrading, the first point at which the natural resources are delivered to a main pipeline, a common carrier, a refinery, a marine terminal, or a facility which upgrades such natural resources into synthetic oil or gas.

Instruction 2 to paragraph (a)(16)(i): For purposes of this paragraph (a)(16), the term saleable hydrocarbons means hydrocarbons that are saleable in the state in which the hydrocarbons are delivered.

- (ii) Oil and gas producing activities do not include:
  - (A) Transporting, refining, or marketing oil and gas;
  - (B) Processing of produced oil, gas or natural resources that can be upgraded into synthetic oil or gas by a registrant that does not have the legal right to produce or a revenue interest in such production;
  - (C) Activities relating to the production of natural resources other than oil, gas, or natural resources from which synthetic oil and gas can be extracted; or
  - (D) Production of geothermal steam.

(17) Possible reserves. Possible reserves are those additional reserves that are less certain to be recovered than probable reserves.

- (i) When deterministic methods are used, the total quantities ultimately recovered from a project have a low probability of exceeding proved plus probable plus possible reserves. When probabilistic methods are used, there should be at least a 10% probability that the total quantities ultimately recovered will equal or exceed the proved plus probable plus possible reserves estimates.
- (ii) Possible reserves may be assigned to areas of a reservoir adjacent to probable reserves where data control and interpretations of available data are progressively less certain. Frequently, this will be in areas where geoscience and engineering data are unable to define clearly the area and vertical limits of commercial production from the reservoir by a defined project.
- (iii) Possible reserves also include incremental quantities associated with a greater percentage recovery of the hydrocarbons in place than the recovery quantities assumed for probable reserves.
- (iv) The proved plus probable and proved plus probable plus possible reserves estimates must be based on reasonable alternative technical and commercial interpretations within the reservoir or subject project that are clearly documented, including comparisons to results in successful similar projects.

- (v) Possible reserves may be assigned where geoscience and engineering data identify directly adjacent portions of a reservoir within the same accumulation that may be separated from proved areas by faults with displacement less than formation thickness or other geological discontinuities and that have not been penetrated by a wellbore, and the registrant believes that such adjacent portions are in communication with the known (proved) reservoir. Possible reserves may be assigned to areas that are structurally higher or lower than the proved area if these areas are in communication with the proved reservoir.
- (vi) Pursuant to paragraph (a)(22)(iii) of this section, where direct observation has defined a highest known oil (HKO) elevation and the potential exists for an associated gas cap, proved oil reserves should be assigned in the structurally higher portions of the reservoir above the HKO only if the higher contact can be established with reasonable certainty through reliable technology. Portions of the reservoir that do not meet this reasonable certainty criterion may be assigned as probable and possible oil or gas based on reservoir fluid properties and pressure gradient interpretations.

(18) Probable reserves. Probable reserves are those additional reserves that are less certain to be recovered than proved reserves but which, together with proved reserves, are as likely as not to be recovered.

- (i) When deterministic methods are used, it is as likely as not that actual remaining quantities recovered will exceed the sum of estimated proved plus probable reserves. When probabilistic methods are used, there should be at least a 50% probability that the actual quantities recovered will equal or exceed the proved plus probable reserves estimates.
- (ii) Probable reserves may be assigned to areas of a reservoir adjacent to proved reserves where data control or interpretations of available data are less certain, even if the interpreted reservoir continuity of structure or productivity does not meet the reasonable certainty criterion. Probable reserves may be assigned to areas that are structurally higher than the proved area if these areas are in communication with the proved reservoir.
- (iii) Probable reserves estimates also include potential incremental quantities associated with a greater percentage recovery of the hydrocarbons in place than assumed for proved reserves.
- (iv) See also guidelines in paragraphs (a)(17)(iv) and (a)(17)(vi) of this section.

(19) Probabilistic estimate. The method of estimation of reserves or resources is called probabilistic when the full range of values that could reasonably occur for each unknown parameter (from the geoscience and engineering data) is used to generate a full range of possible outcomes and their associated probabilities of occurrence.

(20) Production costs.

- (i) Costs incurred to operate and maintain wells and related equipment and facilities, including depreciation and applicable operating costs of support equipment and facilities and other costs of operating and maintaining those wells and related equipment and facilities, they become part of the cost of oil and gas produced. Examples of production costs (sometimes called lifting costs) are:

- (A) Costs of labor to operate the wells and related equipment and facilities.
  - (B) Repairs and maintenance.
  - (C) Materials, supplies, and fuel consumed and supplies utilized in operating the wells and related equipment and facilities.
  - (D) Property taxes and insurance applicable to proved properties and wells and related equipment and facilities.
  - (E) Severance taxes.
- (ii) Some support equipment or facilities may serve two or more oil and gas producing activities and may also serve transportation, refining, and marketing activities. To the extent that the support equipment and facilities are used in oil and gas producing activities, their depreciation and applicable operating costs become exploration, development or production costs, as appropriate. Depreciation, depletion, and amortization of capitalized acquisition, exploration, and development costs are not production costs but also become part of the cost of oil and gas produced along with production (lifting) costs identified above.

(21) Proved area. The part of a property to which proved reserves have been specifically attributed.

(22) Proved oil and gas reserves. Proved oil and gas reserves are those quantities of oil and gas, which, by analysis of geoscience and engineering data, can be estimated with reasonable certainty to be economically producible—from a given date forward, from known reservoirs, and under existing economic conditions, operating methods, and government regulations—prior to the time at which contracts providing the right to operate expire, unless evidence indicates that renewal is reasonably certain, regardless of whether deterministic or probabilistic methods are used for the estimation. The project to extract the hydrocarbons must have commenced or the operator must be reasonably certain that it will commence the project within a reasonable time.

- (i) The area of the reservoir considered as proved includes:
  - (A) The area identified by drilling and limited by fluid contacts, if any, and
  - (B) Adjacent undrilled portions of the reservoir that can, with reasonable certainty, be judged to be continuous with it and to contain economically producible oil or gas on the basis of available geoscience and engineering data.
- (ii) In the absence of data on fluid contacts, proved quantities in a reservoir are limited by the lowest known hydrocarbons (LKH) as seen in a well penetration unless geoscience, engineering, or performance data and reliable technology establishes a lower contact with reasonable certainty.
- (iii) Where direct observation from well penetrations has defined a highest known oil (HKO) elevation and the potential exists for an associated gas cap, proved oil reserves may be assigned in the structurally higher portions of the reservoir only if geoscience, engineering, or performance data and reliable technology establish the higher contact with reasonable certainty.

- (iv) Reserves which can be produced economically through application of improved recovery techniques (including, but not limited to, fluid injection) are included in the proved classification when:
  - (A) Successful testing by a pilot project in an area of the reservoir with properties no more favorable than in the reservoir as a whole, the operation of an installed program in the reservoir or an analogous reservoir, or other evidence using reliable technology establishes the reasonable certainty of the engineering analysis on which the project or program was based; and
  - (B) The project has been approved for development by all necessary parties and entities, including governmental entities.
- (v) Existing economic conditions include prices and costs at which economic producibility from a reservoir is to be determined. The price shall be the average price during the 12-month period prior to the ending date of the period covered by the report, determined as an unweighted arithmetic average of the first-day-of-the-month price for each month within such period, unless prices are defined by contractual arrangements, excluding escalations based upon future conditions.

(23) Proved properties. Properties with proved reserves.

(24) Reasonable certainty. If deterministic methods are used, reasonable certainty means a high degree of confidence that the quantities will be recovered. If probabilistic methods are used, there should be at least a 90% probability that the quantities actually recovered will equal or exceed the estimate. A high degree of confidence exists if the quantity is much more likely to be achieved than not, and, as changes due to increased availability of geoscience (geological, geophysical, and geochemical), engineering, and economic data are made to estimated ultimate recovery (EUR) with time, reasonably certain EUR is much more likely to increase or remain constant than to decrease.

(25) Reliable technology. Reliable technology is a grouping of one or more technologies (including computational methods) that has been field tested and has been demonstrated to provide reasonably certain results with consistency and repeatability in the formation being evaluated or in an analogous formation.

(26) Reserves. Reserves are estimated remaining quantities of oil and gas and related substances anticipated to be economically producible, as of a given date, by application of development projects to known accumulations. In addition, there must exist, or there must be a reasonable expectation that there will exist, the legal right to produce or a revenue interest in the production, installed means of delivering oil and gas or related substances to market, and all permits and financing required to implement the project.

Note to paragraph (a)(26): Reserves should not be assigned to adjacent reservoirs isolated by major, potentially sealing, faults until those reservoirs are penetrated and evaluated as economically producible. Reserves should not be assigned to areas that are clearly separated from a known accumulation by a non-productive reservoir (i.e., absence of reservoir, structurally low reservoir, or negative test results). Such areas may contain prospective resources (i.e., potentially recoverable resources from undiscovered accumulations).

(27) Reservoir. A porous and permeable underground formation containing a natural accumulation of producible oil and/or gas that is confined by impermeable rock or water barriers and is individual and separate from other reservoirs.

(28) Resources. Resources are quantities of oil and gas estimated to exist in naturally occurring accumulations. A portion of the resources may be estimated to be recoverable, and another portion may be considered to be unrecoverable. Resources include both discovered and undiscovered accumulations.

(29) Service well. A well drilled or completed for the purpose of supporting production in an existing field. Specific purposes of service wells include gas injection, water injection, steam injection, air injection, salt-water disposal, water supply for injection, observation, or injection for in-situ combustion.

(30) Stratigraphic test well. A stratigraphic test well is a drilling effort, geologically directed, to obtain information pertaining to a specific geologic condition. Such wells customarily are drilled without the intent of being completed for hydrocarbon production. The classification also includes tests identified as core tests and all types of expendable holes related to hydrocarbon exploration. Stratigraphic tests are classified as "exploratory type" if not drilled in a known area or "development type" if drilled in a known area.

(31) Undeveloped oil and gas reserves. Undeveloped oil and gas reserves are reserves of any category that are expected to be recovered from new wells on undrilled acreage, or from existing wells where a relatively major expenditure is required for recompletion.

- (i) Reserves on undrilled acreage shall be limited to those directly offsetting development spacing areas that are reasonably certain of production when drilled, unless evidence using reliable technology exists that establishes reasonable certainty of economic producibility at greater distances.
- (ii) Undrilled locations can be classified as having undeveloped reserves only if a development plan has been adopted indicating that they are scheduled to be drilled within five years, unless the specific circumstances, justify a longer time.
- (iii) Under no circumstances shall estimates for undeveloped reserves be attributable to any acreage for which an application of fluid injection or other improved recovery technique is contemplated, unless such techniques have been proved effective by actual projects in the same reservoir or an analogous reservoir, as defined in paragraph (a)(2) of this section, or by other evidence using reliable technology establishing reasonable certainty.

(32) Unproved properties. Properties with no proved reserves.