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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, 2016

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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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  
7.625% Notes due 2019  
4.250% Notes due 2018  
5.875% Notes due 2023

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

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

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**Title of each class**

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

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 and posted on its corporate Web site, if any, every Interactive Data File required to be submitted and posted 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 and post such files).

N/A

Indicate by check mark whether the registrant is a large accelerated filer, an accelerated filer, or a non-accelerated filer. See definition of "accelerated filer and large accelerated filer" in Rule 12b-2 of the Exchange Act. (Check one):

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† provided pursuant to Section 13(a) of the Exchange Act.

† 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. You may read and copy any materials filed with the SEC in the SEC's public reference room at 100 F Street, NE, Washington, D.C. 20549. Please call the SEC at 1-800-SEC-0330 for further information on the operation of the public reference room. 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 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 forecast 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 contained in this annual report.

### 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>2016</b>	<b>2015</b>	<b>2014</b>	<b>2013</b>	<b>2012</b>
Oil and gas production (mboed)	717.9	760.7	755.4	788.2	754.0
Proved oil and gas reserves (Mmboe) <sup>(1)</sup>	1,598	1,849	2,084	1,972	1,877
Exploratory Wells <sup>(2)</sup>	6	5	28	22	23
Refinery Through-put (bpd) <sup>(3)</sup>	332,751	234,861	240,484	283,362	296,340
1P Reserves replacement ratio	(7%)	6%	146%	139%	108%

(1) For 2016, 2015 and 2014, proved reserves include natural gas royalties. Data for 2012 and 2013 excludes natural gas royalties. Data for all years excludes crude oil royalties.

(2) Gross exploratory wells.

(3) Refinery through-put includes Barrancabermeja, Reficar, Apiay and Orito. 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 under stabilization, with full operation in July 2016.

### 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>2016</b>	<b>2015</b>
Revenue	48,485,561	52,347,271
Operating income	8,904,548	2,131,165
Net income (loss) attributable to Ecopetrol’s shareholders	2,447,881	(7,193,859)
Net operating income per share	217	52
Weighted average number of shares outstanding	41,116,694,690	41,116,694,690
Earnings(loss) per share (basic and diluted)	59.5	(175.0)
<b>Total assets</b>	<b>120,437,924</b>	<b>123,588,190</b>
<b>Financial Information</b>	<b>2016</b>	<b>2015</b>
<b>Total equity</b>	<b>43,560,501</b>	<b>43,100,963</b>
Subscribed and paid-in capital	25,040,067	25,040,068
Number of common shares	41,116,694,690	41,116,694,690
Dividends declared per share	23	-
<b>Total liabilities</b>	<b>76,877,423</b>	<b>80,487,227</b>

Our consolidated financial statements for the years ended December 31, 2014, 2015 and 2016 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 in paragraphs 9 and 18 of the International Accounting Standard 27 “Consolidated and Separated 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 and recognizing non-controlling interest. We present our operating information on a consolidated basis.

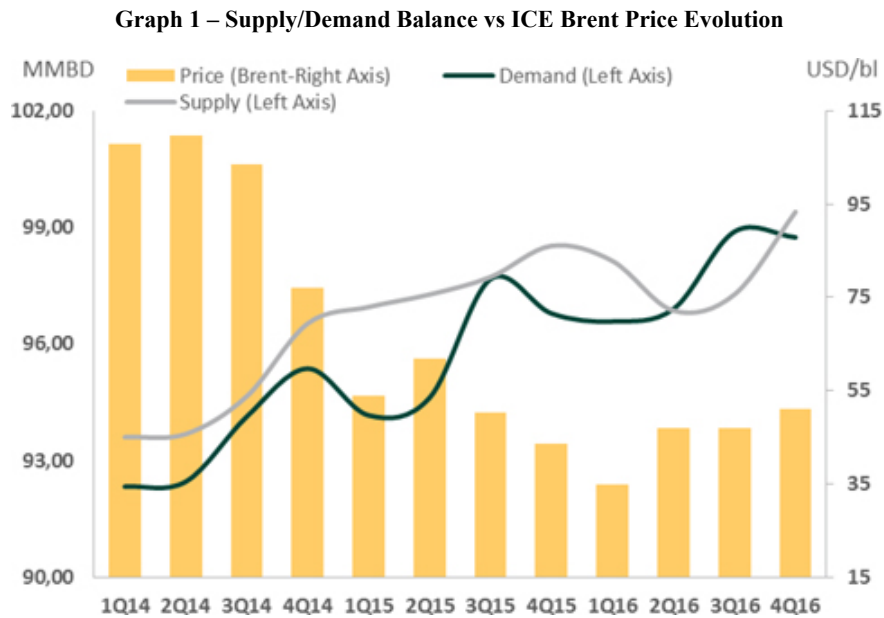
The regulations of the SEC do not require foreign private issuers that prepare their financial statements on the basis of IFRS to reconcile such financial statements to U.S. GAAP. Accordingly, while we have in the past reconciled our consolidated financial statements prepared in accordance with Colombian Government Entity GAAP to U.S. GAAP, those reconciliations are no longer presented in our filings before the SEC. 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. Other than as required under ASC Topic 932, any references to accounting treatments under Colombian Government Entity GAAP or U.S. GAAP relate solely to the application of Colombian Government Entity GAAP or U.S. GAAP to our historical consolidated 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\$3,053.42 per US\$1.00, which corresponds to the *Tasa Representativa Promedio del Mercado* (TRM), or Average Representative Market Exchange Rate, for 2016. 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 May 26, 2017, the Representative Market Exchange Rate was COP\$2,911.66 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

Due to market imbalances, there was a sharp contraction in crude oil price, particularly in the first quarter of 2016. As demand proved to sustain itself while producers implemented previously announced capital expenditure reduction decisions that encompassed the adjustments necessary under the new price environment, the market began its path towards tighter balances (see Graph 1 – Supply/Demand vs ICE Brent price evolution). Although oil prices have recovered from the lowest prices during the oil crisis, high levels of uncertainty persist indicating a less than smooth recovery. Nonetheless, the change in OPEC’s stance, announced at the end of September 2016 and later ratified in early December 2016, towards coordinated production cuts provided a lift that allowed the ICE Brent price to end the year above US\$55 per barrel.



Source: PIRA Energy Group, World Oil Market Forecast (February 28, 2017)

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 2016 Colombia’s GDP grew 2% in real terms, as compared to 2015. The industries with the greatest growth rates were financial institutions, insurance, real estate and business services, construction and manufacturing. On the other hand, the industry with the largest drop in growth was mining. Local sales of liquid fuels (diesel, gasoline, jet fuel and LPG) increased by 2% mainly due to the increase in sales of gasoline. Gasoline domestic sales were more competitive than its substitutes due to its price decrease and fewer than expected conversions to natural gas for vehicles (NGV) in Colombia.

In 2016, there were no major changes in natural gas regulation. With respect to natural gas supply, in November 2016, a new regasification plant located in Cartagena became available, meaning that Colombia is now connected to the international LNG market and LNG prices will be a reference for national gas prices.

## 2.1 Our Corporate Strategy

The low oil price environment present at the end of 2015 and the beginning of 2016 led to a revision of our business plan 2015-2020, originally launched in May 2015, with a price scenario of US\$80 per barrel. Our new 2017-2020 business plan is focused on value generation, profitability and financial sustainability under a price scenario of US\$50 per barrel, and allows for considerable upsides in case of potential price increases. For example, if prices were to increase to an average price of US\$70 per barrel, production by 2020 could reach 830 thousand barrels equivalent per day, or 16% over the current production.

The three pillars of the plan are: (i) cash flow focus and cost efficiency, (ii) strict capital discipline and (iii) profitable reserves and production growth.

**Cash flow focus and cost efficiency:** In 2015, we launched the 2015-2020 Transformation Program (the “Transformation Program”) with a goal of increasing our efficiency and decreasing cost. The Transformation Program has allowed us to decrease structural costs by US\$1.5 billion compared to 2014. Such reduction has been accomplished due to the implementation of initiatives through our different business segments and corporate areas. The new business plan entails a second phase of the Transformation Program, with activities aimed to achieve excellence in project planning and execution as well as in our production, transportation, refining and marketing operations.

**Capital discipline:** We have preserved a rigorous level of capital discipline through the adjustment of investments and the adoption of strict controls to ensure that projects are delivered efficiently and within the expected time frame and budget. The plan calls for investments of approximately US\$13 billion between 2017 and 2020. By 2020, approximately 90% of this investment will be allocated to the development of exploration and production projects, while investments in transportation and refining will seek to improve operational integrity and reliability.

As part of capital discipline, Ecopetrol is currently engaged in the divestment of non-strategic assets and the sale of minor fields, and has also defined a dividend policy as described in [Section 6.2 Dividend Policy](#).

**Profitable growth in production and exploration:** One of the pillars of the revised business plan is the view that a strong production portfolio and a greater exploratory success will bring about profitable growth. Under a price scenario of US\$50 per barrel, production should average 760 thousand barrels of oil equivalent per day by 2020, an approximately 6% growth from 2016. Approximately 94% of this production will come from the current producing assets.

In exploration, the plan estimates the incorporation of approximately 1,000 million barrels of contingent resources. In respect of adding reserves, we highlight the results of the exploratory campaigns in the Colombian Caribbean offshore and the Gulf of Mexico in the United States. During the period 2017 – 2020, Ecopetrol expects to add 600 million barrels of proven reserves from current fields and exploration.

Consistent with the business plan update, in November 2016, the board of directors of Ecopetrol (“Board of Directors”) approved a US\$3.5 billion investment plan for 2017. The Ecopetrol Group will continue to produce an average of about 715 thousand barrels of oil equivalent per day during 2017. This production level lays the foundation for Ecopetrol’s expected increase in production by 2020.

Most of the investment will be in exploration and production. In refining, petrochemicals and biofuels, and transportation and logistics, investments will be made to comply with integrity and operational requirements as well as project completion. The table below sets forth the details of the investment plan per business segment.

**Table 3 – 2017 Investment Plan**

<b>Business Segment</b>	<b>Millions of US\$<sup>(1)</sup></b>	<b>% Percentage</b>
Exploration	650	18.6%
Production	2,200	62.9%
Transportation and Logistics	265	7.6%
Refining, Petrochemicals, and Biofuels	360	10.3%
Others	25	0.6%
<b>TOTAL</b>	<b>3,500</b>	<b>100%</b>

(1) Rounded figures.

### ***Exploration***

In the exploration segment, US\$650 million will be allocated mainly to the evaluation and appraisal of discoveries and ongoing exploration efforts of Ecopetrol S.A. (approximately US\$460 million), Hocol S.A. (“Hocol”) (approximately US\$114 million), Ecopetrol America Inc. (approximately US\$11 million), Ecopetrol Costa Afuera (approximately US\$44 million) and Ecopetrol Brazil (approximately US\$21 million).

### ***Production***

In the production segment, US\$1,977 million will be allocated mainly to the execution of development and incremental production projects in the Castilla, Rubiales, Yarigui-Cantagallo, La Cira - Infantas, Tibú, Piedemonte, Chichimene, Quifa, Provincia and Cusiana-Cupiagua fields (approximately US\$1,147 million). We have also allocated funds for our affiliates and subsidiaries as follows: US\$64 million for the operation and maintenance of fields of Ecopetrol America Inc. in the U.S. Gulf of Mexico, US\$88 million to Hocol, US\$63 million to Equion and US\$8 million to Savia.

### ***Transportation and logistics***

In the transportation and logistics segment, US\$138 million will be allocated to investments focused on the completion of projects such as San Fernando-Monterrey and transportation of heavy crude oils as well as crude oil dilution projects. The segment is seeking a higher efficiency in operations and maintenance practices.

### ***Refining, petrochemicals, and biofuels***

In the refining, petrochemicals, and biofuels segment, US\$105 million will be allocated to Reficar, US\$150 million to programs to improve operations at the Barrancabermeja Refinery through initiatives aimed to increase revenues, improve efficiency and reduce operational costs and US\$82 million to Bioenergy. The segment is seeking a higher efficiency in operations and maintenance practices. It is important to highlight that the Barrancabermeja Refinery modernization plan will continue to be delayed until the oil price environment allows investments to be made in such a major project. The mode of execution will be defined in this context, after analyzing alternatives which include a modular option in time and investment.

## **3. Business Overview**

### ***3.1 Our History***

We were formed in 1951 by the Colombian government as Empresa Colombiana de Petróleos and began operating the crude oil fields at La Cira-Infantas, the oldest Colombian oil field whose 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, 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. We carried out our initial public offering in November 2007 when our common shares became 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 2, 2016, our ADR’s were officially delisted from the TSX.

### 3.2 *Our Corporate Structure*

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

Our subsidiaries Refinería de Cartagena (Reficar), Cenit and 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 March 31, 2017, we have eight directly owned and 20 indirectly owned subsidiaries.

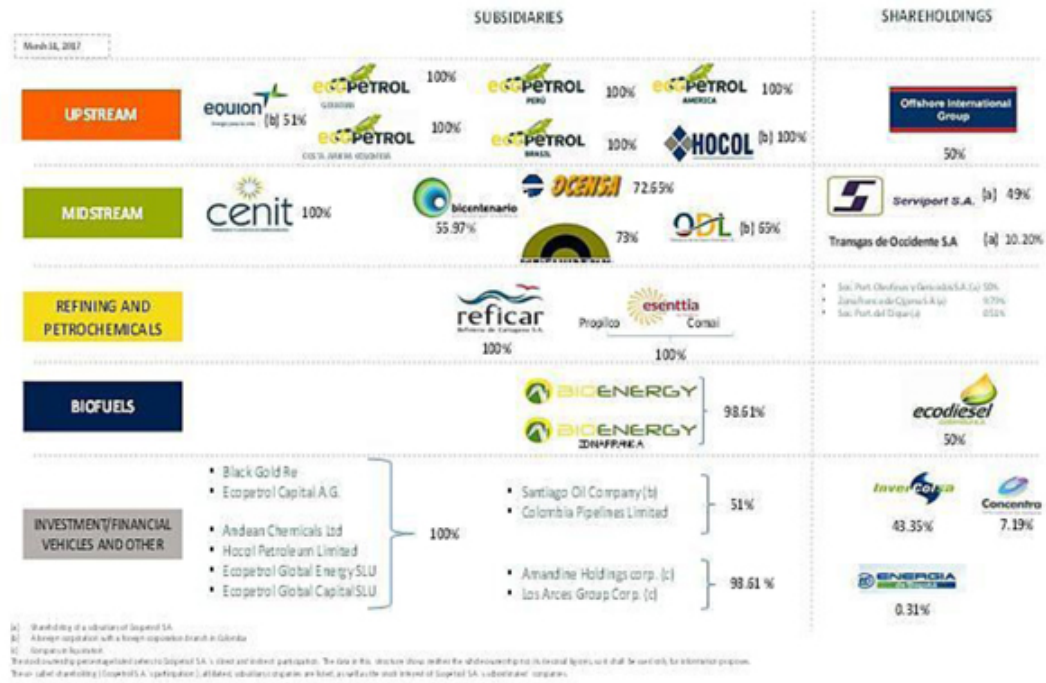
During 2016, the following changes were made to the Ecopetrol Group's structure:

- In January 2016, we organized a new wholly-owned subsidiary, Ecopetrol Costa Afuera Colombia S.A.S., which will be responsible for offshore exploration and production activities in Colombia. The new subsidiary seeks to develop offshore activities in Colombia, which the Company currently carries out as operator and non-operator, and take advantage of the benefits of Decree 2682/14, pursuant to which the conditions and requirements are established for declaring the existence of permanent offshore free trade zones.
- Polipropileno del Caribe S.A. (Propilco), a wholly owned subsidiary, incorporated Esenttia Resinas del Peru S.A.C in Peru. This new company is wholly indirectly owned by Ecopetrol S.A. For Propilco, the creation of this new company represents an opportunity to strengthen the company's commercial strategy in Peru.
- The process of reorganizing Ecopetrol S.A.'s indirect participation in Oleoducto de Colombia S.A. ("ODC") (held through Equion Energia Limited) was successfully completed. As a result of this reorganization, Equion transferred 100% of the shares issued by Sento S.A.S. ("Sento") to Cenit S.A.S. ("Cenit"), and consequently Sento S.A.S. became the holder of 7.43% of the outstanding capital stock in ODC. However, this restructuring had no impact on our consolidated financial statements.
- In January 2017, the merger by absorption between Sento and Cenit was completed, with the latter being the absorbing company as of January 6, 2017. As a result, Cenit is now the direct holder of a 51.28% equity interest in the outstanding capital stock of ODC. However, this restructuring had no impact on our consolidated financial statements.

Exhibit 8.1 to this annual report identifies our principal operating subsidiaries, their respective countries of incorporation, and our percentage ownership in each (both directly and indirectly through other subsidiaries), in each case as of March 31, 2017.

Graph 2 – Ecopetrol Corporate Structure

Ecopetrol Corporate Structure: Subsidiaries and Shareholdings



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.

We are in the process of selling some of our non-core shareholdings:

- We currently own 0.31% of the total outstanding shares of Empresa de Energía de Bogotá. As approved by Decrees 2305 of November 13, 2014 and 2110 of December 22, 2016, we are authorized to offer our remaining 0.31% of total outstanding shares of Empresa de Energía de Bogotá to the general public using the most appropriate mechanism for the volume and value of the remaining shares. The first stage of the divestment plan took place during the second quarter of 2015, in which we placed 352,872,414 shares at COP\$1,740 per share. In 2016, Ecopetrol placed 249,760,551 ordinary shares of Empresa de Energía de Bogotá at COP\$1,815 per share. The operation was executed in accordance with the procedures defined by the Law 226 of 1995 and the Decree 2305 of November 13, 2014. On December 22, 2016, the Colombian Government issued Decree 2110 extending the duration of the divestment program until December 31, 2017.
- In 2016, Ecopetrol completed the divestment of its stake in Interconexión Eléctrica S.A. E.S.P. ISA for a total of COP\$513 billion. The operation was carried out in accordance with the procedures defined by the Law 226 of 1995 and the Decree 1800 of September 9, 2015.
- We currently own 100% of the total outstanding shares of Propilco. On January 27, 2016, the Board of Directors of Ecopetrol approved the commencement of a divestment plan to sell Ecopetrol’s shares in Propilco. On June 13, 2016, the divestment program was approved by the Council of Ministers of Colombia. The next step in the process is the issuance of a Decree with the final approval to begin the divestiture process under Law 226 of 1995, which has not yet been provided and therefore we are not yet accounting this as a discontinued operation.
- On November 25 of 2016, Ecopetrol conducted an auction to divest 20 non-core producing and non-producing assets. As a result of the bidding process, Ecopetrol received offers for US\$53.4 million in six non-core assets, out of which three are currently producing 1.8 mbod and the rest are not in operation.

### **3.3 Our Business**

We are a vertically integrated oil company with a presence primarily in Colombia and with activities in Peru, Brazil and the U.S. Gulf Coast. The Nation currently controls 88.49% of our voting capital stock. We are among the top 36 oil and gas companies in the world based on the Petroleum Intelligence Weekly Top 50 Ranking - 2016. We play a key role in the local hydrocarbon market.

### **3.4 Exploration and Production**

Our exploration and production business segment includes exploration, development and production activities in Colombia and abroad. We began local exploration in 1955 and international exploration in 2006. We conduct exploration and production activities directly in Ecopetrol S.A., through some of our subsidiaries, and through joint ventures with third parties. As of December 31, 2016, we were the largest operator and the largest producer of crude oil and natural gas in Colombia, maintaining the largest acreage exploration position in Colombia.

#### **3.4.1 Exploration Activities**

Ecopetrol is planning to incorporate about 1 billion barrels of contingent resources by 2020, through exploration activities in the following areas: (i) offshore Colombia, (ii) near field exploration in Colombia, (iii) consolidation of exploration areas outside of Colombia, such as the Gulf of Mexico, Brazil and other areas in America.

During 2016 our exploration activities focused in three work fronts: onshore Colombia, Colombia and the US Gulf of Mexico offshore and near field exploration in Colombia.

On January 15, 2016 Hocol Petroleum Limited - HPL, subsidiary of Ecopetrol S.A. and owned 100% by Ecopetrol, constituted and registered before the Chamber of Commerce in Colombia the company Ecopetrol Offshore ("Ecopetrol Costa Afuera" or "ECAS"). ECAS and Hocol S.A. are subsidiaries of HPL.

ECAS' purpose is to develop oil and gas activities in offshore Colombia by taking advantage of offshore free trade zones regime. These activities include exploration, exploitation, production, transport, distribution, export, sales and commercialization of oil and gas and any other hydrocarbon products or derivatives.

During 2016 bidding rounds were not launched by the National Hydrocarbons Agency to offer licenses for exploratory activities in Colombia.

Ecopetrol signed farmout agreements with the following companies: Parex Resources Colombia Ltd (acquired 50% of the working interest in Convenio Playón and 50% of the working interest in Convenio de Mares), Talisman Colombia Oil & Gas Ltd (acquired 49% of the working interest in Convenio Upar) and Hupecol Operating Co LLC (acquired 100% of the working interest in CPO-11 E&P Contract).

Additionally, Ecopetrol carried out its Onshore Round 1-2016 offering working interest in the onshore blocks LLA-38, LLA-39, LLA-52, PUT 13 and VMM-32 located in Colombia.

*For purposes of this exploration section, "we" refers to Ecopetrol S.A., its subsidiaries and partnerships in which Ecopetrol has an interest. Unless otherwise stated, all figures are given before deductions for royalties.*

#### **3.4.1.1 Exploration Activities in Colombia**

Currently we have exploration activities in most of the sedimentary basins in Colombia, in which active oil and gas operations are found.



The following map shows the basins where Ecopetrol has been conducting its main exploration activities.

**Graph 3 – Sedimentary Basins in Colombia**



Source: ANH

We conduct exploration activities in Colombia on our own and through joint ventures with regional and global oil and gas companies.

**Seismic**

During 2016, two 2D seismic programs were acquired in Colombia: Cardon (106.5 Km) and Nogal (44 Km). These seismic programs are intended to increase the knowledge of the Caguan-Putumayo basin.

Additionally, our subsidiary Hocol S.A. successfully completed the acquisition of 294.9 km<sup>2</sup> of 3D seismic in the exploratory blocks GUA2 (213.5 km<sup>2</sup>) and YDSN1 (81.4 km<sup>2</sup>) in Middle Magdalena Basin and Llanos Basin, respectively.

**Exploratory Wells**

During 2016, onshore drilling operations were started in five wells by Ecopetrol and its subsidiary Hocol S.A. in the Lower Magdalena Basin and Llanos Basin. Additionally Hocol finalized drilling operations in the Payero well (Piedemonte basin), which started in December 2015 and was operated by Equion. In terms of offshore Colombia, drilling operations started at the Purple-Angel 1 well (following the discovery announced at the Kronos-1 well in July 2015) and at the Gorgon-1 prospect. Our joint venture partner Anadarko operates both wells. On March 8, 2017, we announced the discovery of a gas presence at Purple-Angel 1.

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,		
	2016	2015	2014
	(number of wells)		
<b>COLOMBIA</b>			
<b>Ecopetrol S.A.</b>			
<b>Gross Exploratory Wells</b>			
<b>Owned and operated by Ecopetrol</b>			
Productive <sup>(1)</sup>	–	–	3.0
Dry <sup>(2)</sup>	1.0	1.0	9.0
<b>Total</b>	<b>1.0</b>	<b>1.0</b>	<b>12.0</b>
<b>Operated by Partner in Joint Venture</b>			
Productive	–	1.0	1.0
Dry	–	1.0	2.0
<b>Total</b>	<b>–</b>	<b>2.0</b>	<b>3.0</b>
<b>Operated by Ecopetrol in Joint Venture</b>			
Productive	–	–	1.0
Dry	–	–	–
<b>Total</b>	<b>–</b>	<b>–</b>	<b>1.0</b>
<b>Net Exploratory Wells<sup>(3)</sup></b>			
Productive	–	0.5	4.1
Dry	1.0	1.5	10.7
<b>Total</b>	<b>1.0</b>	<b>2.0</b>	<b>14.8</b>
<b>Sole Risk</b>			
Productive	–	–	–
Dry	–	–	–
<b>Total</b>	<b>–</b>	<b>–</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
<b>Total</b>	<b>1.0</b>	<b>1.0</b>	<b>4.0</b>
<b>Net Exploratory Wells</b>			
Productive	0.5	0.5	–
Dry	–	–	3.0
<b>Total</b>	<b>0.5</b>	<b>0.5</b>	<b>3.0</b>

(1) A productive well is an exploratory well that has evidence of hydrocarbons.

(2) 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.

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

Ecopetrol drilled two wells in 2016: (i) Chimú-1 St-1 well, where Ecopetrol holds a 100% working interest at Caño Sur Block, which was a dry well, and (ii) Boranda well, in which Ecopetrol holds a 50% working interest and Parex holds the remaining 50% working interest, as block operator. As of March 30, 2017 we announced that the presence of crude was discovered at this well.

Our subsidiary Hocol S.A. drilled three wells in 2016: (i) Payero E1 well, located at Niscota Block and operated by Equión. Total holds a 50% working interest, Repsol holds a 30% working interest and Hocol S.A. holds a 20% working interest, this well was declared temporarily suspended; (ii) Bullerengue Sur-1 well, located at SSJN1 Block. Hocol S.A. holds a 50% working interest and Lewis Energy holds the remaining 50%, this one is a productive well, and (iii) Pegaso well, located at CPO 16 Block where Hocol S.A. holds a 100% working interest, this well was under evaluation as of December 31, 2016.

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

Our international exploration strategy is focused on participating in bidding rounds to secure blocks available for exploration and entering into joint ventures with international and regional oil companies. We believe exploring outside Colombia allows us to diversify our risks and improve the possibilities of increasing our crude oil and natural gas reserves.

With respect to our seismic data outside of Colombia, during 2016, our subsidiary Ecopetrol Brasil bought 854 Km<sup>2</sup> of seismic data on the Potiguar basin, POT-M-567, in which Ecopetrol Brasil holds a 100% working interest.

With respect to our exploratory drilling outside of Colombia, during 2016, we have undertaken deep water exploratory drilling in the U.S. Gulf Coast in association with our business partners. The following table sets forth information on our exploratory drilling in the years 2016, 2015 and 2014.

Table 5 – Exploratory Drilling Outside Colombia

	For the year ended December 31,		
	2016	2015	2014
	(number of wells)		
<b>INTERNATIONAL</b>			
<b>Ecopetrol America Inc.</b>			
<b>Gross Exploratory Wells</b>			
Productive <sup>(1)</sup>	1.0	–	2.0
Dry <sup>(2)</sup>	–	1.0	3.0
<b>Total</b>	<b>1.0</b>	<b>1.0</b>	<b>5.0</b>
<b>Net Exploratory Wells<sup>(3)(4)</sup></b>			
Productive	0.2	–	0.7
Dry	–	0.5	0.5
<b>Total</b>	<b>0.2</b>	<b>0.5</b>	<b>1.2</b>
<b>Ecopetrol Óleo e Gás do Brasil Ltda.</b>			
<b>Gross Exploratory Wells</b>			
Productive	–	–	–
Dry	–	–	–
<b>Total</b>	<b>–</b>	<b>–</b>	<b>–</b>
<b>Net Exploratory Wells</b>			
Productive	–	–	–
Dry	–	–	–
<b>Total</b>	<b>–</b>	<b>–</b>	<b>–</b>
<b>Ecopetrol Germany</b>			
<b>Gross Exploratory Wells</b>			
Productive	–	–	–
Dry	–	–	2.0
<b>Total</b>	<b>–</b>	<b>–</b>	<b>2.0</b>
<b>Net Exploratory Wells</b>			
Productive	–	–	–
Dry	–	–	0.2
<b>Total</b>	<b>–</b>	<b>–</b>	<b>0.2</b>
<b>Savia Perú</b>			
<b>Gross Exploratory Wells</b>			
Productive	–	–	–
Dry	–	–	–
<b>Total</b>	<b>–</b>	<b>–</b>	<b>–</b>
<b>Net Exploratory Wells</b>			
Productive	–	–	–
Dry	–	–	–
<b>Total</b>	<b>–</b>	<b>–</b>	<b>–</b>

(1) A productive well is an exploratory well that has evidence of hydrocarbons.

(2) 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.

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

(4) None of our international wells were dug pursuant to a sole risk contract.

As set forth in the table above, in 2016, our subsidiary Ecopetrol America Inc. drilled in the United States Gulf of Mexico the Warrior exploratory well, in which Ecopetrol America Inc. holds a 20% working interest and our partners Anadarko (operator) holds a 65% working interest and MCX Gulf of Mexico LLC holds the remaining 15% working interest. The well was declared productive. This oil discovery is the result of our new exploratory strategy, which includes partnerships with leading companies to diversify risk, undertake further exploration activities and increase contingent resources. The Warrior well is the fifth oil discovery of the Ecopetrol Group in this prosperous oil region and contributes with increasing our contingent resources.

Ecopetrol America Inc. also drilled a successful appraisal well in Leon discovery (León 2 BP4), operated by Repsol, which holds a 60% working interest. Ecopetrol America Inc. holds the remaining 40% working interest. The result of this well adds contingent resources to those initially discovered with the León 1 exploratory well in 2014.

During 2016, Ecopetrol S.A. did not participate in bidding rounds in the Gulf of Mexico.

With regards to ECP Oil and Gas Germany GmbH's operations in Angola, we reached an agreement with our partners on the terms upon which we will withdraw from Block 38/11 and Block 39/11. This agreement was sent for approval of the National Concessionaire, Sonangol EP, followed by the issuance of a decree from the Ministry of Petroleum. We expect the withdrawal process to be concluded by mid-year of 2017.

### 3.4.2 Production Activities

Our consolidated average production was 717.9 thousand boepd in 2016, a decrease of approximately 43 thousand boepd as compared to 2015. This decrease is mainly the result of the natural production decline of our fields and a reduction in the upstream investments during 2016, as a consequence of the drop in oil prices.

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,								
	2016			2015			2014		
	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>	582.5	123.3	705.8	619.2	130.4	749.6	610.9	133.3	744.2
Total International production <sup>(3)</sup>	9.6	2.5	12.1	7.3	3.8	11.1	8.6	2.6	11.2
Total production of Ecopetrol Group	592.1	125.8	717.9	626.5	134.2	760.7	619.5	135.9	755.4

(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, 2016, Ecopetrol S.A. was the largest participant in the Colombian hydrocarbons industry, accounting for approximately 62% of crude oil production (according to calculations made by Ecopetrol based on information from the Ministry of Mines and Energy) and approximately 61% of natural gas production (according to calculations made by Ecopetrol based on information from the Ministry of Mines and Energy). Also during 2016, Ecopetrol S.A. carried out development drilling mainly in the Oriente and Orinoquia regions, drilling 133 development wells; 83 of those through direct operations and 50 through joint ventures.

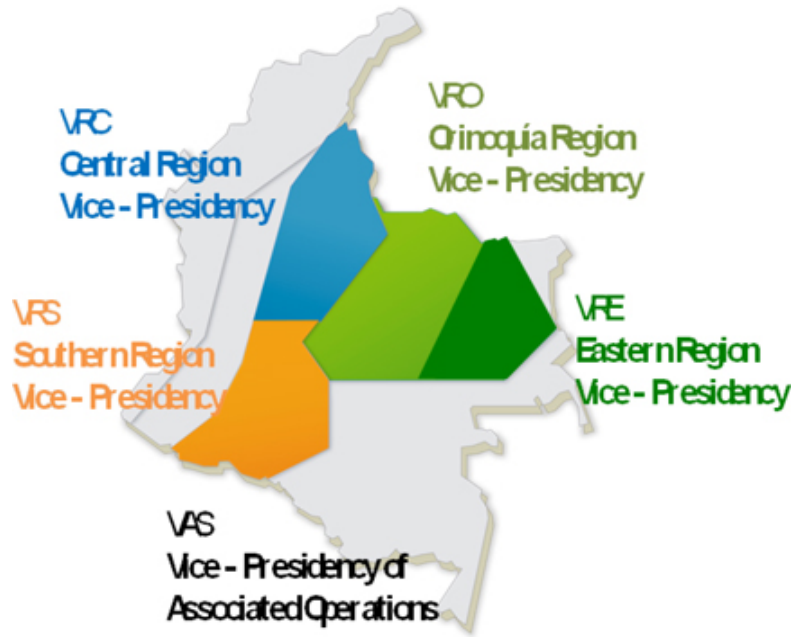
In terms of operational structure, Ecopetrol S.A. manages its production operations through a regional organization. Since July 1, 2014, three regional Vice-Presidencies were created: Central, Orinoquia and Southern. After the company took over the operations of the Rubiales field in July of 2016, a new Vice-Presidency, the Eastern Region, was incorporated to this scheme. Our operating assets are distributed in the following regions:

- Central Region: comprising 30 fields with active production in 2016.
- Orinoquia Region: comprising 19 fields with active production in 2016.
- Southern Region: comprising 34 fields with active production in 2016.
- Eastern Region: comprising 4 fields with active production in 2016.

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 137 fields with active production in 2016.

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

Graph 4 – Ecopetrol S.A. Operations in Colombia



Note: VAS is the countrywide Vice-presidency.

*Crude Oil Production*

The average daily production of crude oil in Colombia by Ecopetrol S.A. (excluding its subsidiaries), was 552.1 mbod in 2016, 34.1 mbod lower than in 2015, which represents a year-to-year decrease of 6%.

However, it is important to highlight that since July of 2016 we took over the operations of the Rubiales and Cusiana fields. A plan was set up with more than two years in advance, which allowed us to successfully transition between operators, without technical, operational or communities' issues in any of the two fields. In the case of the Rubiales field, it is important to highlight that we restarted investments in the asset with new development drilling during the last quarter of the year 2016, which helped us mitigate the production decline observed during 2015.

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,		
	2016	2015	2014
	(thousand bpd)		
<b>Central Region</b>			
1) La Cira – Infantas	19.1	22.9	24.6
2) Casabe	17.8	21.9	22.0
3) Yarigui	16.6	17.8	16.7
4) Other	21.3	23.7	21.0
<b>Total Central Region</b>	<b>74.8</b>	<b>86.3</b>	<b>84.3</b>
<b>Orinoquía Region</b>			
1) Castilla	121.3	122.5	104.4
2) Chichimene	74.0	78.0	56.2
3) Cupiagua	11.3	14.0	16.4
4) Other	18.3	21.1	26.0
<b>Total Orinoquía Region</b>	<b>224.9</b>	<b>235.6</b>	<b>203.0</b>
<b>Eastern Region</b>			
1) Rubiales <sup>(1)</sup>	61.5	0	0
2) Caño Sur <sup>(2)</sup>	0.4	0	0
<b>Total Eastern Region</b>	<b>61.9</b>	<b>0</b>	<b>0</b>
<b>Southern Region</b>			
1) San Francisco	6.5	8.1	9.2
2) Huila Area	7.4	7.8	8.2
3) Tello	4.4	4.5	4.3
4) Other	9.4	11.0	11.8
<b>Total Southern Region</b>	<b>27.7</b>	<b>31.4</b>	<b>33.5</b>
<b>Associated Operations</b>			
1) Rubiales <sup>(1)</sup>	41.4	94.3	104.3
2) Quifa	19.6	24.2	33.0
3) Caño Limon	23.3	25.6	30.0
4) Cusiana <sup>(3)</sup>	2.6	5.2	7.0
5) Other	75.9	83.6	84.6
<b>Total Associated Operations</b>	<b>162.8</b>	<b>232.9</b>	<b>258.9</b>
<b>Total average daily crude oil production Ecopetrol S.A. (Colombia)</b>	<b>552.1</b>	<b>586.2</b>	<b>579.7</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 became 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 became a part of the Eastern Region.
- (3) In the first half of 2016, the Cusiana field was part of the Vice-Presidency of Associated Operations. Since July 3, 2016, it became a part of the Orinoquia Region.

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

	2016 (mbod)	Year-on-Year Δ (%)	2015 (mbod)	Year-on-Year Δ (%)	2014 (mbod)
Light	44.6	(0.0)%	44.6	0.2%	44.5
Medium	161.5	(13.7)%	187.1	(5.8)%	198.6
Heavy	346.0	(2.4)%	354.5	5.3%	336.6
<b>Total</b>	<b>552.1</b>	<b>(5.8)%</b>	<b>586.2</b>	<b>1.1%</b>	<b>579.7</b>

Ecopetrol S.A.’s crude oil production during 2016 consisted of approximately 37% light and medium crudes and 63% heavy crudes. In 2015, approximately 40% of the crude oil production corresponded to light and medium crudes and 60% to heavy crudes. During 2014, production distribution was approximately 42% of light and medium crudes and 58% of heavy crudes.

#### Natural Gas Production

In 2016, the average daily production of natural gas by Ecopetrol S.A. reached 116.0 mboed, including natural gas liquids (“NGLs”), corresponding to a 4% decrease in comparison to 2015 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.

Of our total natural gas production during the year ended December 31, 2016, approximately 29% was supplied from the Guajira field, 25% from the Cusiana field, 25% from the Cupiagua field and the remaining 21% 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, 2016, 2015 and 2014.

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

	For the year ended December 31,		
	2016	2015 (thousand boepd)	2014
<b>COLOMBIA</b>			
<b>Central Region</b>			
1) La Cira – Infantas	0.17	0.12	0.16
2) Provincia	3.09	3.75	4.00
3) Yarigui	0.56	0.56	0.50
4) Gibraltar	6.32	5.52	5.57
4) Other	1.60	1.51	1.02
<b>Total Central Region</b>	<b>11.74</b>	<b>11.46</b>	<b>11.25</b>
<b>Orinoquía Region</b>			
1) Cupiagua	28.72	24.09	22.80
2) Cusiana <sup>(1)</sup>	15.98	0.00	0.00
2) Other	1.44	1.18	1.37
<b>Total Orinoquía Region</b>	<b>46.14</b>	<b>25.27</b>	<b>24.17</b>
<b>Southern Region</b>			
1) Huila Area	0.64	0.85	1.14
2) Tello	0.35	0.35	0.26
3) Other	0.03	0.03	0.04
<b>Total Southern Region</b>	<b>1.02</b>	<b>1.23</b>	<b>1.44</b>
<b>Associated Operations</b>			
1) Guajira	33.34	42.71	50.11
2) Cusiana <sup>(1)</sup>	12.65	27.03	26.53
3) Other	11.10	13.47	11.87
<b>Total Associated Operations</b>	<b>57.09</b>	<b>83.21</b>	<b>88.51</b>
<b>Total Natural Gas Production (Colombia)</b>	<b>115.99</b>	<b>121.17</b>	<b>125.37</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 became a part of the Orinoquia Region.

*Projects to Increase Recovery Factor:*

During 2016 Ecopetrol prioritized opportunities within its recovery factor increase program, keeping 18 active pilots in operation and developing a new additional one. From the current pilots, 12 have already presented an increase in production within the area impacted by the pilot.



Among the main results of the pilots in 2016, it is important to highlight the positive results of the water flooding pilots in the heavy crude fields of Castilla and Chichimene. These fields reported a growth in the recovery factor of 5.2% in the pilot area of Chichimene field and 2.5% in the pilot area of Castilla field. Also in 2016, we continued the evaluation of steam injection pilots in the Jazmin and Teca projects, with participation from partners, located in the Middle Magdalena Valley, where we also obtained positive responses in terms of production.

In the air injection pilot at Chichimene field, a detailed revision of the scope and of the works required was carried out due to the drop in global oil prices. During 2017, additional works will be completed and it is expected that the start of the injection will take place in the last quarter of 2017.

Since the beginning of the recovery factor increase program, we have started 34 recovery pilots, of which 24 have shown positive results in terms of pressure increase and 19 in incremental crude production.

#### 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, 2016, 2015 and 2014.

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

	For the year ended December 31,		
	2016	2015	2014
	(number of wells)		
<b>COLOMBIA</b>			
<b>Central Region</b>			
Gross wells owned and operated by Ecopetrol	-	79	104
<b>Orinoquía Region</b>			
Gross wells owned and operated by Ecopetrol	47	109	65
<b>Southern Region</b>			
Gross wells owned and operated by Ecopetrol	-	21	8
<b>Eastern Region</b>			
Gross wells owned and operated by Ecopetrol	36	-	-
<b>Total gross wells owned and operated by Ecopetrol S.A. in Colombia</b>	<b>83</b>	<b>209</b>	<b>177</b>
<b>Associated Operations</b>			
Gross wells in joint ventures	50	330	584
Net wells <sup>(1)</sup>	19	146	374
<b>Total gross wells in joint ventures Ecopetrol S.A. in Colombia</b>	<b>50</b>	<b>330</b>	<b>584</b>
<b>Total net wells in joint ventures Ecopetrol S.A. in Colombia<sup>(1)</sup></b>	<b>19</b>	<b>146</b>	<b>374</b>
<b>Total gross wells Ecopetrol S.A. in Colombia</b>	<b>133</b>	<b>539</b>	<b>761</b>
<b>Total net wells Ecopetrol S.A. in Colombia<sup>(1)</sup></b>	<b>102</b>	<b>355</b>	<b>551</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.

*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, 2016.

**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, 2016 ( acres)			
	Developed		Undeveloped	
	Gross	Net	Gross	Net
Ecopetrol S.A.	448,782	343,233	5,040,681	3,679,116

*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, 2016.

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

	As of December 31, 2016 (number of wells)			
	Crude Oil <sup>(1)</sup>		Natural Gas <sup>(2)</sup>	
	Gross	Net	Gross	Net
<b>COLOMBIA</b>				
<b>Ecopetrol S.A.</b>				
Central region	2,286	1,807	9	9
Orinoquía region	952	946	17	17
Southern region	583	520	6	6
Eastern Region	780	780	0	0
Region of Associated Operations	2,829	1,425	27	10
<b>Total (Ecopetrol S.A.)</b>	<b>7,430</b>	<b>5,478</b>	<b>59</b>	<b>42</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.

**3.4.2.1.2. *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,		
	2016	2015	2014
	(thousand bpd)		
<b>Hocol</b>			
Joint venture operation	2.6	2.1	2.5
Direct operation	15.4	19.3	18.8
<b>Total Hocol</b>	<b>18.0</b>	<b>21.4</b>	<b>21.3</b>
<b>Equion</b>			
Joint venture operation	0.1	–	–
Direct operation	12.3	11.6	10.0
<b>Total Equion</b>	<b>12.4</b>	<b>11.6</b>	<b>10.0</b>
<b>Production Tests</b>	<b>–</b>	<b>–</b>	<b>–</b>
<b>Total Average Daily Crude Oil Production (Subsidiaries in Colombia)</b>	<b>30.4</b>	<b>33</b>	<b>31.3</b>

The 15.4% decrease in Hocol's production in 2016 as compared to 2015 was mainly due to the temporary closure of the fields Guarrojo, Ortega, Toldado, Toy, Quimbaya and Puli as a result of community blockages and governmental resolutions (Constitutional Court) which were lifted afterwards.

The 7% increase in Equion's production in 2016 as compared to 2015 was mainly due to the start of production of a new well and the increase of three wells previously drilled as a result of specific interventions.

#### 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,		
	2016	2015	2014
	(thousand boepd) <sup>(1)</sup>		
<b>Hocol</b>			
Joint venture operation	0.2	–	–
Direct operation	0.6	0.2	0.1
<b>Total Hocol</b>	<b>0.8</b>	<b>0.2</b>	<b>0.1</b>
<b>Equion</b>			
Joint venture operation	0.1	–	–
Direct operation	6.4	9	7.8
<b>Total Equion</b>	<b>6.5</b>	<b>9</b>	<b>7.8</b>
<b>Production Tests</b>	<b>–</b>	<b>–</b>	<b>–</b>
<b>Total Natural Gas Production (Subsidiaries in Colombia)</b>	<b>7.3</b>	<b>9.2</b>	<b>7.9</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,		
	2016	2015	2014
	(number of wells)		
<b>Hocol</b>			
Gross wells owned and operated by Hocol	9	13	16
Gross wells in joint ventures	–	1	6
Net wells <sup>(1)</sup>	9	13	17
<b>Equion</b>			
Gross wells owned and operated by Equion <sup>(2)</sup>	–	–	–
Gross wells in joint ventures	1	5	2
Net wells <sup>(1)</sup>	–	1	1
<b>Total gross wells owned and operated in Colombia</b>	<b>9</b>	<b>13</b>	<b>16</b>
<b>Total gross wells in joint ventures in Colombia</b>	<b>1</b>	<b>6</b>	<b>8</b>
<b>Total net wells (Subsidiaries in Colombia)</b>	<b>9</b>	<b>14</b>	<b>18</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, 2016.

**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, 2016			
	Developed		Undeveloped	
	Gross	Net	Gross	Net
	(in acres)			
Hocol	18,787.4	8,547.0	346.8	329.6
Equion	20,867.4	5,269.0	84,826.9	19,853.0
<b>Total (Subsidiaries in Colombia)</b>	<b>39,654.8</b>	<b>13,816.0</b>	<b>85,173.7</b>	<b>20,182.6</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, 2016. 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. Information in the table below reflects productive wells that directly contribute to hydrocarbons production and therefore excludes wells used for injection, disposal, water abstraction, or other similar activities.

**Table 17 – Ecopetrol S.A.'s Subsidiaries in Colombia Gross and Net Productive Wells**

	For the year ended December 31, 2016			
	Crude Oil		Natural Gas	
	Gross	Net	Gross	Net
	(number of wells)			
Hocol	231	163.9	5	4.5
Equion	22	11	22	11
<b>Total (Subsidiaries in Colombia)</b>	<b>253</b>	<b>174.9</b>	<b>27</b>	<b>15.5</b>

### 3.4.2.2 *Production Activities Outside Colombia*

#### *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,		
	2016	2015	2014
	(thousand bpd)		
Savia Perú	4.1	4.8	5.9
Ecopetrol America Inc.	5.5	2.5	2.6
<b>Total average daily crude oil production (International)</b>	<b>9.6</b>	<b>7.3</b>	<b>8.5</b>

#### *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,		
	2016	2015	2014
	(thousand boepd)		
Savia Perú	1.3	1.2	0.5
Ecopetrol America Inc.	1.2	2.6	2.1
<b>Total average daily natural gas production (International)</b>	<b>2.5</b>	<b>3.8</b>	<b>2.6</b>

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

**Table 20 – Ecopetrol S.A.’s Subsidiaries Outside Colombia Gross and Net Development Wells**

	For the year ended December 31,		
	2016	2015	2014
	(number of wells)		
<b>Savia Perú</b>			
Gross wells	-	-	13
Net wells <sup>(1)</sup>	-	-	6.5
<b>Ecopetrol America Inc.</b>			
Gross wells	3	2	-
Net wells <sup>(1)</sup>	0.7	0.4	-
<b>Total gross wells (International)</b>	<b>3</b>	<b>2</b>	<b>13</b>
<b>Total net wells (International)</b>	<b>0.7</b>	<b>0.4</b>	<b>6.5</b>

(1) 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, 2016.

**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, 2016			
	Developed		Undeveloped	
	Gross	Net	Gross	Net
	(in acres)			
Savia Perú	137,246	79,575	57,671	0
Ecopetrol America Inc. <sup>(1)</sup>	49,680	10,645	18,261	5,736
<b>Total (International)</b>	<b>186,926</b>	<b>90,220</b>	<b>75,932</b>	<b>5,736</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 six blocks, five of which are held by production. For Gunflint, there are four blocks in production.

*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, 2016.

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

	As of December 31, 2016	
	Crude Oil	
	Gross	Net
	(number of wells)	
<b>INTERNATIONAL</b>		
Savia Perú	639	320
Ecopetrol America Inc.	14	2.4
<b>Total (International)</b>	<b>653</b>	<b>322.4</b>

**3.4.2.3 *Marketing of Crude Oil, Natural Gas and Refined Products***

In 2016, Ecopetrol sold 962.5 mboepd, out of which 449.7 mbopd represented sales of crude oil (46.7%), 77.8 mboepd natural gas (8.1%) and 435.0 mboepd of fuels and petrochemicals (45.2%).

*Crude Oil Export Sales*

Export sales of crude oil in 2016 decreased by 101 mbopd as compared to 2015 primarily due to the crude Castilla blend and the Vasconia Norte blend being used as part of the slate for Reficar and therefore not available for exporting activities. Ecopetrol’s crude oil export sales are traded both in the spot and contract markets, primarily to refiners in the United States, Asia, Europe, Central America and the Caribbean.

The Castilla blend is the principal type of crude oil for foreign sales, with 330.8 mbopd sold during 2016 (a 74% share of our crude oil basket) followed by the Vasconia Norte with 32.3 mbopd (an 7% share in our crude oil basket) and the Magdalena blend with 24 mbopd (a 5% share of our crude oil basket).

A market diversification strategy has allowed Ecopetrol to shift towards markets where it captures a better value for its crudes. The United States, Europe, Central America and Caribbean were destinations that showed an increase in our crude oil export volume, from 67% of total export sales in 2015 to 81% of total export sales in 2016. In contrast, other destinations, such as Asia, experienced a decrease in volume mainly due to: (i) larger supply coming into this market from the Middle East and (ii) more opportunities for Ecopetrol S.A. to sell in the United States because of the interest of refiners in imported crude.

### Crude Oil Purchase Contracts

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

The term of some of our purchase contracts is linked to the term of the exploration and production contracts signed with our business partners. Other clauses of the contracts such as price and place of delivery vary and may be subject to renegotiation during the term of the contract. Certain purchase contracts not linked to joint venture agreements may be extended and renegotiated by the parties.

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 corresponding to royalties for the years ended December 31, 2016, 2015 and 2014.

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

	For the year ended December 31,		
	2016	2015	2014
<b>Ecopetrol Corporate Group</b>		(million barrels)	
Crude oil purchased from the ANH	42.9	45.6	45.4
Crude oil purchased from third parties	15.5	15.6	20.9
Crude oil imported from third parties	22	1.8	-

### Import of Diluents

In 2016, Ecopetrol decreased by 12.3% (7.9 mboepd) the imports of diluents used to allow our heavy crudes to be pumped through pipelines, as compared to 2015, due to an increase in the viscosity specifications in the transport of heavy crude oil.

### 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, for compressed natural gas for vehicles and to industries in Colombia. We also market and sell natural gas to the industrial sector and to gas-fired and combined cycle power plants.

Despite higher demand by thermal power plants due to “El Niño” climate phenomenon, Ecopetrol's natural gas sales decreased 15.9% (14.7 mboepd) as compared to 2015 due to the decline of production at the Guajira field, restrictions on transporting natural gas by pipeline to dispatch natural gas from fields found in the inner part of Colombia and the decrease in consumption of the industrial and vehicular sectors. Our market share in 2016 was 64% as compared to 63% in 2015.

### 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,			
	2017	2018	2019	2020
	(gbtud)			
Volume for sales third parties	475.2	464.2	246.2	190.2
Volume for self-consumption	224.4	231.4	225.4	265.4
<b>Total Commitments</b>	<b>699.6</b>	<b>695.6</b>	<b>471.6</b>	<b>455.6</b>

Neither Ecopetrol America, Equion nor Savia Peru are included in the table above since they do not consolidate within Ecopetrol Group. In respect of Ecopetrol America Inc., it does not have any natural gas delivery or supply commitments.

#### *Refined Products*

Domestic sales of refined products increased by 3.6 mboepd, an increase of 1.2% compared with 2015. This increase is primarily the result of: (i) a 10%, or 10.2 mboepd, increase in gasoline sales mainly due to a 13% decrease in gasoline prices as compared to 2015 and less production of ethanol for blending, (ii) a 5%, or 1.3 mboepd increase, in fuel sales mainly due to a 5% increase in the number of passengers transported as compared to 2015 and a 2% increase in air freight as compared to 2015, (iii) a 28%, or 1.3 mboepd, increase in fuel oil sales mainly as a result of new contracts and higher domestic fuel sales at Reficar, and (iv) a 1.9%, or 0.3 mboepd, increase in LPG sales mainly due to an increase in production at Reficar. These increases were partially offset by a 6%, or 7.5 mboepd, decrease in diesel sales mainly due to the freight land transportation strike in June and July 2016 and lower than expected economic growth.

Exports of products increased by 93.7% as compared to 2015, due to 74 mboepd increase by Reficar mainly due to: (i) the finalization of the entire expansion and modernization project, followed by the startup process completed in July 2016, thereby advancing to the stabilization phase, and (ii) an increase in Propilco's exports of close to 0.6 mboepd in 2016 (9.9 mboepd vs. 9.3 mboepd of 2015). This increase was partially offset by a decrease in fuel oil exports by 6 mboepd, or 10%, due to lower fuel oil production in the Barrancabermeja Refinery.

In addition, local sales of petrochemicals (included in domestic sales of products) decreased as compared to the previous year (19.2 mboepd in 2016 compared with 21.7 mboepd in 2015), due to a decrease in asphalt and aromatic solvents sales by Ecopetrol S.A. and a decrease in Propilco's sales.

#### **3.4.3 Reserves**

The reserves audit 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, 2016, 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, 2016, 2015 and 2014.

**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, 2014	967	2	10	979
At December 31, 2015	849	3	6	858
At December 31, 2016	710	6	7	723
<b>Net Proved Developed NGL reserves in million barrels oil equivalent</b>				
At December 31, 2014	62	0	1	63
At December 31, 2015	54	0	1	55
At December 31, 2016	55	0	1	56
<b>Net Proved Developed gas reserves in billion standard cubic feet</b>				
At December 31, 2014	3,260	14	9	3,284
At December 31, 2015	3,156	16	5	3,176
At December 31, 2016	3,114	9	8	3,131
<b>Net Proved Developed oil, NGL and gas reserves in million barrels oil equivalent</b>				
At December 31, 2014	1,602	5	12	1,618
At December 31, 2015	1,457	5	7	1,470
At December 31, 2016	1,311	8	10	1,329

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 Cusiana, Cupiagua, Pauto, Chuchupa, Gibraltar, and Ballena.

The Ministry of Mines and Energy is responsible for reviewing and approving the design of and tracks for crude oil pipelines in Colombia. The Ministry of Mines and Energy establishes transportation rates based on information provided by the service suppliers, with the tariffs based on the principle of cost recovery plus a reasonable rate of return.

In prior filings, Ecopetrol has used the tariffs set by the Ministry of Mines and Energy as transportation cost to be deducted from the crude benchmark price for the purpose of evaluating the economic production, economic life and reserves of Colombian assets.

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 this annual report, 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 234 billion standard cubic feet of fuel gas within our natural gas results and 671 billion cubic feet of royalties, as of December 31, 2016.

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

Reserves Category	Oil (million barrels)	NGL (million barrels)	Natural Gas (bcf)	Total Oil and Gas (Mmboe)
<b>PROVED DEVELOPED RESERVES</b>				
Total (Colombia)	710	55	3,114	1,311
International:				
North America	6	0	9	8
South America	7	1	8	10
<b>TOTAL PROVED DEVELOPED RESERVES</b>	<b>723</b>	<b>56</b>	<b>3,131</b>	<b>1,329</b>
<b>PROVED UNDEVELOPED RESERVES</b>				
Total (Colombia)	238	13	85	266
International:				
North America	3	0	2	3
South America	0	0	0	0
<b>TOTAL PROVED UNDEVELOPED RESERVES</b>	<b>241</b>	<b>13</b>	<b>87</b>	<b>269</b>
<b>TOTAL PROVED RESERVES</b>	<b>964</b>	<b>69</b>	<b>3,218</b>	<b>1,598</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 2016, 2015 and 2014.

#### Changes in Proved Reserves

**Table 27 – Changes in Proved Reserves**

	As of December 31,		
	2016	2015	2014
<i>Consolidated Company (million barrels oil equivalent)</i>			
Revisions of previous estimates	(54)	(25)	270
Improved Recovery	11	16	34
Extensions and discoveries	27	24	51
<b>Total reserves additions</b>	<b>(16)</b>	<b>16</b>	<b>355</b>
Production	(235)	(251)	(243)
<b>Net change in proved reserves</b>	<b>(251)</b>	<b>(235)</b>	<b>112</b>

The reserves replacement ratio for 2016 was (0.07) compared to 0.06 in 2015. The average replacement ratio for the last three years was 0.48.

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

	As of December 31,		
	2016	2015	2014
Annual	(0.07)	0.06	1.46
Three year average	0.48	0.97	1.31

### Revisions of Previous Estimates

In 2016, revisions reduced reserves by 54 million boe, mainly as a result of:

- (i) A decrease of 157 million boe, due to: (i) economic factors, primarily the decrease in oil prices, leading to a 114 million boe decrease in reserves (the ICE Brent crude price was 20% lower in 2016 as compared to 2015, which resulted in the lowering of economic limits in some of our fields) and (ii) our portfolio of projects decreased by 43 million boe.
- (ii) An increase of 27 million boe due to: (i) 19 million boe increase at the Palagua-Caipal fields, given the execution of the Company's plan to perform additional drilling activities in order to cover new proved area, and (ii) the development projects in the Guatiquia, Ocelote, Provincia, Quifa and Dalmatian fields that increased reserves by 8 million boe.
- (iii) An increase of 25 million boe, as a result of change in the percent of royalties collected from the drilling project at the Rubiales field.
- (iv) An estimated 53 million boe increase given that Ecopetrol is using real transportation costs in this annual report as opposed to the tariff established by the Ministry of Mines and Energy.

### Improved Recovery

In 2016, improved recovery increased reserves by 11 million boe. The additions were associated with the continued development of water flood projects through existing wells, although additional drilling may be required to fully optimize the development configuration. The main additions were in La Cira-Infantas, Chichimene, Casabe and Yarigui fields, which collectively accounted for an 8 million boe increase.

### Extensions and Discoveries

Extensions and discoveries during 2016 amounted to 27 million boe, which is comprised of 25 million boe of extensions of proved acreage and 2 million boe from newly discovered fields and reservoirs. The newly discovered fields in Colombia corresponded to the Bayonero and Oripaya fields, and new reservoirs were discovered in Coren, Corocora Sur and Cravo Este. The extensions of proved acreage resulted mainly from activities in new proved areas in the Castilla, Chichimene, Gibraltar, Pauto and Rubiales fields, which accounted for 20 million boe of the total of 25 million boe from extensions of proved acreage. The remaining 5 million boe corresponds to smaller changes in several other fields.

### Development of reserves

As of December 31, 2016, our total proved undeveloped oil and gas reserves amounted to 269 million boe, 27% of which are related to the drilling activities in Area Castilla and 25% to the development activities in Rubiales field. The Cupiagua, Palagua, Pauto, Quifa, and Yarigui fields collectively accounted for 27% of total proved undeveloped oil and gas reserves with the remaining 21% from several other fields.

Our proved undeveloped reserves represent 17% 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**

Proved Reserves as of December 31,	Oil Mmbls	NGL Mmbls	Gas Bcf	Total Mmboe
<b>2016 proved reserves</b>				
Developed	723	56	3,131	1,329
Undeveloped	241	13	87	269
<b>2015 proved reserves</b>				
Developed	858	55	3,176	1,470
Undeveloped	308	18	303	379
<b>2014 proved reserves</b>				
Developed	979	63	3,284	1,618
Undeveloped	405	18	245	466

Of the total amount of proved undeveloped reserves that Ecopetrol had at the end of 2015 (379 million boe), we converted approximately 68 million boe, or 18%, to proved developed reserves during 2016, primarily associated with the development of crude oil and gas projects in the Castilla, Pauto, Mamey, Bonga and Gunflint fields. These projects accounted for approximately 84% of the total conversion while the remaining 16% is associated with development execution in other fields such as the Quifa and Rubiales fields, among others. The amount of investments made during 2016 to convert proved undeveloped reserves to proved developed reserves was US\$709 million.

*Changes in Undeveloped Proved Reserves*

The following table reflects the main changes in undeveloped proved reserves during 2016.

**Table 30 – Changes in Undeveloped Proved Reserves in 2016**

<i>Consolidated Companies</i> <i>(million barrels oil equivalent)</i>	
Revisions of previous estimates	(60.4)
Improved recovery	7.1
Extensions and discoveries	11.8
Proved Undeveloped converted to Proved Developed	(68.4)
Net change in unproved reserves	(109.9)

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

*Reserve Estimation Process*

Ecopetrol's reserves process is supervised and coordinated by the Corporate Reserves Director, a highly experienced geologist and engineer, who reports to the Chief Financial Officer. The reserves audit group is comprised of reserves coordinators who are geologist and petroleum engineers, each with more than 10 years of experience in reservoir characterization, field development, estimation and reporting of reserves and who have supervision and supporting responsibilities over the professionals involved in the estimation and reporting process.

Reserves are first estimated internally, supervised and coordinated by the Corporate Manager of Reservoirs, a geologist who holds a Master's degree in geology and has more than 20 years of experience in projects associated with reservoir characterization and development, estimation, and reporting of reserves. The employees involved in the reserves process meet the Society of Petroleum Engineers qualifications for reserves estimators. Internally estimated reserves are submitted to an external audit process, which was conducted by the external engineers (Ryder Scott and DeGolyer and MacNaughton). According to our corporate policy, we report the reserves values obtained from the external engineers, even if they are lower than our internal estimated reserves.

The reserves estimation process ends when the Corporate Reserves Director consolidates the results and presents them to the Reserves Committee, which is composed of the Chief Financial Officer and the Vice-President of Development and Production. Results are presented to the Audit Committee of the Board of Directors and finally approved by the Board of Directors.

Petroleum engineering consultants DeGolyer and MacNaughton and Ryder Scott have audited Ecopetrol's proved reserves as of December 31, 2016. These external engineers audited 99% of our estimated net proved reserves. The reserves reports of the external engineers are included as exhibits to this annual report. The external engineers DeGolyer and MacNaughton and Ryder Scott audited 99% of our estimated net proved reserves for the year ended December 31, 2015 and 2014.

Ecopetrol uses deterministic methods that 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, 2014 through 2016, and the changes therein.

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

Consolidated companies	Colombia	North America	South America excluding Colombia	Total
	Net proved oil, NGL and gas reserves in Mmboe			
Revisions	264.7	1.7	4.0	270.4
Purchase of Minerals	0.0	0.0	0.0	0.0
Improved Recovery	34.1	0.0	0.0	34.1
Extensions and discoveries	50.1	0.8	0.0	50.9
Sales	0.0	0.0	0.0	0.0
Production	(239.6)	(1.5)	(2.0)	(243)
At December 31, 2014	2,043	18	23	2,084
Revisions	(14.8)	(2.8)	(7.1)	(24.7)
Purchase of Minerals	0.0	0.0	0.0	0.0
Improved Recovery	15.8	0.0	0.0	15.8
Extensions and discoveries	24.4	0.0	0.0	24.4
Sales	0.0	0.0	0.0	0.0
Production	(247.5)	(1.4)	(1.8)	(250.7)
At December 31, 2015	1,821	14	14	1,849
Revisions	(51)	(0.7)	(2.5)	(54)
Improved Recovery	11	0	0	11
Extensions and discoveries	27	0	0	27
Production	(231)	(2.3)	(1.7)	(235)
At December 31, 2016	1,577	11	10	1,598

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, 2016:

### **Association Contract**

Created by the Decree 2310 of 1974, the purpose of this contract 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 and La Cira) 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 incremental 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 fields' production as specified in the contract. This type of contract has a ten-year term calculated as 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.

### **Operation for Risk Production Contracts for Discovered Undeveloped and Inactive Fields (Second Round 2005)**

The contracts awarded in the second round of undeveloped and inactive discovered fields are service contracts wherein services rendered are payable with a percentage of the production. Ecopetrol S.A. keeps all rights to explore and exploit hydrocarbons found in the area.

These contracts have a 10 year term, including an evaluation period of 8 months, within which the operator has to comply with a minimum commitment to conduct a technical evaluation of the field at its own risk.

The facilities built during the term of the contract, other than facilities associated with drilled wells, will be owned by the operator, who will remain responsible for them, even after contract ends. Only drilled wells become property of Ecopetrol S.A. upon the contract's termination.

### **Risk Participation Contract**

The purpose of this contract is the exploration of the contracted area, and the exploitation of the oil found in the contracted area. Unlike in the association contract, Ecopetrol S.A. shares exploratory risks and costs with the contractual partner, the associate, together with the oil produced, in the proportions established by the contract.

Risk participation contracts provide for an executive committee which is created upon the execution of the contract.

These contracts have a 28 year term, including an exploratory period of six years (which period is extendible under certain contracts for one or two years), after which the exploitation period commences.

### **Special Contracts**

We are party to a Joint Venture Contract for Exploration and Exploitation of "La Cira-Infantas" 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 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-Cocomá 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 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 Sureco 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 development of 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 Sureco 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 at the time when ANH was created and Ecopetrol retains the authority to execute agreements with respect to all areas that it held as of January 1, 2004 when the ANH was created.

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 to 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 received a percentage of oil revenues in two cases: (i) when the international oil prices rose 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, and not only in the extension phase of the contract as mentioned in the previous paragraph, in addition to 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 above-mentioned 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 years 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**

### **3.5.1.1 Transportation Activities**

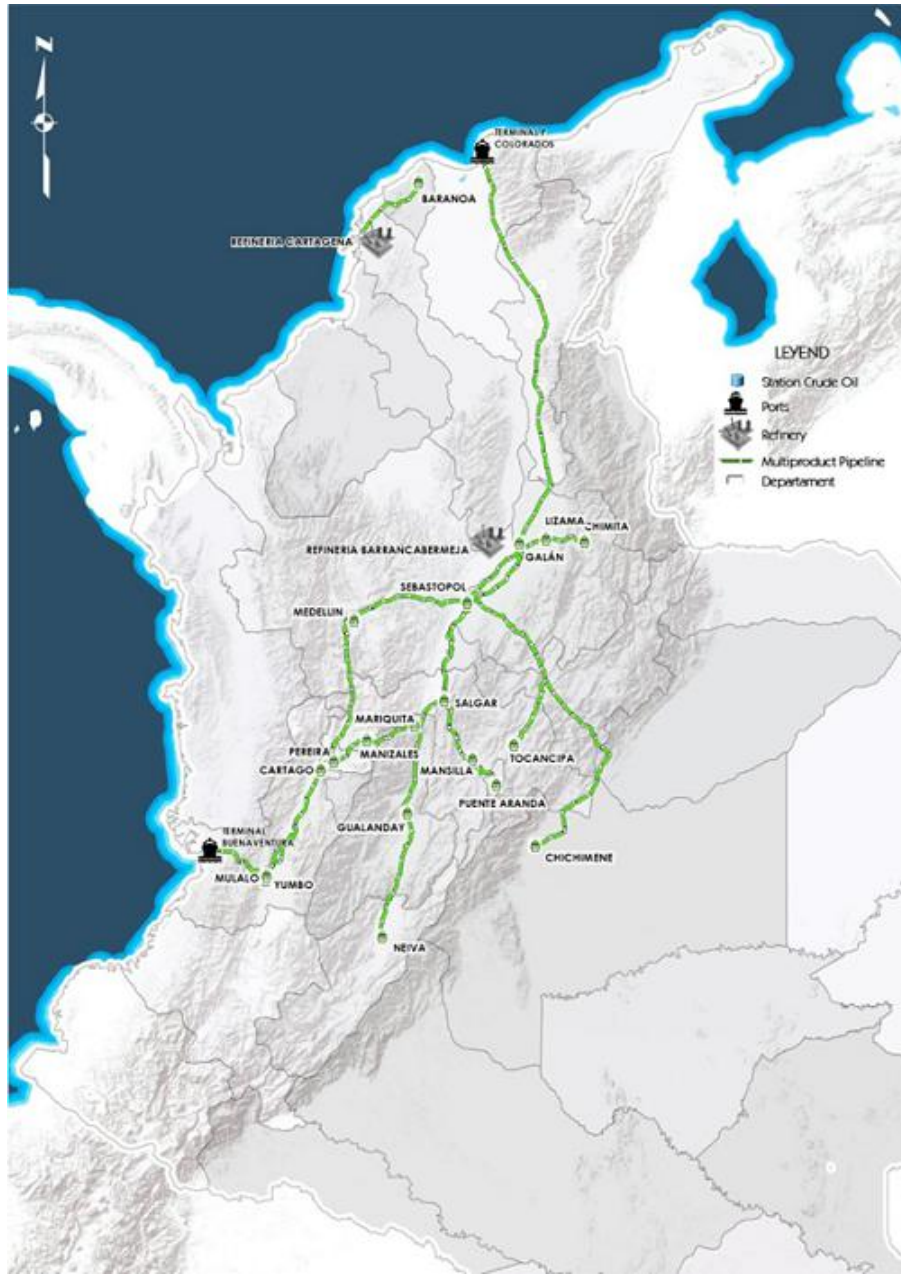
The transportation and logistics segment includes the transportation of crude oil, motor fuels, fuel oil and other refined products including diesel and biofuels. We conduct most of these activities through our wholly-owned subsidiary Cenit and its subsidiaries.

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,		
	2016	2015	2014
	(thousand bpd)		
Crude oil transport <sup>(1)</sup>	867	978	954
Refined products transport <sup>(2)</sup>	263	254	251
<b>Total</b>	<b>1,130</b>	<b>1,232</b>	<b>1,205</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 decreased in 2016 by 11% compared to the previous year. This decrease was mainly the result of lower production volumes in Colombia and impacted most of our crude oil pipelines. Of the total volume of crude transported by oil pipeline, approximately 68% belonged to Ecopetrol's corporate group.

The volume of refined products transported by Cenit increased by 4% in 2016 mainly due to a higher volume of products transported through the Galan – Sebastopol system to fulfill the demand in the central region. Of the total volume of refined products transported in multi-purpose pipelines during the year, 20% belonged to Ecopetrol's corporate group.

#### *Transportation Capacity*

During 2016, we increased the capacity of our primary and secondary oil pipelines and loading facilities due to the reversion of the Ayacucho-Galan 14" system. Meanwhile, our main expansion projects are under way with our main focus being to perform the adjustments to our infrastructure to allow the transportation of heavier crude oil. Our main crude oil pipeline systems' operating capacity increased from 1,336,000 bpd in 2015 to 1,369,000 bpd in 2016.

Our main refined products pipeline transportation capacity decreased from 529 thousand bpd in 2015 to 515 thousand bpd in 2016. This decrease in capacity was primarily the result of a reduction in the utilization of drag reducer agent (DRA) in our Galan – Sebastopol 12" system and the transportation of three refined products (naphtha, gasoline and diesel) in our Pozos Colorados – Galan system instead of the two refined products (naphtha and diesel) transported in 2015.

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 Barrancabermeja Refinery 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 our Galan-Sebastopol, Galan-Bucaramanga, Cartagena-Baranoa, Pozos Colorados-Galan and Buenaventura-Yumbo systems.

#### **3.5.1.2 Pipelines**

As of December 31, 2016, 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 49% 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 81% of the oil pipeline shipping capacity in Colombia. By December 31, 2016, our network of crude oil and multipurpose pipelines was approximately 8,860 kilometers in length. The transportation network consists of approximately 5,146 kilometers of main crude terminals and oil pipeline networks connecting various fields to the Barrancabermeja Refinery and Reficar, as well as to export facilities. We also own 3,714 kilometers of multipurpose pipelines for transportation of refined products from the Barrancabermeja Refinery and from Reficar to major distribution points. Out of the 5,146 kilometers of crude oil pipelines, owned by us, 2,985 kilometers of crude oil pipeline are wholly owned and 2,161 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, 2016.

**Table 33 – Our Main Pipelines**

Pipeline	Kilometers	Capacity (mbd)	Product Transported	Origin	Destination	Indirect Ownership Percentage
Caño Limón-Coveñas	771	250	Crude Oil	Caño Limón	Coveñas	100.00%
Oleoducto de Alto Magdalena (OAM)	391	110	Crude Oil	Tenay	Vasconia	87.29%
Oleoducto de Colombia (ODC)	483	236	Crude Oil	Vasconia	Coveñas	73.00%
Oleoducto Central –Ocensa (*Segment 2)	836	616*	Crude Oil	Cupiagua	Coveñas	72.65%
Oleoducto de los Llanos (ODL)	260	340	Crude Oil	East fields	Monterrey	65.00%
Oleoducto Bicentenario de Colombia	230	110 <sup>(1)</sup>	Crude Oil	Araguaney	Banadia	55.97%

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

As of December 31, 2016 we owned 68 stations, 34 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, 2016, we had a nominal storage capacity associated with the transportation network of 16 million barrels of crude oil and 4 million barrels of refined products. We do not own any tankers.

#### Pipeline Projects SAN FERNANDO – MONTERREY

The San Fernando – Monterrey project's objectives include ensuring the ability to transport 300,000 bpd 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" 171 km crude oil pipeline, a receipt, storage and pumping station, and the reversion/conversion of the existing pipeline of 16" between the Castilla II plant and the Apiay station in order to transport diluent (naphtha) from the Apiay station to the Castilla II plant.

As a result of the evaluations we made and due to the reduction in production forecasts, the scope of the project was modified and the transportation capacity was reduced from 390,000 bpd to 300,000 bpd from the San Fernando station to the Monterrey station.

During 2016 progress was achieved on construction of the San Fernando station, especially with regards to the assembly of the pumping system units. We completed the construction of the lines between San Fernando and Apiay, and the branch lines between San Fernando and the Castilla and Chichimene stations. By the end of the first quarter of 2017 the filling of tanks and lines and the testing of main pumping units had been completed.

#### OCENSA (P135)

The OCENSA P135 project's main objective is to increase the pipeline transportation capacity by 135,000 bpd. The project involves improving the pumping system and increasing the storage capacity. The main project activities were completed at the end of December 2016 and the shippers were notified of such completion by Ocensa. Before commencing operations, Ocensa is expecting the ruling required by the Colombian Ministry of Mines and Energy.

## OLEODUCTO AL PACIFICO SAS

Cenit is participating in the Oleoducto al Pacifico SAS, led by Enbridge, which intends to transport heavy crude oil to the Colombian Pacific coast. In 2015, the scope of work was focused on reviewing the business case for the development of the project, conducting advance prior consultations with communities along the rights of way, negotiating project governance matters and reviewing regulatory, commercial and technical issues.

Due to the environment of the oil industry and uncertainty about future volume of oil production in Colombia, the project continuity is under review and it was put on hold.

## TRANSPORTATION OF HIGHER VISCOSITY CRUDES

In 2016 crude was transported at viscosities greater than 405 cSt on the principal systems, particularly at Ocesa, where since the last quarter of 2016 there has been the ability to transport crudes at viscosities of up to 600 cSt.

Adaptations were also made to one of the single buoy moorings of the Coveñas terminal to permit the importation of naphtha for dilution at this terminal. Integral capacity tests are scheduled to be executed in 2017 for the transport of crude with this viscosity, and transport is expected to begin in the second quarter of 2017.

The main modifications are on: the ODL pipeline (Oleoducto de los Llanos; Rubiales – Cusiana), on Ocesa Segment 1 (Cusiana – Porvenir), Segments 2 & 3 (El Porvenir – Vasconia – Coveñas) and on the Oleoducto de Colombia Pipeline (ODC – Oleoducto de Colombia). This project, combined with the expansion of capacity on Ocesa (P-135), will make it possible to transport higher viscosity crudes.

### **3.5.1.3 Export and Import Facilities**

We currently have concessions granted by the Nation 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 reached 0.18 million bpd.

Our crude oil loading facilities can load tankers of up to 350 thousand deadweight tonnage (DWT). Adjacent to these loading facilities we also have crude oil storage facilities that are capable of storing 9 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 1.2 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 in pipelines or in tanker trucks because of capacity limitation is transported by barges. During 2016, 22.9 million barrels of crude oil and refined products were transported by tanker trucks and 7.9 million barrels of crude oil and refined products were transported by barges, particularly using the Rio Magdalena, 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 (73% of revenues), followed by the refined products pipeline transport (17% of revenues) and ports and related services (8% 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., Metapetroleum Corp., Petrominerales, Occidental de Colombia, Mansarovar and Gran Tierra, who collectively represented 92% of this business segment's revenues in 2016. Transportation services for crude oil provided to Ecopetrol S.A. represented 60% 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 41% of refined products pipeline transport revenues in 2016, principally due to the transport of naphtha. Cenit also has 15 other fuel wholesalers' customers for whom it transports other refined products. The most significant of these customers are Organizacion Terpel, ExxonMobil, Chevron Petroleum Company, Biocombustibles and Petrobras Colombia.

Deregulated businesses such as ports and crude loading facilities represent a smaller portion of Cenit's revenue (8% in 2016). Clients for these businesses include some of the same parties for which Cenit provides crude oil and refined products transportation services.

### 3.6 Refining and Petrochemicals

#### 3.6.1 Refining

Our main refineries are: (i) the Barrancabermeja Refinery, which Ecopetrol S.A. directly owns and operates, and (ii) Reficar Refinery, located in the free trade zone in Cartagena, which is 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 the products are for local on-site consumption.

These refineries produce a full range of refined products, including gasoline, diesel, jet fuel, liquefied petroleum gas (LPG), and heavy fuel oils, among others.

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

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

	For the year ended December 31,								
	2016			2015			2014		
	Capacity (bpd)	Through- put (bpd)	% Use	Capacity (bpd)	Through- put (bpd)	% Use	Capacity (bpd)	Through- put (bpd)	% Use
Barrancabermeja	250,000	213,091	85%	250,000	221,900	89%	250,000	226,900	91%
Reficar <sup>(1)</sup>	150,000	117,188	78%	165,000 <sup>(3)</sup>	10,428	6%	80,000	10,420	13%
Apiay <sup>(2)</sup>	2,500	1,382	55%	2,500	1,604	64%	2,500	1,380	55%
Orito <sup>(2)</sup>	2,500	1,090	44%	2,500	929	37%	2,500	1,784	71%
<b>Total</b>	<b>405,000</b>	<b>332,751</b>	<b>82%</b>	<b>420,000</b>	<b>234,861</b>	<b>56%</b>	<b>335,000</b>	<b>240,484</b>	<b>72%</b>

(1) Reficar operations were shut down in March 2014 to enable the completion of the expansion and modernization project. The new crude unit began start-up process in October 2015. During 2016, Reficar was under stabilization, with full operation in July 2016. The refinery's design capacity, tested in 2016, is 150 thousand barrels per day.

(2) Apiay and Orito are considered to be part of the upstream segment, not the refining segment, and the majority of products are for local on-site consumption.

(3) The capacity indicated in 2015 was 165 thousand barrels per day which includes a design safety factor of 10%.

#### 3.6.1.1 Barrancabermeja Refinery

The Barrancabermeja Refinery supplies 73.8% of the fuels consumed in Colombia according to internal calculations made by the Barrancabermeja Refinery and Colombia's fuels consumption reported by the Ministry of Finance.

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

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

	For the year ended December 31,		
	2016	2015 (bpd)	2014
LPG, Propylene and Butane	11,956	13,623	13,834
Gasoline Fuels and Naphtha	59,305	59,487	68,914
Diesel	48,233	46,212	44,273
Jet Fuel and Kerosene	20,435	22,388	23,227
Fuel Oil	55,730	64,306	66,928
Lube Base Oils and Waxes	668	521	1,103
Aromatics and Solvents	2,879	3,197	2,640
Asphalts and Aromatic Tar	14,092	9,519	7,501
Polyethylene, Sulfur and Sulfuric Acid	1,541	1,318	1,094
<b>Total</b>	<b>214,839</b>	<b>220,571</b>	<b>229,514</b>
Difference between Inventory of Intermediate Products	(661)	142	(640)
<b>Total Production</b>	<b>214,178</b>	<b>220,713</b>	<b>228,874</b>

In 2016, total production from the Barrancabermeja Refinery decreased 3.0% from 220,713 bpd in 2015 to 214,178 bpd in 2016 primarily due to the processing of a heavier crude slate which lowered throughput, and the scheduled maintenance of two of its crude units in March and October 2016.

We own and operate four petrochemical plants and one paraffin and lube plant located within the Barrancabermeja Refinery. In 2016, we produced 55,642 tons of low-density polyethylene, an increase of 26% compared to the production of 44,161 tons in 2015. This increase was due primarily to the recovery of the Turbo expander unit, which resumed operations in August 2015 and supplied a greater amount of feedstock (ethylene) to polyethylene plants. We produced 1,994 mboepd of aromatics (benzene, toluene, xylene, orthoxylene, heavy aromatics and cyclohexane), a 12% decrease as compared with the production of 2,259 mboepd of aromatics in 2015. The decline was mainly the result of lower demand.

The gross refining margin decreased from US\$16.8 per barrel in 2015 to US\$14 per barrel in 2016, primarily due to price differentials of refined products as compared to crude oil, in line with international market trends.

The average conversion ratio for Barrancabermeja Refinery was 74.6% in 2016 and 73.5% in 2015. This increase in the conversion ratio was primarily due to the upgrading of a gasoil hydro-treating unit to a mild hydrocracker unit allowing higher middle distillate yields.

### 3.6.1.2 *Reficar*

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

**Table 36 – Production of Refined Products from Reficar**

	For the year ended December 31, <sup>(1)</sup>		
	2016	2015	2014
		(bpd)	
LPG, Propylene and Butane	6,080	0	0
Motor Fuels	35,012	1,558	1,997
Diesel	40,950	2,282	2,254
Jet Fuel and Kerosene	5,768	1,202	812
Fuel Oil	24,602	2,826	3,352
Sulfur	241	0	0
<b>Total</b>	<b>112,653</b>	<b>7,868</b>	<b>8,415</b>
Difference between Inventory of Intermediate Products	911	2,476	1,896
<b>Total Production<sup>(2)</sup></b>	<b>113,564</b>	<b>10,344</b>	<b>10,311</b>
<b>Petcoke (Metric tons)</b>	<b>601,163</b>	<b>0</b>	<b>0</b>

(1) The table shows the entire production of Reficar.

(2) Does not include petcoke.

During the second half of 2016, the refinery initiated its stabilization period.



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

**Table 37 – Imports and Sales of Refined Products from Reficar**

	For the year ended December 31,		
	2016	2015 (bpd)	2014
<b>Imports</b>			
Motor Fuels	3,641	15,112	11,460
Diesel	6,155	21,979	18,334
Jet Fuel and Kerosene	2,211	4,384	3,419
Alkylate	83	-	-
LPG and Butane	355	-	-
<b>Total Imports</b>	<b>12,445</b>	<b>41,475</b>	<b>33,213</b>

During 2016, Reficar imported products to cover the North Coast sales demand.

	For the year ended December 31,		
	2016	2015 (bpd)	2014
<b>Sales</b>			
Motor Fuels	38,534	16,101	14,154
Diesel	46,060	22,692	21,942
Jet Fuel and Kerosene	7,479	5,012	3,681
Fuel Oil	16,593	2,066	4,335
Other Products	22,990	2,281	2,194
<b>Total Sales</b>	<b>131,656</b>	<b>48,152</b>	<b>46,306</b>

After seven years of construction work, Reficar reached its most important historical milestone to date by entering 34 operating units into operation in July 2016. Reficar's new and expanded processing capacity may exceed 150 thousand barrels of crude oil per day with a high value product conversion factor of 97.5%. A number of critical milestones were reached during the first semester of 2016, including finishing project construction activities and developing successful sequential start-up of the units up to July 2016. Reficar is now the most modern refinery in Latin America, introducing new technology to the Colombian refinery industry with delayed coking and hydrocracking facilities; and it now has the ability to process heavier crudes and produce gasolines and diesel fuels with ultra-low sulphur contents.

In September 2016, the operation of the new refinery was formally transferred to Ecopetrol under an Operation and Maintenance Agreement that leverages on Ecopetrol's existing refining capabilities while keeping Reficar as independent manager and owner of the assets.

Following full start-up, the focus areas of the operation have been the stabilization of the production process and the execution of individual unit's performance tests, (62%, or 21 of 34, have been performed to date). The reliability test of the refinery as a whole is expected to be performed in the second half of 2017.

In terms of gross refining margin, the refinery advanced from an average of approximately US\$ 3 per barrel between January and July 2016, to around US\$ 9 per barrel between August and December 2016 (stabilization and performance testing period), with expectations that in 2017 the margin will be in line with the market trend for highly complex refineries.

Reficar's 2016 financials already reflect the operation of the new units, thus total sales have increased 85% as compared to 2015, from US\$ 1,155 million in 2015 to US\$ 2,142 million in 2016. A total of 42.9 million barrels of crude were processed in 2016 compared to 3.8 million barrels processed in 2015. Exports to international markets represented 54% of total sales (US\$ 1,158 million). The refinery's production has substituted 10 million barrels of gasoline and diesel imports, which previously had to be imported in order to supply the domestic demand. As per information provided by the Colombian Government (specifically by the National Statistics Department –DANE-), Reficar's entrance into operation contributed 3.8% to the National Industrial GDP, and 0.4% to the National GDP during 2016.

## 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 refinery in Cartagena, 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. As of December 31, 2016, the principal amount owed to the senior lenders under these finance agreements was US\$2,796.3 million. Interest payments during 2015 and 2016 were US\$92 million and US\$87 million, respectively.

As part of the project finance structure, Ecopetrol S.A. entered into a Construction Support Agreement (the “Construction Support Agreement”) and a Debt Service Guarantee Agreement (the “Debt Service Guarantee Agreement”) to support certain obligations of Reficar. Pursuant to the terms of the Construction Support Agreement, Ecopetrol S.A. agrees to support up to the completion date, any additional costs, expenses or delays incurred during the construction phase of the expansion and modernization of the refinery in Cartagena. By means of the Debt Service Guarantee Agreement, Ecopetrol S.A. provides a liquidity mechanism, allowing Reficar to pay its debt service in situations in which there are liquidity shortfalls.

During 2016, Reficar received capitalizations for US\$615 million to cover project capital expenditures, start-up costs, one-off stabilization costs of the new refinery and a portion its debt service payments. The amount requested by Reficar under the Construction Support Agreement was US\$425 million. The amount requested by Reficar under the Debt Service Guarantee Agreement was US\$170 million. There was no need to request additional contributions under the Debt Service Guarantee to cover the debt service payment due on December 2016. Total debt service payments during 2016 totaled US\$356 million.

The current credit agreements include a mechanism to exit the project finance by transferring the debt at the level of Ecopetrol S.A., either by (i) the occurrence of a Mandatory Debt Assumption Event or (ii) a Voluntary Debt Assumption; as defined in said agreements.

In total, the Reficar modernization project has had capital expenditure needs of US\$7,867 million of a total capital expenditures approval of US\$8,016 million.

### 3.6.1.3 Polipropileno del Caribe S.A.

During 2016, Propilco production totaled 445 thousand tons of petrochemical products, a 2.5% increase compared to the 434 thousand tons produced in 2015, due to higher sales volumes explained by greater competitiveness in the local market. The total contribution margin in 2016 (including the contribution of polypropylene, polyethylene and masterbatches) was 9% higher than in 2015, an increase from US\$293 per ton in 2015 to US\$318 per ton in 2016. The increase in contribution margin was primarily due to the execution of a new commercial strategy focused on differentiation and value-added products and services.

**Table 38 – Operating Capacity of Propilco**

	For the year ended December 31,		
	2016	2015	2014
		(Metric Tons)	
Average capacity	470,000	470,000	475,000
Throughput	444,812	434,484	389,604
% Use	95%	92%	82%

### 3.6.1.4 Biofuels

We have investments in two biofuels companies: (i) Bioenergy S.A., in which we own 98.6% of the shares, currently advancing on the construction of an ethanol plant with theoretical capacity of 480,000 liters / day, and (ii) Ecodiesel S.A., in which we own 50% of the shares, currently in operations 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, natural gas and petrochemical products, among others.

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

The Colombian Petroleum Institute, the innovation and technology center of Ecopetrol, was created in June 1985 to add value to our business segments through innovation and the development of technologies and competitive advantages.

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, asset integrity and automation. 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 takes advantage of that tax benefit. In 2016, we obtained US\$5.6 million in science and technology-related tax benefits certified by COLCIENCIAS.

Our intellectual capital is 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 194 patent applications in the last ten years, 12 of them in 2016. Our most recent patent applications include innovative technologies such as (i) a catalyst to efficiently upgrade heavy oil residues in a slurry-type hydrocracking reactor; (ii) a system for the early prediction of production events that are likely to trigger artificial lift system failures that may be avoidable; (iii) an intelligent tool to locate restrictions in pipelines; and (iv) two methods to obtain nanotechnology-based fluids, to prevent the flocculation of asphaltenes around the wellbore, and to break down emulsions, respectively. In 2016, Ecopetrol declared three industrial secrets that strengthen its competitive advantages in exploration of Colombian basins.

In 2016, Colombian and international authorities granted us 10 new patents. We currently hold 79 patents in Colombia, the United States, Mexico, Russia, Peru, Venezuela, Ecuador, Brazil, Nigeria, Indonesia, and Malaysia.

In 2016, Ecopetrol S.A. licensed twelve (12) of its technologies to private companies for manufacturing, marketing commercialization, and after-sales support. To date, we have licensed 28 technologies to Colombian and multi-national companies. These licensed technological products have been tested and successfully used in our organization to solve problems related to refining, production and transportation of hydrocarbons, and some have potential uses in other industries.

### **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, included 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 mining sector and the oil and gas sector, regarding the coexistence of their rights in some specific projects.

On May 26, 2015, the Ministry of Mines and Energy issued Decree 1073 which compiles the majority of Colombian decrees and regulations 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.

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 levelling 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.

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

Law 99 of 1993 and other environmental regulations, such as particularly Decree 1076 of 2015, 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 hydrocarbons 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 pre-requisite 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 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).

A new environmental licensing procedure came into force in Colombia on January 1, 2015 as a result of the enactment of Decree 2041 of 2014, which now is compiled by Decree 1076 of May 26, 2015, repealing the licensing process defined in decree 2820 of 2010. 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 new 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 to request additional information about the proposed project. The ANLA will have no other opportunities to request additional information after this hearing.

The Ministry of Environment and Sustainable Development is also responsible for establishing guidelines regarding climate change policies for the hydrocarbon sector in Colombia. We are in compliance with those guidelines. At present, the Ministry of Environment and Sustainable Development 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 five thousand bpd to 25% for fields producing in excess of 600 thousand bpd. 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 considered 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 CREG.

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. According to Law 681 of 2001, multipurpose pipelines owned by Ecopetrol (through Cenit) must be open to third-party use on the basis of equal access to all.

Notwithstanding the general rules for hydrocarbon transportation in Colombia, 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 share of production. 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 are to 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 31 325 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, latterly amended by Resolution 31325 of 2015.

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.

#### *Refined products 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.

CREG is in the process of defining and introducing the transportation regulation and the rate calculation method for refined products. On September 25, 2015, CREG published a draft resolution that established the proposed regulations for transport of liquid fuels and liquefied petroleum gas. The primary goals and components of the proposed regulation are: a) to ensure access to the transport systems for liquid fuels and the LPG pipeline systems without discrimination; b) to promote the timely expansion of the transport system in line with the needs of the market; c) to promote competition and prevent restrictive practices; d) to separate the operations of refining and transport; and e) to ensure the efficient and continuous operation of transport systems. Currently, CREG continues with the task of drafting this regulation.

### **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 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 selling diesel and gasoline at its refinery in Barrancabermeja in order to produce diesel and gasoline that complies with the requirements of the aforementioned law.

#### **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 Resolution 53 of 2011 (as amended by 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 Resolutions 59 of 2008, 002 of 2009, 123 of 2010, 095 of 2011, 65 and 129 of 2016).

According to Article 212 of the Petroleum Code and Law 39 of 1987 (added by Law 26 of 1989), the distribution of liquid fuels and their derivatives is considered a public utility. 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.

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, 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. Resolution 31514 of 1992 established that any LPG household, commercial and industrial facility with a storage capacity of LPG greater than 420 pounds must receive an authorization from the Ministry of Mines and Energy prior to commencing operations.

The Domestic Public Service Superintendence also oversees the liquefied petroleum gas transportation business. Cenit reports key operational and financial indicators to it on a monthly basis.

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

According to the Decree - Law 4130 of 2011, 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 (ACPM), biofuels and mixtures thereof.

Then, since May 2012, CREG fixes the prices for most crude oil by-products, but for gasoline, diesel, ACPM 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.

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 and the crude oil price reference for local refining.

Decree 381 of 2012 and 1617 of 2013, as amended by Decree 2881 of 2013, 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, any refining company operating in Colombia must provide a portion or, if needed, the total of its production to supply local demand prior to exporting any production. If local demand increases, and imported crudes are needed, the refining company may charge the State additional transportation costs in proportion to the imported crudes delivered to the refinery.

The Fuel Price Stabilization Fund (FEPC) was created by means of Law 1151 of 2007 with the aim to mitigate, in the domestic market, the impact of fluctuations in fuel prices (gasoline and motor fuel oil) in international markets. As per article 2.3.4.1.3 of Decree 1068 of 2015, the funding for the operation of the FEPC comes from the following sources: (i) financial returns on the funds of the FEPC; (ii) extraordinary contributions from the National Treasury; and (iii) resources from the General Budget of Colombia.



The FEPC is currently regulated by Decree 1068 of 2015, which compiles Decree 1880 of 2014, and sets forth the calculation method of the Differential as the product of the volume reported by the refiner and/or importer to the Ministry of Mines and Energy times the difference between the international parity price and the reference price. It also provides that refiners and/or importers shall submit monthly reports to the Ministry of Mines and Energy on the volume, origin and type of fuel (gasoline and motor fuel oil) sold in the domestic market for said period.

Based on those reports, the Ministry of Mines and Energy shall calculate and liquidate the Net Position every six months by issuing a resolution provided, however, that such Net Position results from the sum of the differentials for the relevant six-month period. Decree 1068 of 2015 also provides that the FEPC shall pay in Colombian Pesos the value corresponding to the six-month Net Position of each refiner and/or importer within the term that the Ministry of Mines and Energy establishes and based on availability of resources of the FEPC. For more information regarding the FEPC and Ecopetrol, see the section 5.1.2.

By Resolution 31356 of 2016, the Ministry of Mines and Energy liquidated the net positions for Ecopetrol corresponding to December 23 to 31, 2014 and the first and second quarters of 2015, establishing that Ecopetrol must pay to FEPC COP\$114,172,749,145.09 as a contribution differential; Ecopetrol appealed but the Ministry of Mines and Energy confirmed its decision by Resolution 31121 of 2017.

By Resolution 31127 of 2017, the Ministry of Mines and Energy liquidated the net position for the third quarter of 2015 and October 1 to November 25, 2015, establishing that FEPC must pay to Ecopetrol COP\$318,638,400,647.33.

By Resolution 31128 the Ministry of Mines and Energy liquidated the net position for Ecopetrol corresponding to November 26 to December 31, 2015 and the first half of 2016 establishing that FEPC must pay to Ecopetrol COP\$338,252,758,969.68.

As of the date of this annual report, the Ministry of Mines and Energy has not calculated or liquidated the Net Position for each fuel (gasoline and motor fuel oil) to be paid by the FEPC to Ecopetrol for its sales during the second half of 2016.

Recently, Law 1819 of December 29, 2016, created a contribution to finance the FEPC which will come from the sales in Colombia of gasoline or ACPM by the refiner or importer to the wholesale distributor, on the basis of the differential between the international parity price and the reference price.

The Ministry of Mines and Energy will exercise the functions of control, management, settlement, determination, discussion and collection of the contribution. In particular, it will calculate the contribution to the FEPC through the liquidation of the quarterly Net Position of each refiner or importer with respect to the FEPC based on the reporting of information that refiners and/or importers present.

### **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) sorts of market that will be served with biogas and biomethane; b) quality and safety conditions; and c) tariff regime (article 2). Pursuant to article 4 of the before mentioned 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. In the same way, 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, issued by the Ministry of Mines and Energy, 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, other than with respect to the Opón field, the price of natural gas is determined by the market.

CREG issued Resolutions 088 of 2013 and 089 of 2013 (amended by CREG Resolutions 204 of 2013, 089 and 122 of 2014, 022, 032, 088, 105, 139, 143, and 218 of 2015, 137 and 070 of 2016 and 001 of 2017) that established the procedures for marketing natural gas in Colombia. 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 cfpd); 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 re-sell 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 exportation. 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) fair 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 Resolutions 089 of 2013 and 204 of 2013 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). Decree 1073 of 2015 and CREG Resolution 089 of 2013 permits 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 guide 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.

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.



The results of the HSE strategies in 2016, compared with the prior year, were:

- A 25% 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.
- Improved performance during maintenance activities, in order to ensure proper safety practices.
- 16,287 training sessions related to 885 critical procedures for our workers.
- A 25% decrease in the number of incidents involving employee or contractor injuries that require medical treatment or time off.
- A reduction in the severity of occupational incidents.
- A reduction in oil spills.
- Improvement in reporting of minor oil spills and identification of their causes.

##### *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.

The objectives of our contingency plans are to:

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

Our contingency plan includes:

- Procedures for the containment of oil and other harmful substances, as well as procedures to safeguard the safety of affected communities and the personnel involved in such containment actions.
- Strategies for responding to emergencies located outside of our facilities and mutual aid emergency plans, including actions developed with local environmental authorities, stakeholders, the local community and other organizations for containment and recovery of spilled product, and cleaning and recovery of affected areas, monitoring of the environmental effects and 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 drills.

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

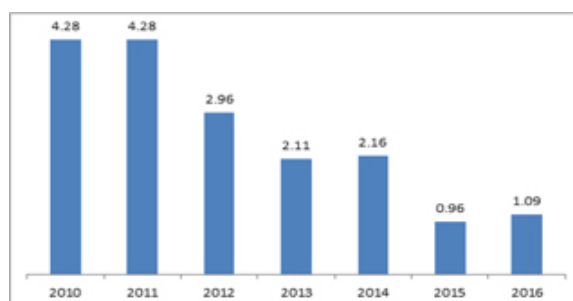
#### *Total Recordable Incident Rate – Employees and Contractors*

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

Ecopetrol S.A. monitors a standard measure of occupational safety known as 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.

TRIF has improved from 4.28 incidents per million hours worked in 2010 to 1.09 in 2016. In 2016, 28% of occupational accidents affecting our employees and contractors resulted in a medical treatment, restricted work or time away from work that lasted for three days or less. Additionally, we had a 38% reduction in occupational incidents compared to 2015 as a result of the sustained implementation of the HSE management system.

**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 S.A.

*Frequency of process safety incidents*

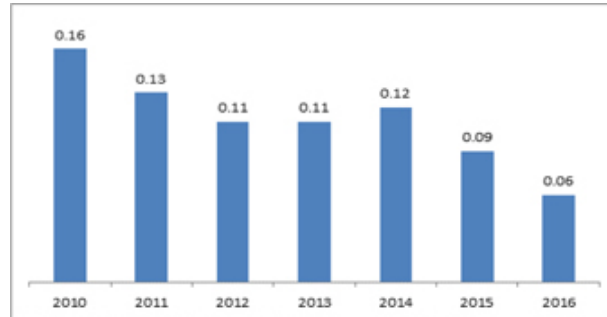
Our “Process Safety Management” (PSM) strategy is to: first, define high-risk processes; second, prioritize intervention in high-risk processes; and third, apply all PSM elements in the prioritized high-risk processes.

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 reduced our Tier 1 process safety indicator by 33% compared to 2015 (2016: 0.06 and 2015: 0.09). 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 2016, there were 0.06 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 figures for Ecopetrol S.A.’s subsidiaries.

*Environmental Incidents*

In 2016, Ecopetrol S.A. recorded 8 environmental incidents compared with 11 in 2015 and 29 in 2014. The volume of oil spills was 202 barrels in 2016, a decrease from 207 barrels in 2015 and 885 barrels in 2014. The decrease in the numbers of environmental incidents and oil spills was the result of 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.

**3.9.1.2 *Cenit***

While Cenit had previously followed Ecopetrol’s HSE guidelines, in 2015, Cenit established its own HSE practice and set and defined its own HSE Key Performance Indicators (KPIs) and targets in respect of its non-operative facilities and offices. This resulted in significant cost reductions with no change in risk levels in 2015 and 2016. Local and field operations, however, are still conducted under Ecopetrol’s HSE model and guidelines.

Cenit intends to implement its own HSE Management System based on Decree 1072 of 2015 during the first half of 2017. Cenit is also leading the definition of HSE KPIs with 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.

### 3.9.1.3 *Refinería de Cartagena*

In 2016, around 10.4 million man-hours were employed conducting Reficar’s business activities. Our HSE performance indicators for Total Recordable Cases (TRIF), Process Safety Incident (ISP) and Environmental Incident (EI) were well-within our established guidelines.

The following table covers Reficar’s Total Recordable Cases (TRIF) for 2015 and 2016, which includes Ecopetrol Operation and Maintenance (O&M), Reficar and subcontractors. The table presents statistics related to construction, pre-commissioning, start-up and operating activities. Reficar reported more than 145 million man-hours without fatalities (accidents that caused deaths) during the period 2010-2016.

**Table 39 – Performance Indicators**

<b>METRIC</b>	<b>2016</b>	<b>2015<sup>(1)</sup></b>
Man-hours	10,351,896	32,944,698
Recordable accidents	29	57
Total recordable cases (TRIF)*	2.80	1.73
Environmental Incidents (EI)	0	0
Process Safety Incidents (ISP)*	0.19	0.03

<sup>(1)</sup> In our annual report on Form 20-F for 2015, man hours and accidents corresponding to Reficar’s construction stage were reported. This report registers man hours and accidents of 2015 corresponding to the entire operation of the Refinery.

\* In the second half of 2016, these risks were associated with the new stage of operation of the units while in 2015 they were associated with the construction, commissioning, precomissioning and start-up of the new refinery.

The results of other related performance indicators during 2016 were:

- Lost Time Injury Incidents: 12 incidents, which include eight for Ecopetrol O&M and four incidents for Reficar and subcontractors.
- Medical Treatment Injury: six incidents, which include four for Ecopetrol O&M, and two incidents for Reficar and subcontractors.
- Restricted Work Incidents: 11 incidents, which include 10 for Ecopetrol O&M, and one incident for Reficar and subcontractors.
- Environmental Incidents: None.
- Process Safety Incident: Two.

### 3.9.2 *Human Rights*

Ecopetrol has a Human Rights Policy with an integrated and systemic management approach to human rights based on the due diligence principle, which we continued to strengthen in 2016.

In view of our commitment to respect and promote human rights, Ecopetrol updated its human rights risk assessment in order to evaluate and mitigate human rights impacts. As a result of this assessment, Ecopetrol S.A. has focused its efforts on the following principles:

- Right to life, liberty and personal security,
- Right of association and collective bargaining,

- Abolition of forced or compulsory labor,
- Abolition of child labor,
- Equality and non-discrimination at work,
- Just, equitable, and satisfactory conditions of work,
- Rights of ethnic groups, and
- Collective rights and the environment.

### 3.9.3 Environmental Sustainability

#### 3.9.3.1 Environmental Practices

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

During 2016, the environmental management strategy of Ecopetrol included the following components:

1. **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.
2. **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:
  - Mitigation: reducing our carbon dioxide emissions and creating carbon offset alternatives;
  - Vulnerability and Adaptation: reducing the risks and impacts to our operations posed by climate variability and change;
  - 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
  - Involvement in Policymaking: informing and influencing government policies on climate change.
3. **Biodiversity:** this strategy aims to reduce Ecopetrol's impacts on the ecosystems in areas where we operate. This strategy mainly focuses on knowledge building and conservation efforts in areas where we operate.
4. **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.
5. **Integrated Management of Water Resources:** this strategy aims to ensure compliance with water resources laws and reduce conflicts over water use in the areas near our projects and operations. Our core focus areas under this strategy are aligned with the objectives defined by the 2010 National Water Policy for the Management of Water Resources in Colombia which focuses on water supply, demand, quality, risk governance and institutional strengthening.

Since 2009, Ecopetrol has reported its achievements in the sphere of environmental management to various relevant organizations focused on promoting sustainable business practices, such as the Dow Jones Sustainability Index, the Carbon Disclosure Project (CDP) and the CDP Water Information Request; Environmental Benchmarking of ARPEL.

### 3.9.4 Energy Projects

#### *Refining*

Ecopetrol's refining companies have been undertaking significant efforts to make efficient and rational use of energy resources in its production processes and reduce energy consumption and costs and carbon dioxide emissions. We focus on efficiency, reliability and optimization, and energy diversification. During 2016, the refinery segment's average monthly energy consumption was 61.42 MWhm (megawatts per hour per month) equivalents, from which 99.9% was provided through self-generation and the remaining 0.01% with non-regulated energy purchased from the National Transmission System.

#### *Production*

Further, during 2016, Ecopetrol S.A.'s production sector had an average a monthly energy consumption of 272,839 MWhm (megawatts per hour per month) for its direct operation, from which 76% was provided through self-generation and the remaining 24% with non-regulated energy purchased from the National Transmission System.

### 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 32 – Related Parties 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 Vitol of 24,000 barrels per day for segment I and II and 14,000 barrels per day for segment III. In 2016, payments made by Ecopetrol S.A. under this agreement amounted to US\$873 million.
- In December 2011, Ecopetrol S.A. entered into an operation and maintenance agreement for the Porvenir, Miraflores and Vasconia pumping stations with Ocensa. In 2015, pursuant to the terms of this agreement, Ecopetrol S.A. received payments of approximately US\$9 million at fixed and variable costs plus applicable taxes. Pursuant to the terms of the agreement, in September 2015 Ocensa notified Ecopetrol of its decision not to extend the term of the contract, which expired in March 2016.
- 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 Ocensa'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 Ocensa'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 Ocensa 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 Ocensa's facilities. On March 2016 Ocensa temporarily modified the fee for unloading operations based on the stretch market conditions to US\$0.50. By virtue of these agreements, Ecopetrol S.A. paid fees of US\$2.6 million to Ocensa in 2016.



- On January 17, 2013, Ocesa and its shareholders – Cenit, Ecopetrol Pipelines International Limited, Santiago Pipelines Company, New Santiago Pipelines Company, Total Colombia Pipeline, Inversiones Sol del Sur S.A.S. and Cepsa Colombia S.A. – entered into a shareholders agreement that establishes the basis for a new business model, pursuant to which Ocesa has become a profit center instead of a cost center. This agreement became effective as of the date of execution and will be in effect until Ocesa is registered on an exchange. Additionally, this agreement might be renegotiated if the control structure of Ocesa is modified.

The Ocesa shareholders' agreement establishes the basis for Ocesa's corporate governance model. It provides for a board of directors composed of five members, two of which must be independent. Cenit may nominate three members of the board of directors, including the two independent members, while minority shareholders may together nominate the remaining two members.

The Ocesa shareholders' agreement provides the minority shareholders with certain rights, including the right to nominate two members of the five-member board of directors. Significant decisions must be approved by a qualified majority of at least four Ocesa shareholders, and by supermajorities of the outstanding Ocesa shares. These actions include, among others (i) issuing additional shares or publicly listing shares, declarations of dividends in amounts other than all distributable income and certain amendments to Ocesa's bylaws and (ii) asset sales in excess of US\$50 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 on December of 2004, under which Ocesa paid a variable rate to Ecopetrol. In 2016, Ecopetrol S.A. received an aggregate sum of US\$4.9 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 2016, Ocesa billed Equion US\$13.6 million and Santiago Oil Company US\$1.6 million, in each case for transportation fees. Ocesa billed Hocol, as assignee of transportation rights from original shippers, US\$13 million in 2016.
- 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. ODL paid Ocesa US\$2.6 million under this contract in 2016.

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

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

- In July 1992, a take-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 2016, payments made by Ecopetrol S.A. under this agreement amounted to US\$105 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. Pursuant to the terms of this agreement, ODC paid approximately US\$20 million in 2016.
- 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 2016.
- 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\$5 million in 2016. 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 2016, ODC paid Ecopetrol US\$10 million under this agreement.

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 2016, the transportation fees billed by ODC were: Equion (US\$11 million), Santiago Oil Company (US\$1 million) and Hocol (US\$8 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 two two-year grace periods, 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\$115 billion in 2016.
- 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 (termination date of the agreement). Payments by Ecopetrol S.A. under this contract were COP\$112 billion in 2016.
- 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. Payments by Ecopetrol S.A. under this contract were COP\$421 billion in 2016.
- 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 five years, adjusting certain conditions. Pursuant to the terms of this agreement, ODL paid to Ecopetrol S.A. COP\$8 billion in 2016.
- In July 2013, Ecopetrol S.A. entered into a 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 2014, this contract was amended to include an oil transfer service that has a "take or pay" volume of 15,000 bpd. Payments by Ecopetrol S.A. under this contract were COP\$31 billion in 2016.
- 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. Pursuant to the terms of this agreement, Bicentenario paid to ODL COP\$13 billion plus applicable taxes in 2016.

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

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 crude oil transportation agreements with Oleoducto Bicentenario that establish 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 the 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 this contract 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, 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. Pursuant to the terms of this agreement, in 2016 Ecopetrol and Hocol paid to Bicentenario S.A. COP\$603 billion plus applicable taxes.

- 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. Pursuant to the terms of this agreement, in 2016 Ecopetrol and Hocol paid to Bicentenario COP\$25 billion plus applicable taxes.
- In August 2012, Ecopetrol S.A. entered into an Operation and Maintenance agreement for the Araguaney – Banadia pipeline system. The duration of this agreement is 15 years. Pursuant to the terms of this agreement, Ecopetrol S.A. received COP\$15 billion in 2016.

#### *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 expires on December 31, 2017. In 2016, a total of COP\$264 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. As of April 2017, Ecopetrol disbursed US\$56.5 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, 2016, 2015 and 2014, 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: 42.9 million barrels, 45.6 million barrels and 45.4 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*)		Deductible		Ecopetrol		
	Onshore	Offshore	On shore	Off shore	Downstream	Reficar	Propilco
			(figures in USD in millions)				
Property all risk	2,744	0	5	N/A	X	X	X
Sabotage and terrorism	600	0	0.5	N/A	X	X	X

(\*) Eel: each and every loss. Agg: Aggregate

*Group 2 – Up and Midstream Program:* This program provides coverage for upstream and midstream (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 and Midstream Program**

Policies	Limit (eel/agg*)		Deductible		Ecopetrol						
	Onshore	Offshore	Onshore	Offshore	Upstream	Equion	Hocol	América	Brazil	ODL	Cenit
			(figures in USD in millions)								
Property all risk	400	400	0.25	0.5	X	X	X	X	NA	X	X
Sabotage and terrorism	55	0	0.5	N/A	X	X	X	NA	NA	X	X
Control of Wells	250/50**	400	0.25-0.5	5	X	X	X	X	X	NA	NA

(\*) Eel: each and every loss. Agg: Aggregate

(\*\*) Drilling USD250M / Production USD50M

*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*)		Deductible		Ecopetrol Down stream	Reficar	Propilco (figures in USD in millions)	Ecopetrol Up stream	Equion	Hocol	América	Brazil	ODL	Cenit
	On shore	Off shore	On shore	Off shore										
Third Party Liability	500	500	1	1	X	X	X	X	X	X	X	X	X	X
Crime	75/150		Various	Various	X	X	X	X	X	X	NA	NA	NA	X
Directors & Officers	250		Various	Various	X	X	X	X	X	X	X	X	NA	X
Cargo	120		3% dispatch	NA	X	X	NA	X	NA	X	NA	NA	NA	NA
Charterers	750		0.02		NA	NA	NA	X	NA	NA	NA	NA	NA	NA

(\*) 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.

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.

### 3.12 Human Resources/Labor Relations

#### 3.12.1 Employees

As of December 31, 2016, the Ecopetrol Corporate Group had 10,920 employees, an increase of 1.48% from 2015. 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, 2016, 2015 and 2014.

**Table 43 – Corporate Group's Employees**

	As of December 31,		
	2016	2015 <sup>(1)</sup>	2014 <sup>(2)</sup>
	(number of employees)		
<b>Ecopetrol S.A.</b>			
Exploration and Production			
Exploration	225	218	187
Production	2,095	1,880	2,022
Others	452	457	429
<b>Total Exploration and Production</b>	<b>2,772</b>	<b>2,555</b>	<b>2,638</b>
<b>Downstream</b>			
Refining	2,685	2,700	2,771
Marketing	133	136	199
Others	72	6	19
<b>Total Downstream</b>	<b>2,890</b>	<b>2,842</b>	<b>2,989</b>
Transport	949	1,158	1,251
Others	244	61	3
<b>Total Operations</b>	<b>6,855</b>	<b>6,616</b>	<b>6,881</b>
<b>Corporate</b>	<b>1,993</b>	<b>2,115</b>	<b>2,269</b>
<b>TOTAL ECOPETROL S.A.</b>	<b>8,848</b>	<b>8,731</b>	<b>9,150</b>
Ecopetrol America Inc.	71	75	57
Bioenergy S.A.	145	122	96
Bioenergy Zona Franca S.A.S.	258	126	94
Hocol S.A.	179	172	185
Equion Energía Limited	321	458	462
Oleoducto Central S.A.	290	271	249
Oleoducto de Colombia S.A.	2	2	1
Oleoducto de los Llanos S.A.	55	56	33
Oleoducto Bicentenario de Colombia S.A.S.	0	0	39
Ecopetrol del Perú S.A.	0	0	0
Ecopetrol Costa Afuera de Colombia S.A.S.	0		
Refinería de Cartagena S.A.	170	270	247
Ecopetrol Óleo e Gás do Brasil Ltda.	16	17	14
Polipropileno del Caribe S.A. (Esentia S.A.)	409	388	374
Cenit Transporte y Logística de Hidrocarburos S.A.S.	156	73	72
<b>TOTAL</b>	<b>10,920</b>	<b>10,761</b>	<b>11,073</b>

(1) 31 persons employed by us during 2015 were not included in our 2015 employee statistics as they were independent contractors involved in non-regular activities and cannot be classified as temporary employees.

(2) 79 persons employed by us during 2014 were not included in our 2014 employee statistics as they were independent contractors involved in non-regular activities and cannot be classified as temporary employees.

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

To improve the quality of life of our employees, 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 and cannot exceed 59 times the applicant's monthly salary. Ecopetrol S.A. does not guarantee any loans made by third parties. In 2016, Ecopetrol S.A. extended 999 housing loans for a total of COP\$173 billion and 1,742 general-purpose loans for a total of COP\$13 billion. Ecopetrol S.A. also provided on-site and external training and development, which total to COP\$5.7 billion, and it extended a total of COP\$165 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 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 4,180 employees as of January 1, 2017. The agreement also governs our labor relations with the 2,818 non-unionized employees who, according to current labor legislation, have been beneficiaries of the collective bargaining agreement.

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

- Unión Sindical Obrera de la Industria del Petróleo — USO (industry labor union);

- Asociación de Directivos Profesionales, Técnicos y Trabajadores de las Empresas de la Rama de Actividad Económica del Recurso Natural del Petróleo y sus Derivados de Colombia — ADECO (industry labor union);
- Sindicato Nacional de Trabajadores de Empresas Operadoras, Contratistas, Subcontratistas de Servicios y Actividades de la Industria del Petróleo y Similares — SINDISPETROL (industry labor union);
- Unión de Trabajadores de la Industria Energética Nacional y de Servicios Públicos – UTEN (industry labor union);
- Asociación Sindical de Trabajadores de la Industria del Petróleo – ASTIP (industry labor union);
- Asociación de Profesionales de Ecopetrol — ASPEC (company labor union);
- Sindicato Nacional de Trabajadores de Ecopetrol — SINCOPEPETROL (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); and
- Sindicato de Profesionales de Ecopetrol S.A. – SINPROECOP (company labor union).

Currently Ecopetrol S.A. does not have any workers in the SINCOPEPETROL union. This union does not participate in the negotiation process.

Any employee working for any company in the oil and gas industry may join the USO, ADECO SINDISPETROL, UTEN or ASTIP. 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.

The collective bargaining agreement has been in effect since 2014 and expires on June 30, 2018. In 2016, the agreement was reviewed on application matters, except for monetary expenses (including wages and benefits). This review ended with a mutual arrangement document, signed on December 10, 2016.

This agreement currently covers all workers benefiting from the Collective Labor Convention, regardless of whether they are part of any labor union.

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

Our consolidated financial statements for the years ended December 31, 2014, 2015 and 2016 were prepared in accordance with IFRS. Our date of transition from our previous GAAP to IFRS was January 1, 2014.

IFRS differs in certain significant respects 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 and, to a somewhat lesser extent, 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, thus revenues too. 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. 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. Finally, terrorist attacks by guerillas against our pipelines and other facilities can lead to loss of revenues by restricting the availability of transport systems for exports or sales of crude oil and products in addition to the direct costs of repairing and cleaning them.

##### *Sales volumes and prices*

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

We sell crude oil mainly in the international market. We also process crude oil at the Barrancabermeja and Reficar refineries 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 48% of our total revenues, on average, for the past three years.

##### *International Sales and Prices*

Our foreign sales represented 52% 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 focus towards markets where we have been able to capture better value 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 of 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.

##### *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. Therefore, pursuant to this law, in 2016, as a result of the return of the Rubiales field to Ecopetrol in July 2016, the royalty rate went from 20% to 32%.

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 production, without any deduction for royalties. The cost of natural gas royalties totaled COP\$ 478,332 million in 2016.

#### *Purchases of hydrocarbons*

We continue purchasing 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 us 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 and Tumaco ports and a marketing fee. We sell the physical product purchased from the ANH as part of our ordinary business. In June 2016, the contract between the ANH and us was extended until June 30, 2018.

Our purchases of hydrocarbons from the ANH are made in the ordinary course of business, and on terms comparable to those offered to private parties. We have established procurement policies and approval processes for purchases of products and services, which do not depend on whether the counterparties are state-owned entities.

Since 2016, we import crude oil for Reficar feedstock when such imports are to result in a 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 more changes to the Colombian tax system, applicable beginning in 2017, including the following aspects:

- The CREE and CREE surtax were eliminated. Instead, a unified income tax rate was set, which will be 34% for 2017 and 33% for 2018 and onwards.
- An income tax surtax for profits above COP\$800 million is set which will be 6% in 2017 and 4% in 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. This is the basis upon which to calculate the income tax.
- A withholding tax on dividends is triggered for dividends paid to non-resident shareholders as follows: (i) 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 not taxed at the company's level, and (iii) an additional 5% dividend tax rate after having applied and deducted the initial 35% withholding. As of fiscal year 2017, for Colombian individuals, dividends will be taxed between 5% and 10% depending on the dividend amount. Profits that did not pay tax at the corporate level would be subject to a 35% withholding tax at the time of distribution. In this case, the base amount subject to the dividend tax would be the remaining amount after the 35% withholding tax. Dividends tax will be applicable to profits generated as of 2017. Finally, dividends paid to local corporations are not subject to this tax.
- 2017 and future loss carryforwards are subject to a time-limit of 12 years.

- Depreciation and amortization methods and annual percentages are limited to the established in the fiscal 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.
- The income tax for tax free 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 contract is 15% during the contract's duration term.
- The presumptive income rate will increase from 3% to 3.5% as of 2017.
- Tax rate for VAT will increase from 16% to 19%.
- The charge on financial transactions is stabilized at 4x1,000.
- A new national carbon tax is established which will be triggered 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 the oil and gas industry the tax reform includes 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 reimbursement will depend on certain percentages that should be established and further regulated by Colombian Government.

The CERT will be granted when the income tax return is filed, subject to the procedure to be established by the Colombian Government.

The CERT can only be redeemed to pay taxes and is effective up to two years after it is issued. However, the CERT can also be sold and traded in fixed income market.

For production activities, the CERT 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.

The effect of this regulation is still uncertain and will depend on how and when the government issues the detailed regulations.

- 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.

#### **4.2.2 Exchange Rate Variation**

The functional currency of each Ecopetrol Group company 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, coming from Ecopetrol Group companies whose functional currency is the Colombian Peso is derived from local sales and exports of crude oil, natural gas and refined products are sold at prices referenced to 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.

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 Colombian Pesos. Costs of imported goods 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. Conversely, when the Colombian Peso depreciates against the U.S. dollar, our reported revenues, costs related to imported goods and services, interest costs, and operating income, all tend to increase. 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, assets and liabilities held in foreign currency.

During 2016, 2015 and 2014, the Colombian Peso depreciated on average 11.18%, 37.28% and 7.05%, respectively, against the U.S. dollar. Additionally, as of December 31, 2016 the Colombian Peso appreciated 4.72% from the rate a year earlier. As of December 31, 2015 and 2014, in contrast, the Colombian Peso depreciated 31.64% and 24.17%, respectively, from the rate a year earlier.

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. In 2015, our consolidated debt in foreign currency increased by a total of US\$3,425 million as Ecopetrol S.A. raised US\$1,925 million through an international loan and US\$1,500 million through an international bond issuance. In 2014, our consolidated debt in foreign currency increased through international bond issuances by Ecopetrol S.A. and Ocesa for a total of US\$3,700 million.

As of December 31, 2016 our U.S. dollar-denominated total debt was US\$15.2 billion, 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\$12 billion 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 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 the 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) a cash flow hedge for exports of crude oil and ii) a hedge of a net investment in a foreign operation. As a result of the implementation of both hedges 88% (\$10.5 billion) of Ecopetrol S.A.'s debt in U.S. dollars 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 the 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 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. As of December 31, 2016, Ecopetrol Group companies with the U.S. dollar as functional currency have a net active U.S. dollar position after the instruments of natural hedging previously mentioned.

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

Inflation in Colombia has not exceeded an average annual rate of 8% for the past ten years. It decreased in 2016 as compared to 2015. As measured by the general consumer price index, average annual inflation in Colombia for the years ended December 31, 2016, 2015 and 2014; inflation was 5.75%, 6.77% and 3.66%, respectively. The decrease in inflation in 2016 is mainly explained by the normalization of prices as a consequence of the ending of "El Niño" weather phenomenon and the slight appreciation of the Colombian Peso against the U.S. dollar in the second half of 2016. Cost inflation in the prices of goods, raw materials, interest cost of debt in local currency indexed to inflation and services that are necessary for the development and operation of oil and gas producing assets can vary over time and between each market segment.

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

The average price of ICE Brent crude was US\$45.1 per barrel in 2016 as compared to US\$53.6 per barrel in 2015 and US\$99.3 per barrel in 2014. As a consequence, our average price crude oil basket was US\$35.7 per barrel in 2016 as compared to US\$43.9 per barrel in 2015 and US\$87.3 per barrel in 2014, which represents a decrease of US\$8.2 per barrel in 2016 compared to 2015. This decrease is mainly explained by a continuing imbalance between supply and demand in the global crude market due to higher OPEC production as well as a resilient North American production. Nevertheless, the Ecopetrol's average crude oil basket price relative to ICE Brent reported a discount of US\$9.4 in 2016, stronger than the US\$9.7 and US\$12 observed in 2015 and 2014, respectively, due to an active commercial strategy.

In the *Operating Results* section below, we present the impact of the price decline in our revenue and cost of sales.

Additionally, fluctuations in the price of oil have had an impact on the value of our oil and gas reserves. The valuation of these reserves was made using a price in accordance with SEC regulations. A decline in hydrocarbon prices and reserves, as well as changes in environmental regulations may lead to the recognition of impairment of assets. In 2015, in connection with the current adverse economic context faced by the hydrocarbons sector, which resulted in a reduction in forecasted oil prices and an increase in market and country risk that is reflected in the discount rate, as well as a reduction in the recoverable reserves amount and refining margin, among other factors, Ecopetrol recognized an impairment of non-current assets of COP\$7,864,875 million before taxes. In 2016, in connection with our evaluation of the recoverable amount of the assets value, which includes the variation in estimations of future prices under the current scenarios of OPEC's oil quota agreements and the impact resulting from changes on specifications issued by the International Marine Organization agreement regarding marine pollution, Marpol on crude and fuels with high sulfur content, Ecopetrol recognized an impairment of non-current assets of COP\$928,747 million before taxes. For additional information about this impairment charges, see Notes 14, 17 and 28 to our consolidated financial statements.

#### **4.3 Accounting Policies**

Our consolidated financial statements for the years ended December 31, 2014, 2015 and 2016 were prepared in accordance with IFRS. Our date of transition to IFRS was January 1, 2014. 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, 2016, 2015 and 2014.

Table 44 – Consolidated Income Statement

<i>Income Statement</i> <i>(Colombian Pesos in millions)</i>	For the Years ended December 31,			% Change	
	2016	2015	2014	2016/2015	2015/2014
Revenue	48,485,561	52,347,271	65,971,888	(7.4)	(20.7)
Cost of Sales	34,251,423	36,994,516	42,975,128	(7.4)	(13.9)
<b>Gross Profit</b>	<b>14,234,138</b>	<b>15,352,755</b>	<b>22,996,760</b>	<b>(7.3)</b>	<b>(33.2)</b>
Operating Expenses	4,400,843	5,356,715	6,243,166	(17.8)	(14.2)
Impairment of non-current assets	928,747	7,864,875	2,304,567	(88.2)	241.3
<b>Operating Income</b>	<b>8,904,548</b>	<b>2,131,165</b>	<b>14,449,027</b>	<b>317.8</b>	<b>(85.3)</b>
Finance results, net	(1,175,367)	(7,663,104)	(3,510,669)	(84.7)	118.3
Share of profit of companies	61,345	(46,687)	166,070	(231.4)	(128.1)
<b>Income before income tax</b>	<b>7,790,526</b>	<b>(5,578,626)</b>	<b>11,104,428</b>	<b>(239.6)</b>	<b>(150.2)</b>
Income tax	(4,543,046)	(710,353)	(5,434,855)	539.5	(86.9)
<b>Net Income (loss)</b>	<b>3,247,480</b>	<b>(6,288,979)</b>	<b>5,669,573</b>	<b>(151.6)</b>	<b>(210.9)</b>
Net Income (loss) attributable to:					
Company's shareholders	2,447,881	(7,193,859)	5,046,517	(134.0)	(242.6)
Non-controlling interest	799,599	904,880	623,056	(11.6)	45.2
<b>Net Income (loss)</b>	<b>3,247,480</b>	<b>(6,288,979)</b>	<b>5,669,573</b>	<b>(151.6)</b>	<b>(210.9)</b>

#### 4.5.1.1 Total Revenues

**Table 45 – Third-Party Revenues by Business Segment**

The following table sets forth our principal sources of third-party revenues by business segment for the years ended December 31, 2016, 2015 and 2014. An explanation of how we classify our operations into business segments is included in Section 4.5.2 below.

Revenue by segment	2016			2015			2014			% Change Sales Revenues	
	Volume (barrels equivalent)	Average price U.S. dollars/ barrels	Sales revenues (Colombian Pesos in millions)	Volume (barrels equivalent)	Average price U.S. dollars/ barrels	Sales revenues (Colombian Pesos in millions)	Volume (barrels equivalent)	Average price U.S. dollars/ barrels	Sales revenues (Colombian Pesos in millions)	2016/2015	2015/2014
Local crude oil	5,288,631	35.0	553,666	4,904,765	38.5	491,279	8,202,886	74.7	1,213,718	12.7	(59.5)
Foreign crude oil	159,311,257	35.7	17,278,579	178,581,520	44.0	21,181,265	176,233,111	87.9	30,835,510	(18.4)	(31.3)
Trading of crude oil	-	-	-	17,526,239	-	1,309,196	17,977,861	-	1,486,060	(100.0)	(11.9)
Natural gas local	27,543,046	23.6	1,988,336	30,831,442	21.8	1,845,345	30,218,758	22.3	1,346,625	7.7	37.0
Foreign natural gas	931,754	20.9	58,809	2,906,034	23.6	182,950	6,726,072	31.0	423,461	(67.9)	(56.8)
Other income <sup>(1)</sup>	1,288,736	-	647,942	3,558,621	-	659,178	2,925,769	-	597,671	(1.7)	10.3
<b>Exploration and production sales</b>	<b>194,363,424</b>	-	<b>20,527,332</b>	<b>238,308,621</b>	-	<b>25,669,213</b>	<b>242,284,457</b>	-	<b>35,903,045</b>	<b>(20.0)</b>	<b>(28.5)</b>
Local refined products	106,047,637	54.9	17,771,166	102,475,029	67.1	18,806,063	94,736,264	111.2	20,952,495	(5.5)	(10.2)
Foreign refined products	51,843,743	40.4	6,330,648	26,357,160	48.8	3,535,666	29,762,138	92.5	5,431,828	79.1	(34.9)
Other income <sup>(1)</sup>	-	-	92,210	-	-	115,137	-	-	227,881	(19.9)	(49.5)
<b>Refining and petrochemicals</b>	<b>157,891,380</b>	-	<b>24,194,024</b>	<b>128,832,189</b>	-	<b>22,456,866</b>	<b>124,498,402</b>	-	<b>26,612,204</b>	<b>7.7</b>	<b>(15.6)</b>
Transportation services	-	-	3,764,205	-	-	4,221,192	-	-	3,456,639	(10.8)	22.1
<b>Transportation and logistics</b>	<b>-</b>	<b>-</b>	<b>3,764,205</b>	<b>-</b>	<b>-</b>	<b>4,221,192</b>	<b>-</b>	<b>-</b>	<b>3,456,639</b>	<b>(10.8)</b>	<b>22.1</b>
<b>Total sales</b>	<b>352,254,804</b>	-	<b>48,485,561</b>	<b>367,140,810</b>	-	<b>52,347,271</b>	<b>366,782,859</b>	-	<b>65,971,888</b>	<b>(7.4)</b>	<b>(20.7)</b>
Crude oil	164,599,888	35.7	17,832,245	201,012,524	43.9	22,981,740	202,413,858	87.3	33,535,288	(22.4)	(31.5)
Natural gas	28,474,800	23.5	2,047,145	33,737,476	22.0	2,028,295	36,944,830	23.9	1,770,086	0.9	14.6
Refined products	159,180,116	50.1	24,101,814	132,390,810	63.4	22,341,729	127,424,171	106.8	26,384,323	7.9	(15.3)
Other	-	-	4,504,357	-	-	4,995,507	-	-	4,282,191	(9.8)	16.7
<b>Total sales</b>	<b>352,254,804</b>	-	<b>48,485,561</b>	<b>367,140,810</b>	-	<b>52,347,271</b>	<b>366,782,859</b>	-	<b>65,971,888</b>	<b>(7.4)</b>	<b>(20.7)</b>

Note: All intercompany sales transactions have been eliminated in full in order to show our sales to third parties. As a result of the evaluation of control over companies under IFRS, Ecopetrol does not consolidate Equion. As a consequence, the volume information for 2014 included in this annual report (which has been prepared under IFRS) differs from the information we previously published for 2014 under Colombian Government Entity GAAP (where we did consolidate Equion).

(1) In the case of the exploration and production segment, 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, corresponds to industrial services.

In 2016, total revenues decreased by 7.4% as compared to 2015, primarily as a result of: (i) a COP\$6,456,917 million decrease in revenues mainly due to the 18.6%, or US\$8.2 per barrel reduction of our average crude oil basket price, (ii) a COP\$1,572,854 million decrease in revenues attributable to the decrease in our sales volume and lower services provided by our transportations and logistics segment. This decrease was partially offset by the 11.2% devaluation of the Colombian Peso against the U.S. dollar, from an average exchange rate of COP\$2,746.47/US\$1.00 in 2015 to an average exchange rate of COP\$3,053.42/US\$1.00 in 2016, resulting in an increase in sales revenue from exports, which represented an increase of COP\$4,168,061 million.

The decrease of our sales volume in 2016 as compared to 2015 was the result of (a) the 18.1%, or 36.4 mbe, decrease in our crude sales volume caused mainly by lower crude exports due to production decline, reduced purchases by third parties and lower availability of crude due to its use for feedstock at Reficar, and (b) the 15.6%, or 5.3 mbe, decrease in natural gas sales volume due to lower thermal demand as a result of the end of the “El Niño” weather phenomenon and the termination of our sales contract to Venezuela on June 30, 2015. This decrease in sales volume was partially offset by the 20.2%, or 26.8 mbe, increase in sales of refined products given the increase of operations at Reficar and higher demand due to the growth in the number of motor vehicles in Colombia.

In 2015, total revenues decreased by 20.7% as compared to 2014, primarily as a result of: (i) a COP\$27,847,772 million, decrease in revenues mainly due to the 49.7%, or US\$43.4 per barrel reduction of our average crude oil basket price. This decrease was partially offset by (i) the 37.28% devaluation of the Colombian Peso against the U.S. dollar, from an average exchange rate of COP\$2,000.68/US\$1 in 2014 to an average exchange rate of COP\$2,746.47/US\$1 in 2015, resulting in an increase in sales revenue from exports as well as in services provided by our transportation and logistics segment, which combined represented an upturn of COP\$13,312,094 million and (ii) COP\$882,873 million increase in revenues which was attributable to increase our sales volume.

The increase of our sales volume in 2015 as compared to 2014 was mainly the result of the 3.9%, or 4.97 mbe, increase in our refined products sales volume, which in turn was primarily the result of the 8.2% increase in local sales of refined products given higher demand caused mainly by the increase in the number of vehicles in Colombia, the higher consumption of diesel for energy generation at thermal power plants due to warmer weather caused by the El Niño climate phenomenon and supplying the border area with Venezuela due to that country’s decision to temporarily close its border with Colombia; partially offset by lower exports of fuel oil, as a result of the difficulties in transporting these products to port by means of the Rio Magdalena due to the reduced flow from this river. This increase in sales volume was partially offset by the 56.8%, or 3.8 mbe, decrease in natural gas exports due to the termination of our Venezuela sales contract on June 30, 2015 and the natural decline in production at the Guajira field.

#### **4.5.1.2 Cost of Sales**

Our cost of sales was principally affected by the factors described below. See Note 26 Cost of sales to our consolidated financial statements for more detail.

Cost of sales in 2016 was COP\$34,251,423 million, representing a COP\$2,743,093 million (7.4%) decrease as compared to 2015, primarily as a result of the following factors:

- A COP\$2,043,600 million decrease in the purchase costs of crude oil, natural gas and refined products, which were purchased for sales and in the case of raw materials for refining, which was primarily the result of (i) a lower average purchase prices due to the COP\$3,571,691 million decrease in international benchmark prices for crude oil, natural gas and refined products, and (ii) a COP\$142,758 decrease in volumes purchased due to the positive effect of a decrease in imports by Reficar and lower products imports by the Refinery of Cartagena given its beginning of operation partially offset by greater purchases of crude oil in the international market for its supply. This decrease was partially offset by a COP\$1,670,849 increase in the average exchange rate of the Colombian Peso against the U.S. dollar (which led to increased costs in Colombian Peso terms).



- A COP\$966,578 million increase in maintenance and contracted services cost, which was primarily the result of (i) a COP\$630,576 million decrease in contracted services, mainly due to cost savings achieved through the implementation of our business transformation plan and the transfer of the direct operation of the Rubiales field to Ecopetrol in July 2016, ; and (ii) a COP\$336,002 million decrease in maintenance costs, mainly due to savings achieved from our 2016 maintenance plan which included the renegotiation of fees and the optimization of time without affecting operations.
- A COP\$587,696 million decrease in transportation costs, which was the result of an optimization of the use of tanker trucks. This optimization included improvements in the pipeline transportation system for the transportation of heavy crude oil and consequently less use of tanker trucks, use of shorter transportation routes and renegotiation of fees for contracts.

The factors mentioned above were partially offset by a a) COP\$784,266 million increase in the amortization, depletion and depreciation of property, plant and equipment in connection with the start-up of the Reficar units and capitalization of major maintenance costs at the Barrancabermeja refinery and b) a COP\$70,515 million decrease in other minor items.

Cost of sales in 2015 was COP\$36,994,516 million, representing a COP\$5,980,612 million (13.9%) decrease as compared to 2014, primarily as a result of the following factors:

- COP\$4,900,941 million decrease in the purchase costs of crude oil, natural gas and refined products (primarily diluents, diesel and gasoline), which were purchased for sales and in the case of raw materials for refining, which was primarily the result of lower average purchase prices due to the COP\$12,068,310 million decrease in international benchmark prices for crude oil, natural gas and refined products. This decrease was partially offset by (i) a COP\$5,156,625 increase in the average exchange rate of the Colombian Peso against the U.S. dollar (which led to increased costs in Colombian Peso terms) and (ii) a COP\$2,010,744 million increase in volumes purchased from third parties, primarily consisting of increased purchases of gasoline volumes due to the closing of the Cartagena refinery for most of the year and increased local demand in Colombia caused by an increased number of automobiles and the closure of Colombia's border with Venezuela.
- A COP\$898,407 million decrease in maintenance and contracted services cost, which was primarily the result of (i) a COP\$585,705 million decrease in contracted services, mainly due to cost savings achieved through the implementation of our business transformation plan, operating cost optimizations contained in our partnership contracts for the Rubiales, Nare and Quifa fields, and lower costs related to the Cravo Norte field, in which our participation in 2015 was lower than in 2014; and (ii) a COP\$312,702 million decrease in maintenance costs, mainly due to savings achieved from our 2015 maintenance plan, which included the restructuring of maintenance services and quantities and the renegotiation of fees for field maintenance contracts.
- A COP\$357,835 million decrease in cost of sales, which was primarily the result from the accumulation of inventories due to the start-up of Reficar's operations.
- A COP\$94,625 million decrease in transportation costs, which was primarily the result of decreased use of tanker trucks as a result of the increased availability of pipelines due to greater operating stability and improved security conditions during 2015, which led to a decrease in attacks on our infrastructure.
- A COP\$70,032 million decrease in other minor items.

The factors mentioned above were partially offset by a COP\$341,228 million increase in the amortization, depletion and depreciation of property, plant and equipment, primarily as a result of higher investments in the Castilla, Chichimene, and Rubiales fields.

#### **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\$4,400,843 million in 2016, a COP\$ 955,872 million (17.8%) decrease as compared to 2015, mainly as a result of the following factors (see Notes 27 and 29 to our consolidated financial statements for more detail).

- A COP\$855,659 million decrease in exploratory expenses as a result of decreased seismic activity and fewer dry wells reported in the period;
- A COP\$309,746 million decrease in commissions, fees, freights and services due to optimization achieved through the implementation of the transformation program.

This decrease was partially offset by:

- A COP\$134,665 million increase in labor expenses mainly due to the implementation of a voluntary retirement plan. This plan includes benefits such as monthly income, education and health until the date on which the employees are granted their legal retirement pension.
- A COP\$74,868 million increase in other minor items.

Operating expenses and selling, general and administrative expenses before taking into account the impairment of our non-current assets amounted to COP\$5,356,715 million in 2015, a COP\$886,451 million (14.2%) decrease as compared to 2014, mainly as a result of the following factors:

- A COP\$992,045 million decrease in exploratory expenses as a result of decreased seismic activity and fewer dry wells reported in the period;
- A COP\$365,786 million decrease in general expenses due to optimization in commissions fees, services and agreements achieved through the implementation of the transformation program; and
- A COP\$157,433 million decrease in other minor items.

This decrease was partially offset by a COP\$628,813 million increase in taxes mainly due to the wealth tax applicable for year 2015, as no accrual was made for wealth tax expenses in 2014.

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 (recovery) of impairment of property, plant and equipment and natural resources, investments in companies and goodwill. The Company is exposed to certain future risks derived from variations in: a) oil prices, b) refining margins and profitability, c) cost profile, d) investment and maintenance, e) amount of recoverable reserves, f) market and country risk reflected on the discount rate, g) changes in domestic and international regulations, among others. Any change in the foregoing variables to calculate the recoverable amount can have a material effect on the recognition or recovery of impairment charges. For example, the exploration and production segment is highly sensitive to variation of hydrocarbon prices, while the refining segment is highly sensitive to changes in product prices and raw materials in the international market, the discount rate given the leveraging, the refining margins, changes in environmental regulations and the cost structure and the level of capital expenditures. (See Notes 3.2, 4.12, 17 and 28 to our consolidated financial statements for more detail). Impairment of non-current assets amounted to COP\$928,747 million in 2016, COP\$7,864,875 in 2015 and COP\$2,304,567 in 2014. These impairments are an accounting effect that does not involve any disbursement of resources and they are susceptible to reversion when the fair value of the asset exceeds its book value.

We recognized a smaller impairment in 2016 as compared to 2015 mainly by the variation in estimations of future prices which include the current scenarios of oil quota agreements of OPEC and the impact of changes in specifications issued by the Marpol (abbreviation of marine pollution) agreement on crude and fuels with high sulfur content. Additionally, the impairment recognized in 2016 included the effect of operational adjustments to the variables observed during Reficar's stabilization period and new ethanol prices affecting Bioenergy.

The impairments recognized in 2015 and 2014 were mainly due to the existing low oil price environment, which resulted in a reduction in forecasted crude oil prices and an increase in market and country risk, which had been reflected in the discount rate, as well as a reduction in the amount of recoverable reserves.

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

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

Finance results, net, amounted to a loss of COP\$1,175,367 million in 2016 as compared to a loss of COP\$7,663,104 million in 2015. This decrease in loss was mainly due to:

- The positive impact (COP\$6,543,044 million) resulting from the depreciation of the Colombian Peso against the U.S. dollar on our U.S. dollar net asset position. Our 2016 exchange rate gain was COP\$976,430 million, as compared to a loss of COP\$5,566,614 million in 2015.

The adoption of cash flow hedge accounting in October 2015 and the hedging of our net investment in June 2016 has allowed us to neutralize, overall, the effect of the exchange rate fluctuation over 88% of the U.S. dollar debt of Ecopetrol S.A., since exchange rate changes are recognized under other comprehensive income within equity.

- A COP\$688,664 million increase in financial income corresponding to the reversal of a provision we had set aside relating to a litigation concerning Santiago de las Atalayas (the "Comuneros"). In November 2016, the Ministry of Mines and Energy concluded that the amounts being held were not royalties and therefore not due to the Comuneros. The amounts belonged to Ecopetrol and therefore Ecopetrol recovered the provision it had been recognizing in its financial statements relating to this dispute. See Note 23.3 to our consolidated financial statement for more detail.
- A COP\$107,244 million increase in the valuation of our forward hedging operations used to mitigate the volatility of the exchange rate in the cash flow required for the operations of our subsidiary Ocesa, whose functional currency is the U.S. dollar.
- A COP\$145,191 million increase in other minor financial items.

This decrease in our financial loss was partially offset by a COP\$996,406 million increase in interest expenses as a result of (i) the recognition of Reficar's interest expenses which, up to 2015, had been capitalized (ii) the aggregate US\$475 million international loans we entered into in February and May 2016 and the US\$500 million international bond we issued in June 2016, and (iii) the negative effect the Colombian Peso had on our exchange rate on interest due on our foreign debt.

Finance results, net, amounted to a loss of COP\$7,663,104 million in 2015 as compared to a loss of COP\$3,510,669 million in 2014. This increase in loss was mainly due to:

- The negative impact (COP\$3,296,421 million) resulting from the depreciation of the Colombian Peso against the U.S. dollar on our U.S. dollar net liability position. Our 2015 exchange rate loss was COP\$5,566,614 million, as compared to a loss of COP\$2,270,193 million in 2014.

- A COP\$1,007,362 million increase in financial expenses due to higher interest expenses as a result of the US\$1,925 million international loan we entered into in February 2015 and the US\$1,500 million international bond we issued in June 2015 as well as the negative effect the Colombian Peso had on our exchange rate on interest due on our foreign debt.

This increase in our financial loss was partially offset by (i) a COP\$110,600 million gain resulting from the sale of shares in Empresa de Energía de Bogotá and dividends received from equity instruments and (ii) a COP\$40,748 million decrease in other minor financial expenditures.

For more details on our financial income and expenses see Note 30 – Finance results, net to our consolidated financial statements.

#### 4.5.1.6 *Income Tax*

Income taxes amounted to COP\$4,543,046 million in 2016, COP\$710,353 million in 2015 and COP\$5,434,855 in 2014. The above is equivalent to an effective tax rate of 58.3%, 12.7% and 48.9% in 2016, 2015 and 2014, respectively.

The increase in the effective tax rate from 2015 to 2016 was mainly due to: i) lower recovery of deferred tax asset, ii) the effect of the adjustment in deferred tax resulting from the application of the Colombian tax reform described above, and iii) the recognition of the presumptive tax on subsidiaries reporting tax losses.

The decrease in the effective tax rate from 2014 to 2015 was mainly due to: (i) foreign exchange losses and a related adjustment for foreign currency translation, (ii) an adjustment to the tax rate of entities whose tax rate differed from that of Ecopetrol S.A. and (iii) the implementation of a nondeductible wealth tax in 2015.

See Note 10 –Taxes to our consolidated financial statements.

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

As a result of the foregoing, in 2016, net income attributable to owners of Ecopetrol was COP\$2,447,881 million whereas, in 2015, net loss attributable to owners of Ecopetrol was COP\$7,193,859 million and, in 2014, net income attributable to owners of Ecopetrol was COP\$5,046,517 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, 2016, 2015 and 2014:

**Table 46 – Revenues by Business Segment**

	Year ended December 31,			% Change	
	2016	2015	2014	2016/2015	2015/2014
	(Colombian Pesos in millions)				
<b>Exploration and Production</b>	<b>28,221,210</b>	<b>31,732,611</b>	<b>45,155,191</b>	<b>(11.1)</b>	<b>(29.7)</b>
<b>Third parties</b>	<b>20,527,332</b>	<b>25,669,213</b>	<b>35,903,045</b>	<b>(20.0)</b>	<b>(28.5)</b>
Local crude oil	553,666	491,279	1,213,718	12.7	(59.5)
Foreign crude oil	17,278,579	21,181,265	30,835,510	(18.4)	(31.3)
Trading of crude oil	-	1,309,196	1,486,060	(100.0)	(11.9)
Natural gas local	1,988,336	1,845,345	1,346,625	7.7	37.0
Foreign natural gas	58,809	182,950	423,461	(67.9)	(56.8)
Other income	647,942	659,178	597,671	(1.7)	10.3
<b>Inter-segment net operating revenues</b>	<b>7,693,878</b>	<b>6,063,398</b>	<b>9,252,146</b>	<b>26.9</b>	<b>(34.5)</b>
<b>Refining and Petrochemicals</b>	<b>24,823,714</b>	<b>23,245,676</b>	<b>27,172,300</b>	<b>6.8</b>	<b>(14.5)</b>
<b>Third parties</b>	<b>24,194,024</b>	<b>22,456,866</b>	<b>26,612,204</b>	<b>7.7</b>	<b>(15.6)</b>
Local refined products	17,771,166	18,806,063	20,952,495	(5.5)	(10.2)
Foreign refined products	6,330,648	3,535,666	5,431,828	79.1	(34.9)
Other income	92,210	115,137	227,881	(19.9)	(49.5)
<b>Inter-segment net operating revenues</b>	<b>629,690</b>	<b>788,810</b>	<b>560,096</b>	<b>(20.2)</b>	<b>40.8</b>
<b>Transportation and Logistics</b>	<b>10,648,776</b>	<b>10,844,550</b>	<b>8,343,934</b>	<b>(1.8)</b>	<b>30.0</b>
<b>Third parties</b>	<b>3,764,205</b>	<b>4,221,192</b>	<b>3,456,639</b>	<b>(10.8)</b>	<b>22.1</b>
<b>Inter-segment net operating revenues</b>	<b>6,884,571</b>	<b>6,623,358</b>	<b>4,887,295</b>	<b>3.9</b>	<b>35.5</b>
<b>Eliminations of consolidations</b>	<b>(15,208,139)</b>	<b>(13,475,566)</b>	<b>(14,699,537)</b>	<b>12.9</b>	<b>(8.3)</b>
<b>Total revenues</b>	<b>48,485,561</b>	<b>52,347,271</b>	<b>65,971,888</b>	<b>(7.4)</b>	<b>(20.7)</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 47 – Net Income by Business Segment**

Net income by segment	Year ended December 31,			% Change	
	2016	2015	2014	2016/2015	2015/2014
	(Colombian Pesos in millions)				
Exploration and Production	1,322,370	(5,851,619)	5,089,841	(123)	(215)
Refining and Petrochemicals	(1,823,020)	(4,016,050)	(1,627,705)	(55)	147
Transportation and Logistics	2,960,449	2,819,759	1,758,777	5	60
Eliminations of consolidations	(11,918)	(145,949)	(174,396)	(92)	(16)
<b>Net Income attributable to owners of Ecopetrol S.A.</b>	<b>2,447,881</b>	<b>(7,193,859)</b>	<b>5,046,517</b>	<b>(134)</b>	<b>(243)</b>

**4.5.1.9 *Exploration and Production Segment Results***

In 2016, **exploration and production segment sales** were COP\$28,221,210 million, compared to COP\$31,732,611 million in 2015. In 2016, our segment sales decreased by 11.1% as compared with 2015 mainly as a result of:

- Lower sales of crude oil to third parties, which decreased by 20% in 2016 as compared to 2015 primarily due to: (i) a decline of 36.8 mmbbls in crude oil exports and volumes available for commercialization mainly due to the decrease in the Ecopetrol Group’s production and delivery of crude oil destined for exports to Reficar for its own operations (ii) a decrease in the price of our crude oil basket of US\$8.2 per barrel, (iii) a decrease of 2.0 mmbbl in sales of foreign natural gas mainly due to the termination of our Venezuela sales contract on June 30, 2015. Notwithstanding, the decrease in sales to third parties was partially offset by an increase in the devaluation of the Colombian Peso against the U.S. dollar and higher sales of crude oil and local natural gas, the latter resulting from an increase in the prices of the natural gas basket of US \$2/barrel, which was indexed to 2015 prices and impacted by the “El Niño” weather phenomenon; and
- Higher inter-segment revenues, which increased by 26.9% in 2016 as compared to 2015 mainly due sales of crude oil in order to supply the Cartagena refinery.

In 2015, exploration and production segment sales were COP\$31,732,611 million, compared to COP\$45,155,191 million in 2014. In 2015, our segment sales decreased by 29.7 % as compared with 2014 mainly as a result of:

- Lower sales of crude oil to third parties, which decreased by 28.5% in 2015 as compared to 2014 primarily due to: (i) a decline in crude oil exports mainly due to a decrease in the price of our crude oil basket of US\$43.9 per barrel, (ii) decreased local sales of crude oil mainly due to lower prices of crude oil and (iii) increased availability of our transport systems for foreign crude oil. The decrease in sales of crude oil to third parties was offset by an increase in our sales volume, particularly in respect of natural gas sales mainly due to increased demand from domestic thermal power plants as a result of the El Niño climate phenomenon, which resulted in lack of water for the hydroelectric generating plants; and

- Lower inter-segment sales, which decreased by 34.5% mainly due to: (i) lower prices of oil and gas sold to our refining and petrochemical segment and (ii) a greater percentage of oil purchased from third parties in the mix used in the Barrancabermeja Refinery.

**Cost of sales** affecting our exploration and production segment is mainly related to: (i) the amortization and depletion of our production assets, (ii) contracted services in partnership contracts and (iii) the 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 by transportation services.

In 2016, the cost of sales for this segment decreased by 10.6% as compared with 2015, due to the net effect of:

- Fixed costs decreasing by 3.7%, or COP\$268,558 million, in 2016 as compared to 2015, mainly due to (i) a decrease in contracted services, maintenance and operating materials as a result of the cost efficiencies achieved by the transformation plan, which involved reduction of contract fees and optimization of maintenance timing without affecting operations, and (ii) a decrease in services contracted in association with partners as a result of the return of the Rubiales and Cusiana contracts to Ecopetrol in July 2016, showing the operational capacity and efficiency of the segment. This decrease was partially offset by an increase in the costs of hydrocarbon transportation services as a result of a ship or pay contract, indexed to the U.S. dollar, between the exploration, production, transportation and logistics segments.
- Variable costs decreasing by 13.3%, or COP\$2,467,666 million, in 2016 as compared to 2015, as a result of (i) reduction in purchases of diluent as part of our cost efficiencies, strategy and lower production of heavy crude oil, (ii) lower volumes of crude oil purchases from the ANH, third parties and other products due to the fall in international prices and lower availability of crude oil due to lower production, (iii) lower transportation costs due to the optimization of the use of tanker trucks and savings due to the increase in viscosity for the transportation of heavy crude oil through pipelines, (iv) a decrease in services contracted in association with partners as a result of the return of the Rubiales and Cusiana contracts to Ecopetrol in July 2016, and (v) capitalization of inventories as a result of higher prices on purchases of crude oil, diluent in December 2016 compared to December 2015. This decrease was partially offset by an increase of electric power costs and process materials as chemicals and catalysts used in our direct operation of the Rubiales field and the increase in the average exchange rate of the Colombian Peso against the U.S. dollar (which led to increased costs in Colombian Peso terms).

In 2015, the cost of sales for this segment decreased by 8% as compared with 2014, due to the net effect of:

- Fixed costs increasing by 6.2%, or COP\$420,083 million, in 2015 as compared to 2014, mainly due to a COP\$860,539 million increase in the costs of hydrocarbon transportation services as a result of a ship or pay contract, indexed to the U.S. dollar, between the exploration and production and transportation and logistics segments of the Bicentenario pipeline, offset by COP\$440,456 million decrease in maintenance and contracted services cost as a result of the implementation of our business transformation plan.
- Variable costs decreasing by 12.5%, or COP\$2,638,994 million, in 2015 as compared to 2014, as a result of (i) lower costs related to our purchases of crude oil from the ANH and third parties as well as our purchases of refined products, in each case due to a decrease in international prices, and (ii) cost savings from our renegotiation of rates in some of our contracts.

In 2016, **operating expenses before impairment of non-current assets** decreased by 70.1% in 2016 as compared to 2015, primarily as a result of (i) lower expenses related to our exploratory activity as we engaged in less seismic activity and exploratory drilling, (ii) minor commissions, fees, freight and services as a result of the savings obtained in the implementation of our transformation plan, and (iii) a lower wealth tax. This decrease was partially offset by an increase in labor expenses due to the implementation of the voluntary retirement plan.

In 2015, operating expenses before impairment of non-current assets decreased by 23.9% in 2015 as compared to 2014, primarily as a result of (i) lower expenses related to our exploratory activity as we engaged in less seismic activity and exploratory drilling, (ii) a decrease in commissions, fees, freight and services as a result of cost savings related to our transformation program, and (iii) the recovery of provisions for litigation related to the payment of an electric-power-generation contribution by Ecopetrol S.A. and compensation to third parties for infringement of the free competition clause in the Garcero association contract. This increase was partially offset by an increase in the Colombian wealth tax.

The **impairment of non-current assets** recognized in the exploration and production segment in 2016, which totaled COP\$196,448 million in 2016 as compared to COP\$4,504,497 million in 2015, decreased by 95.6% as compared to 2015 mainly due to variation in estimations of future prices which include the current scenarios of oil quota agreements of OPEC and the impact of changes on specifications issued by the Marpol (abbreviation of marine pollution) agreement on crude and fuels with high sulfur content (See Note 17.1 to our consolidated financial statements for more detail).

The increased impairment charges for non-current assets in 2015, which totaled COP\$4,504,496 million as compared to COP\$965,607 million in 2014, was primarily due to the existing low oil price environment, which resulted in a reduction in forecasted crude oil prices and an increase in market and country risk, which was reflected in the discount rate, as well as a reduction in the amount of recoverable reserves. The most significant cash generation units impacted by the impairments were the following fields: in Colombia, Chichimene, Tibú, CP09, Apiay, Llanito and La Hocha and in the Gulf of Mexico, K2 and Dalmatian (see Note 17.1 to our consolidated financial statements for more details).

The segment recorded net income attributable to owners of Ecopetrol of COP\$1,322,370 million in 2016 as compared to net loss attributable to owners of Ecopetrol of COP\$5,851,619 million in 2015 and net income attributable to owners of Ecopetrol of COP\$5,089,841 million in 2014.

#### *Lifting and Production Costs*

The aggregate average production cost, on a Colombian Peso basis, has decreased to COP\$20,993 per boe during 2016 from COP\$21,732 per boe during 2015, primarily due to:

- Extension of our program for reducing operating costs as well as the implementation of our transformation program. The key optimization strategies contributing to decreased production costs are:
  - (i) Reduction in number of services due to equipment failure, equipment reuse for electric submersible pump (ESP), less maintenance and well monitoring, renegotiation of tariffs and decrease in time to well interventions.
  - (ii) Less tariffs on surface maintenance, reduction of costs by adjustment in integrity strategy, change in equipment inspection periods according to condition, decrease of tariffs of administrative items and prioritization of interventions.
  - (iii) Decrease in energy tariffs, reduction of generation with liquid fuels (Diesel - Fuel Oil No.4), increase in efficiency through the entry of our own generation centers and increase in electrical reliability.
  - (iv) Lower levels of chemical applied in the process of treatment of fluids, biological treatment insurance, reduction in production, transportation and disposal of oily waste and reduction of contracting, inspection and repair through renegotiation of contracts.

- (v) A decrease in production volumes in direct and associated contracts (excluding production tests and discovery of undeveloped fields), mainly due to smaller production in the Yarigui-Cantagallo and Pauto fields of direct operation and a decrease in production volumes from fields held as part of a partnership, such as Rubiales (first half of 2016), La Cira Infantas and Chuchupa, which in turn was primarily due to the prioritization of investments for assets of fast cash return and our policy of profitable fields.

As a result of the above-mentioned factors, our aggregate average production cost, on a Colombian Peso basis, decreased in 2016 as compared to 2015. On a dollar basis, it decreased to US\$6.88 per boe in 2016 from US\$7.92 per boe in 2015 also due to an 11.21% depreciation of the average exchange rate of the Colombian Peso against the U.S. dollar in 2016.

The aggregate average lifting cost, on a Colombian Peso basis, has decreased to COP\$19,799 per boe during 2016 from COP\$20,308 per boe during 2015, primarily due to:

- Continuation of our program for reducing operating costs as well as the implementation of our transformation program. The key optimization strategies contributing to decreased production costs are:
  - (i) Reduction in number of services due to equipment failure, equipment reuse for electric submersible pump (ESP), less maintenance and well monitoring, renegotiation of tariffs and decrease in time to well interventions.
  - (ii) Less tariffs on surface maintenance, reduction of costs by adjustment in integrity strategy, change in equipment inspection periods according to condition, decrease of tariffs of administrative items and prioritization of interventions.
  - (iii) Decrease in energy tariffs, reduction of generation with liquid fuels (Diesel - Fuel Oil No.4), increase in efficiency through the entry of our own generation centers and increase in electrical reliability.
  - (iv) Lower levels of chemical applied in the process of treatment of fluids, biological treatment insurance, reduction in production, transportation and disposal of oily waste and reduction of contracting, inspection and repair through renegotiation of contracts.
- A decrease in production volumes in direct and associated contracts (excluding production tests and discovery of undeveloped fields), mainly due to smaller production in the Yarigui-Cantagallo and Pauto fields of direct operation and a decrease in production volumes from fields held as part of a partnership, such as Rubiales (first half of 2016), La Cira-Infantas and Chuchupa, which in turn was primarily due to the prioritization of investments for assets of fast cash return and our policy of profitable fields.

As a result of the above-mentioned factors, our aggregate average lifting cost, on a Colombian Peso basis, decreased in 2016 as compared to 2015. On a dollar basis, it decreased to US\$6.49 per boe in 2016 from US\$7.40 per boe in 2015 also due to an 11.21% depreciation of the average exchange rate of the Colombian Peso against the U.S. dollar in 2016.

The difference between the aggregate average lifting cost and aggregate average production cost is that lifting costs do not include the costs related to consumption of hydrocarbons by us in our production process or that Ecopetrol sold 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, 2016, 2015 and 2014.



**Table 48 – Crude Oil and Natural Gas Average Prices and Costs**

	2016	2015	2014
Crude Oil Average Sales Price (U.S. dollars per barrel) <sup>(1)</sup>	35.7	43.9	87.3
Crude Oil Average Sales Price (COP\$ per barrel) <sup>(1)</sup>	108,337	118,115	173,769
Natural Gas Average Sales Price (U.S. dollars per barrel equivalent)	23.5	22.0	23.9
Natural Gas Average Sales Price (COP\$ per barrel equivalent)	71,893	60,120	47,912
Aggregate Average Unit Production Costs (U.S. dollars per boe) <sup>(2)</sup>	6.88	7.92	12.43
Aggregate Average Unit Production Cost (COP\$ per boe) <sup>(2)</sup>	20,993	21,732	24,872
Aggregate Average Lifting Costs (U.S. dollars per boe) <sup>(3)(4)(5)</sup>	6.49	7.40	11.29
Aggregate Average Lifting Costs (COP\$ per boe) <sup>(3)(4)(5)</sup>	19,799	20,308	22,581

(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. As a consequence, the information in the table above for this annual report (which has been prepared under IFRS) differs from the information we previously published for 2014 under Colombian Government Entity GAAP (where we did consolidate Savia Perú and Equion).

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

In 2016, our **transportation and logistics segment sales** were COP\$10,648,776 million compared to COP\$10,844,550 million in 2015. The 1.8% decrease in 2016 as compared with 2015 was mainly due to an 11.3% decrease in the volume of crude oil transported by our pipelines, which was primarily due to the production decrease at the national level, in spite of (i) the positive effect on our U.S. dollar-indexed transportation fees resulting from the devaluation of the Colombian Peso against the U.S. dollar and (ii) a 3.7% increase in the volume of refined products transported in the Galán-Sebastopol system to meet the demand for fuel in the country's interior and the start-up of Reficar. Sales to third parties decreased in 2016 as compared to 2015 primarily due to the segment received income from the transportation services to Pacific Rubiales 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.

In 2015, our transportation and logistics segment sales were COP\$10,844,550 million compared to COP\$8,343,934 million in 2014. This 30% increase in 2015 as compared with 2014 was mainly due to higher volume of crude oil transported by the Orensa, Caño Limón Coveñas and Oleoducto Transandino pipelines due to the decline in the number of attacks on our infrastructure and the positive effect on our U.S. dollar-indexed transportation fees resulting from the devaluation of the Colombian Peso against the U.S. dollar.

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\$3,349,791 million in 2016 as compared to COP\$3,744,422 million in 2015. The cost of sales for this segment decreased by 10.5% in 2016 as compared with 2015 mainly due a decrease in costs associated with maintenance, operating supplies and materials due to the continuity of our program to optimize our operating costs. This decrease was partially offset by an increase in material processing costs needed for power generation in pumping stations and an increase in depreciation due to a higher level of investments in the segment.

The cost of sales amounted to COP\$3,744,422 million in 2015 and COP\$3,941,052 million in 2014. The cost of sales for this segment decreased by 5% in 2015 as compared with 2014 mainly due to a decrease in costs associated with maintenance and operating supplies and materials. This decrease was partially offset by an increase in depreciation and amortization due to our increased investments in this segment.

In 2016, **operating expenses before the impairment of non-current assets** increased by 30.7% as compared to 2015 due to a recovery of environmental provisions in 2015, no similar recoveries in 2016 and an increase in labor costs as a result of the implementation of the voluntary retirement plan. This increase was partially offset by lower wealth and industry taxes.

In 2015, operating expenses before the impairment of non-current assets decreased by 16.2% as compared to 2014 due to decreased expenses related to social investment and security agreements, and more stable operations due to a decrease in repairs of our transportation systems. This decrease was partially offset by (i) the Colombian wealth tax implemented in 2015 and, (ii) increased depreciation and amortization.

The **impairment of non-current assets** recognized in the segment in 2016 which totaled COP\$41,062 million recovery in 2016 as compared to COP\$81,388 million expense in 2015, decreased by 150.5% as compared to 2015 mainly by the incorporation, in the assessment of the recovery amount of this segment's assets, of flows associated to the San Fernando - Apiay system project that affects the recoverable amount of the Llanos transportation line, partially offset by an increase in impairment of assets related to the southern transportation line. (See Note 17.3 to our consolidated financial statements for more detail).

The increased impairment charges for non-current assets in 2015, which totaled COP\$81,388 million as compared to a COP\$1,121 million recovery of impairment in 2014 was primarily due to Colombia's hydrocarbon production curves, based on the crude oil price environment and pipeline transportation rates (see Note 17.3 to our consolidated financial statements).

The segment recorded net income attributable to owners of Ecopetrol of COP\$2,960,449 million in 2016 as compared to net income of COP\$2,819,759 million in 2015 and COP\$1,758,777 million in 2014.

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

In 2016, the **refining and petrochemical segment sales** were COP\$24,823,714 million compared to COP\$23,245,676 million in 2015. In 2016, sales of refined products and petrochemicals increased by 6.8% as compared with 2015, mainly due to an increase in the volume of domestic and export sales mainly in mid-distillates due to the startup of operations at Reficar. This increase was partially offset by a decrease in our average products basket price due to the decrease in the international price of crude oil.

In 2015, the refining and petrochemical segment sales were COP\$23,245,676 million compared to COP\$27,172,300 million in 2014. In 2015, sales of refined products and petrochemicals decreased by 14.5% as compared with 2014, mainly due to: (i) a decrease in the international price of fuels and (ii) a decrease in foreign sales volumes of fuel oil due to the low water level in the Rio Magdalena. This decrease was partially offset by (i) an increase in the volume of domestic sales due to increased local demand for fuel resulting from an increased number of vehicles and the closure of Colombia's border with Venezuela that led to higher diesel demand and (ii) an increase in intercompany sales due to higher volumes of diluent sold to our exploration and production segment.

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 products to substitute for the loss of production due to the closure of Reficar as the new refinery was being built for most of 2014 and 2015, feedstock transportation services, services contracted for maintenance of the refinery and the amortization and depreciation of refining assets. Cost of sales amounted COP\$22,843,987 million in 2016, compared to COP\$20,758,808 million in 2015 and COP\$25,537,228 million in 2014.

In 2016, the cost of sales for this segment increased 10% as compared with 2015, principally due to the operation of Reficar's units in 2016 which led to (i) an increase in crude oil purchases through import and inter-segment transactions as Reficar required a special raw material or 'diet' during the stabilization and performance testing period which increased production cost, (ii) an increase in the depreciation of Reficar's units (iii) inventory consumption that had been in stock in December 2015, and (iv) higher costs for services contracted, materials of process, maintenance and electrical power. This increase was partially offset by lower imports of products and the excellent operational performance of the Barrancabermeja Refinery.

In 2015, the cost of sales for this segment decreased 18.7% as compared with 2014, principally due to lower raw material costs, which corresponded to the decrease in international oil prices and lower operating costs as a result of cost optimization at the Barrancabermeja Refinery. This decrease was partially offset by higher imports of gasoline due to increased local demand for fuel resulting from an increased number of vehicles and the closure of Colombia's border with Venezuela.

In 2016, **operating expenses before the impairment of non-current assets** increased by 27.3% as compared to 2015, due to an increase in labor expenses related to our voluntary retirement plan in 2016 and other expenses related to the start-up of operations at Reficar.

In 2015, operating expenses before the impairment of non-current assets increased by 23% as compared to 2014, due to higher levels of investment for the Reficar modernization project, the Colombian wealth tax implemented in 2015 and the increase in other expenses related to the start-up of operations at Reficar.

The **impairment of non-current assets** recognized in the segment in 2016, which totaled COP\$773,361 million in 2016 as compared to COP\$3,278,993 million in 2015, decreased by 76.4% as compared to 2015. The 2016 scenario incorporated the refining margins that include the effect of Marpol in 2016 compared to 2015, partially offset by the effect of adjustment of operational variables based on that observed during Reficar's stabilization period and new ethanol prices on Bioenergy's impairment (see Note 17.2 to our consolidated financial statements). As mentioned earlier, the refining segment is highly sensitive to changes in product prices and raw materials in the international market, the discount rate given the leveraging, the refining margins, changes in environmental regulations and cost structure and the level of capital expenditures.

The increased impairment charges for non-current assets in 2015, which totaled COP\$3,278,993 million in 2015 as compared to COP\$1,340,086 million in 2014 was recorded by the Cartagena Refinery due to the current low oil price environment, which resulted in a reduction in expected refining margins in the coming years, and an increase in market and country risk, which has been reflected in the discount rate (see Note 17.2 to our consolidated financial statements).

The gross margin in 2016 was 8%, compared to 10.7% in 2015. The decrease in the gross margin was explained principally by decreased operational activity during the period of stabilization and testing of Reficar.

The gross margin in 2015 was 10.7%, compared to 6% in 2014. The increase in the gross margin was explained principally by decrease in the oil price (feedstock) compared to the decrease in fuel prices (output).

The refining and petrochemicals segment recorded net loss attributable to owners of Ecopetrol of COP\$1,823,020 million in 2016 as compared to a net loss attributable to owners of Ecopetrol of COP\$4,016,050 million in 2015 and COP\$1,627,705 million in 2014.

#### **4.6 Liquidity and Capital Resources**

Our principal sources of liquidity in 2016 were cash flows from our operations amounting to COP\$14,232,940 million, and cash flows from financing activities, mainly from the proceeds of our net movement of indebtedness, which totaled COP\$ 1,444,723 million.

Our principal uses of cash in 2016 were (i) COP\$5,837,477 million in capital expenditures, which included investments in property, plant and equipment and natural and environmental resources and (ii) COP\$5,446,507 in investment of liquidity surpluses in portfolios, (iii) dividend payments for the fiscal year 2015 amounting to COP\$1,712,298 million, which included the last installment of dividends to the majority shareholder relating to fiscal year 2014 for COP\$690,177 million and the payment of dividends to non-controlling interest in 2016 for COP\$1,022,121 million.

On January 29, 2016, we entered into an international credit agreement for an aggregate amount of US\$175 million with The Bank of Tokyo-Mitsubishi UFJ, Ltd. The credit agreement has a term of five years, repayable with a 2.5 year grace period on principal and interest, payable semi-annually at a rate of Libor plus 145 basis points.

On February 23, 2016, we entered into a bilateral commercial loan agreement with Bancolombia S.A. for COP\$990 billion (approximately US\$330 million at the representative exchange rate of as of December 31, 2016). This loan agreement had a term of 8 years and a 2-year grace period on principal, with interest payable semiannually at a rate of DTF TA plus 560 basis points. Ecopetrol prepaid this loan in full with excess liquidity in October 2016.

On May 16, 2016, we entered into a bilateral commercial loan agreement with Export Development Canada, an export promotion agency of the Canadian Government for US\$ 300 million. This loan agreement has a term of five years, with interest payable semi-annually at rate of six-month Libor + 140 basis points.

On June, 2016, we issued US\$500 million (COP\$1,500 billion according to the COP\$/US\$ exchange rate as of December 31, 2016) aggregate principal amount of our SEC-registered 5.875% notes due 2023. The notes were listed on the NYSE.

#### **4.6.1 Review of Cash Flows**

##### ***Cash from operating activities***

Net cash provided by operating activities increased by 21.9% in 2016 as compared to 2015, mainly as a result of (i) lower working capital needs mainly due to the higher oil prices observed at the end of 2016 versus the end of 2015, (ii) a 4% increase in our operational income before depreciation, depletion and amortization (DD&A) and impairment of non-current assets resulting from a decrease in our costs and operational expenses (before DD&A and impairment) due to our savings generated by the transformation plan. This increase was partially offset by (i) the decrease in international prices of crude oil during 2016, and (ii) an increase in income tax paid by the transportation and logistics segment due to the better results in 2015.

Net cash provided by operating activities decreased by 35.6% in 2015 as compared to 2014, mainly as a result of: (i) a 33.2% decrease in our gross income resulting from the decrease in international prices of crude oil during 2015 and (ii) higher operating expenses due to the Colombian wealth tax implemented and paid in 2015. This decrease was partially offset by a decrease in income tax paid due to the decrease in our income before tax for the year and lower working capital needs due to a decrease in inventories, trade receivables and accounts payable.

##### ***Cash used in investing activities***

In 2016, net cash used in investing activities decreased by 26.8% as compared to 2015, mainly as a result of: (i) a 62.4% decreased investments in capital expenditures due to the effect of decreasing oil prices and the end of the Reficar modernization project, and (ii) additional cash proceeds from the sale of our investments in Empresa de Energia de Bogotá and Interconexion Electrica S.A., which totaled COP\$966,715 million in the aggregate. This decrease was partially offset by increased investments of our excess liquidity in our investment portfolios, which in turn resulted from the savings we achieved and the recovery of the price of oil during the second half of 2016.

In 2015, net cash used in investing activities decreased by 2.4% as compared to 2014, mainly as a result of: (i) a decrease in the amount of dividends we received from associates and joint ventures companies (ii) slightly larger investments in capital expenditures, mainly relating to the Reficar modernization project and our drilling campaigns, primarily in the Castilla, Chichimene and Rubiales fields, and (iii) a lower net cash contribution from purchase and sale of fixed income investments. This decrease was partially offset by cash proceeds from the sale of our investment in Empresa de Energia de Bogotá, which totaled COP\$613,998 million.

### ***Cash used in financing activities***

Net cash used in financing activities increased by 98.5% in 2016, as compared to 2015, due to a decrease in cash from borrowings of COP\$5,151,937 million which was partially offset by a decrease in dividends payments of COP\$3,781,099 million in 2016 as compared to 2015.

Net cash used in financing activities decreased by 81% in 2015, as compared to 2014, due to a COP\$7,023,166 million decrease in dividend payments, which was partially offset by an increase in borrowing and interest payments of COP\$1,069,146 million in 2015 as compared to 2014, which in turn was due to the US\$1,925 million international loan we entered into in February 2015 and the US\$1,500 million international bond we issued in June 2015.

#### ***4.6.2 Capital Expenditures***

Our consolidated capital expenditures in 2016, 2015 and 2014 were COP\$5.8 trillion, COP\$15.5 trillion and COP\$15.6 trillion, respectively. These investments were distributed by business segment on average, for the past three years as follows: 61.2% for the exploration and production segment, 22.1% for refining and petrochemicals and 16.7% for the transportation and logistics segment. See Note 34.1.2 to our consolidated financial statements for more detail about capital expenditures by segment.

Our investment plan approved for 2017 totals US\$3,500 million. The investments will be distributed as follows: 81% for exploration and production, 10% for refining and petrochemicals, 8% for transportation and logistics, and 1% for other investments.

The resources required for the investment plan will be funded through internal cash generation with no need to raise additional net financing.

#### ***4.6.3 Dividends***

In 2016, we paid the last installment of dividends relating to our net income to the Nation of COP\$690,177 million and our transportation and logistics' subsidiaries paid dividends to their non-controlling shareholder for COP\$1,022,121 million. Given the net loss we reported in 2015, our shareholders at the ordinary general shareholder's meeting did not approve distribution of dividends for 2015.

On March 31, 2017, our shareholders at the ordinary general shareholders' meeting approved dividends for the fiscal year ended December 31, 2016 amounting to COP\$945,684 million, or COP\$23 per share, based on the number of outstanding shares as of December 31, 2016. The dividend was paid in one installment on April 28, 2017.

#### ***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, 2016, 2015 and 2014, in accordance with Colombian IFRS and IFRS:

**Table 49 – Consolidated Net Income and Equity**

	For the year ended December 31, (Colombian Pesos in millions)			% Change	
	2016	2015	2014	2016/2015	2015/2014
<b>Net income attributable to owners of Ecopetrol (IFRS)</b>	<b>2,447,881</b>	<b>(7,193,859)</b>	<b>5,046,517</b>	<b>(134.0)</b>	<b>(242.6)</b>
Cash flow hedge for future company exports	(494,604)	2,140,553	–	(123.1)	N/A
Exchange rate effects on tax bases – Deferred tax	(388,568)	1,065,580	678,983	(136.5)	56.9
<b>Net income Attributable to owners of Ecopetrol (Colombian IFRS)</b>	<b>1,564,709</b>	<b>(3,987,726)</b>	<b>5,725,500</b>	<b>(139.2)</b>	<b>(169.6)</b>
<b>Net Equity (IFRS)</b>	<b>43,560,501</b>	<b>43,100,963</b>	<b>48,534,228</b>	<b>1.1</b>	<b>(11.2)</b>
Cash flow hedge for future company exports	(39,803)	(74,259)	–	(46.4)	N/A
Exchange rate effects on tax bases – Deferred tax	1,799,020	2,205,064	998,440	(18.4)	120.9
<b>Net Equity (Colombian IFRS)</b>	<b>45,319,718</b>	<b>45,231,768</b>	<b>49,532,668</b>	<b>0.2</b>	<b>(8.7)</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 *Contaduría General de la Nación* (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 differences, for the year ended December 31, 2016, our net income as reported under IFRS was COP\$494,604 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 result attributable to the aforementioned difference in accounting policies does not generate deferred taxes at December 31, 2016.

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, 2016, our net income attributable to owners of Ecopetrol as reported under IFRS was COP\$388,568 million higher 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\$86,781 million in 2016 and COP\$418,872 million in 2015 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\$71,056 million in 2016 and COP\$81,808 million in 2015 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, 2016, we reported 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. For the year ended December 31, 2015, these same accounting differences led us to report a net loss under IFRS of COP\$7,193,859 million as opposed to a net loss of a COP\$3,987,726 million reported under Colombian IFRS for the same period.

#### 4.8 Financial Indebtedness and Other Contractual Obligations

As of December 31, 2016, we had outstanding consolidated indebtedness of COP\$52.2 trillion, which corresponded primarily to the following long-term transactions:

**Table 50 – Consolidated Financial Indebtedness**

Company	Type	Initial Date	Original Amount	Maturity	Interest Rate	Amortization		
Ecopetrol S.A.	Bonds	July 23, 2009	US\$1,500 million	July 23, 2019	7.625%	Bullet		
		September 18, 2013	US\$350 million	September 18, 2018	4.250%	Bullet		
		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\$138,700 million	December 1, 2017	Floating	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\$120,950 million	August 27, 2018	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		
		Reficar	Bank Loans*	May 27, 2013	COP\$1,839 billion**	May 24, 2025	Floating	Semi-annual
				February 12, 2015	US\$1,925 million	February 12, 2020	Floating	Bullet
January 29, 2016	US\$175 million			February 11, 2021	Floating	Semi-annual		
Ocenca	ECAs	March 22, 2013	US\$245 million	July 25, 2023	Floating	Semi-annual		
		March 22, 2013	US\$151 million	July 6, 2019	Floating	Semi-annual		
Oleoducto Bicentenario	Project Finance	May 16, 2016	US\$300 million	May 24, 2021	Floating	Bullet		
Ocenca	Bond	December 30, 2011	US\$3,497 million	December 20, 2027	Floating / Fixed	Semi-annual		
Oleoducto Bicentenario	Bond	May 7, 2014	US\$500 million	May 7, 2021	4.000%	Bullet		
Oleoducto Bicentenario	Bank Loan	July 5, 2012	COP\$2,100 billion**	July 5, 2024	Floating	Quarterly		
ODL	Bank Loan*	August 1, 2013	COP\$800,000 million**	August 1, 2020	Floating	Quarterly		

\* Reopening of bond due to 2023.

\*\* Bank loans refinanced from their original conditions.

The long term debt transactions executed in 2016 were as follows:

- On January 29, 2016, Ecopetrol S.A. entered into an international credit agreement in an aggregate amount of US\$175 million with The Bank of Tokyo-Mitsubishi UFJ, Ltd. The credit agreement has a term of five years and a 2.5 year grace period on principal, with interest payable semi-annually at a rate of Libor plus 145 basis points.
- On February 23, 2016, Ecopetrol S.A. entered into a bilateral commercial loan agreement with Bancolombia S.A. in an aggregate amount of COP\$990 billion (approximately US\$330 million at the representative exchange rate as of December 31, 2016). This loan agreement had a term of 8 years and a 2-year grace period on principal, with interest payable semiannually at a rate of DTF TA plus 560 basis points. As of the date of this annual report, this loan has been prepaid in full.

- On May 16, 2016, Ecopetrol S.A. entered into a bilateral loan agreement with Export Development Canada (EDC), an agency for the promotion of exports of the Government of Canada, in an aggregate amount of US\$300 million. This loan agreement has a term of 5 years with principal due at maturity and interest payable semiannually at a rate of LIBOR plus 140 basis points.
- On June 15, 2016, Ecopetrol S.A. reopened its SEC-registered 5.875% Notes due 2023 in an aggregate amount of US\$500 million (COP\$1,500 billion according to the COP\$/US\$ exchange rate as of December 31, 2016). The notes were listed on the NYSE.
- On November 16, 2016, the Financial Superintendence of Colombia authorized Ecopetrol's Bond Issuance and Allocation Programme renewal for three additional years, up until November 10, 2019. Thus far, Ecopetrol has issued under the Programme COP\$ 900 billion. The Programme has a remaining amount of up to COP\$2,100 billion and no modifications were made during the renewal process.

### 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, 2016.

**Table 51 – Our Contractual Obligations**

COP\$ in millions	Payments due by period				
	Total	Less than 1 year	1 to 3 years	3 to 5 years	More than 5 years
<b>Contractual obligations</b>					
Employee Benefit Plan	26,365,279.0	1,125,105.0	2,322,451.0	2,420,570.0	20,497,153.0
Contract Service Obligations	5,991,167.1	2,378,785.4	2,407,447.8	429,061.3	775,872.7
Operating Lease Obligations	652,681.2	190,875.0	157,100.1	118,815.1	185,891.0
Natural Gas Supply Agreements	2,107,163.5	229,202.5	495,130.2	395,420.0	987,410.9
Purchase Obligations	1,318,087.2	624,323.3	571,858.9	74,385.0	47,520.0
Energy Supply Agreements	795,408.8	97,418.0	155,820.8	121,267.0	420,902.9
Capital Expenditures	621,571.7	423,021.94	169,321.7	29,228.1	-
Build, Operate, Maintain and Transfer Contracts (BOMT)	576,758.8	65,155.9	114,724.0	113,351.5	283,527.4
Capital (Finance) Lease Obligations	381,838.6	254.1	23,649.2	40,011.2	317,924.1
Financial Sector Debt	20,162,033.8	1,333,129.9	3,181,732.0	9,712,744.3	5,934,427.7
Bonds	30,909,787.0	138,700.0	5,672,263.5	1,980,255.0	23,118,568.5
<b>Total</b>	<b>89,881,776.78</b>	<b>6,605,971.01</b>	<b>15,271,499.17</b>	<b>15,435,108.32</b>	<b>52,569,198.28</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, 2016, 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

##### Ongoing Trends

Ecopetrol updated its 2020 Business Plan on September 29, 2016. This Plan is based on three fundamental pillars: i) protection of cash and cost efficiency; ii) strict capital discipline; and iii) growth in reserves and production; these pillars will strengthen the Company's financial sustainability and afford it opportunities for both organic and inorganic growth, generating value and profitability for its shareholders.



According to this business plan, during 2017 the Company will continue to pursue its transformation to ensure operational and financial sustainability. Ecopetrol has named Phase 3.0 of the business Transformation plan “Ecopetrol’s New Frontier”. It will focus on opening up new markets; multi-year fields development plans; improved return on assets; attracting and retaining the best human talent; committing ourselves to integrity, safe operations, environment consciousness and joint prosperity with communities in which we operate and execute projects.

We believe that our strategy of diversifying our export destinations and sales under term contracts with fixed discounts to reference prices will help to mitigate the impact of the current crude oversupply over the spread of our export basket. We forecast a discount between US\$9 and US\$10 per barrel compared to ICE Brent crude in 2017.

Furthermore, with the full operation of all units of Reficar since 2016 and shifting from stabilization to optimization, Ecopetrol’s trade balance is expected to continue improving due to the reduction of gasoline imports and incremental exports of fuels. Reficar’s fuels production is expected to continue being allocated primarily in the domestic market, with a surplus to be exported.

Adding reserves and maintaining the pace of production are the Company’s focus. The exploration campaign will be focused in regions of high prospectivity. Investment in exploration will rise from US\$ 282 million to US\$ 650 million, thus increasing offshore wells from one to six and onshore wells from five to 11 from 2016 to 2017. Enhanced recovery will continue to leverage additional reserves in mature fields.

We stress that a strong cash position allows us to assess opportunities for inorganic growth of Ecopetrol ‘s reserves.

The Company expects to continue the divestment program and expects to receive during 2017 between US\$500 and US\$1,000 million. The Company is in the process of carrying out the sale of non-strategic assets and shareholdings, such as Propilco, its remaining shares in Empresa de Energía de Bogota and minor production fields.

In order to preserve its investment grade ratings, the Company seeks to maintain financial sustainability and adequate levels of indebtedness. In 2016 international bonds were issued totaling US\$ 500 million and commercial loans were entered into totaling US\$ 475 million. Going forward, and according with the assumptions of the business plan, the Company does not foresee the issuance of new debt or short-term financing.

The Company will continue monitoring oil price scenarios to make the proper decisions and take preventive actions to ensure financial sustainability in 2017 such as: prioritization of investments associated with regulatory commitments and project completion, temporary closing of producing assets with negative margins, redefining and prioritizing maintenance activities and additional austerity measures related to administrative expenses, sponsorships and labor recruitment.

## **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, 2016, taking into account ICE Brent crude oil prices that reasonably reflect management’s view of crude oil prices given prevailing market conditions.

**Table 52 – 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, 2016	1,033	3,218	1,598
Sensitivity Scenario	1,182	3,252	1,752
<b>Difference (million barrels)</b>	<b>149</b>	<b>34</b>	<b>154</b>
<b>Difference (%)</b>	<b>14.4</b>	<b>1</b>	<b>9.6</b>

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\$55 per barrel in 2017, US\$60 per barrel in 2018, US\$65 per barrel in 2019, US\$70 per barrel in 2020 and US\$75 per barrel onwards.
- The base scenario on which our sensitivity analysis is made corresponds to our oil, NGL and natural gas reserves, as of December 31, 2016, as presented elsewhere in this annual report.
- Other variables such as the operating costs, capital costs and portfolio price were not varied 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, 2016, due to variations of US\$1 in the price of ICE Brent crude and of 1% in the COP\$/US\$ exchange rate.

**Table 53 – Results of Reserves’ Sensitivity Analysis**

	Income Statement 2016	Income Statement Case ICE Brent <sup>(1)</sup> + US\$1	Difference Between Real 2016 and Case ICE Brent	Income Statement Case TRM <sup>(2)</sup> - 1%	Difference Between Real 2016 and Case TRM
	(COP\$ in billions)				
Revenue	48,485,56	49,398,37	912,81	48,931,98	446,42
Cost of sales	34,251,42	34,606,79	355,37	34,472,25	220,83
<b>Gross Income</b>	<b>14,234,14</b>	<b>14,791,58</b>	<b>557,44</b>	<b>14,459,73</b>	<b>225,60</b>
Operating expenses	4,400,84	4,400,84	-	4,400,84	-
Impairment of non-current assets	928,75	928,75	-	928,75	-
<b>Operating income</b>	<b>8,904,55</b>	<b>9,461,99</b>	<b>557,44</b>	<b>9,130,14</b>	<b>225,60</b>
Finance results, net	(1,175,37)	(1,175,37)	-	(1,175,37)	-
Share of profit of associates and joint ventures	61,35	61,35	-	61,35	-
<b>Income before income tax</b>	<b>7,790,53</b>	<b>8,347,97</b>	<b>557,44</b>	<b>8,016,12</b>	<b>225,60</b>
Income Tax	(4,543,05)	(4,868,12)	(325,07)	(4,674,60)	(131,56)
<b>Net Income</b>	<b>3,247,48</b>	<b>3,479,85</b>	<b>232,37</b>	<b>3,341,52</b>	<b>94,04</b>

(1) ICE Brent = US\$45 per barrel

(2) Exchange rate (TRM) = COP\$3,051/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 2016, 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 2016. Prices assumed correspond to realized prices for crude oil, natural gas and refined products for 2016, 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 2016. Prices assumed correspond to realized prices of crude oil, natural gas and refined products in 2016 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 2016).
- The income tax for each of our sensitivity analyses (price of ICE Brent and COP\$/US\$ exchange rate) is estimated using the effective corporate tax rate of 58% for 2016.

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 54**

**VARIATION ON ICE BRENT REFERENCE PRICE**

**VARIATION ON AVERAGE EXCHANGE RATE**

	<b>REVENUE</b>	
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, 2016, 2015 and 2014, 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\$101.80 per barrel in 2014, US\$55.57 per barrel in 2015 and US\$44.49 per barrel in 2016. Mainly as a result of the pronounced fall in hydrocarbon prices between 2014 and 2015, the Company recognized a reduction in oil and gas proven reserves of 11% in 2015 as compared to 2014, to 1,849 mmbob in 2015 from 2,084 mmbob in 2014. In 2016, the Company recognized a reduction in oil and gas proven reserves of 14% in 2016 as compared to 2015, to 1,598 mmbob in 2016 from 1,849 mmbob in 2015. 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 signs of impairment to its assets or cash-generating units (CGUs) due to the difference between the carrying amount of such assets or CGUs as opposed to their recoverable amounts, using reasonable assumptions, based on internal and external factors, which reflect market conditions. The recoverable amount is calculated 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.

Impairment charges for non-current assets in 2016 amounted to COP\$928,747 million before taxes as a result of the evaluation of the recoverable amount of the assets value which includes the variation in estimations of future prices under the current scenarios of OPEC's oil quota agreements and the impact resulting from changes on specifications issued by the International Marine Organization agreement regarding marine pollution, Marpol, on crude and fuels with high sulfur content. For additional information about this impairment charges, see Notes 14, 17 and 28 to our consolidated financial statements.

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, 2016. Based on these calculations, assuming an average price per barrel of ICE Brent crude oil of US\$55 per barrel in 2017, US\$60 per barrel in 2018, US\$65 per barrel in 2019, US\$70 in 2020 and US\$75 per barrel for later years, Ecopetrol could recognize an increase in oil and gas proved reserves of approximately 9.6%. 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*.

Moreover, any downward revision in our estimated quantities of proved reserves would indicate lower future production volumes, which could result in higher expenses for depreciation, depletion and amortization for properties to which we apply the units of production method for calculating these expenses. These higher expenses, and any lower revenues as a result of actual production volumes and realized prices, could adversely impact 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 successful development of additional reserves.***

Our long-term growth objectives depend largely on our ability to discover and/or acquire new reserves, and in turn developing them successfully and improving the recovery factor in our mature oil fields. 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.

If we are unable to 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 2016, in Ecopetrol, approximately 91.7% of the revenues came from sales of crude oil, natural gas and refined products and 91% of the total volume sold of these products is 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, such as the current oversupply of crude oil; inventory levels; changes in the cost of capital; adverse economic conditions; global financial crises; development of 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; development or availability of alternative fuels; weather conditions; natural events or disasters; and terrorism and global conflict. In 2016 the impact of an oversupplied market was put to test, as OPEC changed its traditional controlling role and let the market find its own balance. The price of crude oil may also fluctuate due to changes in demand. For example, Brexit's impact on crude oil demand for 2017 is expected to be moderate, the Petroleum Industry Research (PIRA Energy Group) estimates a short-term impact of US\$2 per barrel on crude oil due to a reduction between 100-200 KBD in demand for gasoline, middle distillates and other products.

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 2016, our crude oil basket price was US\$35.7 per barrel versus US\$43.9 per barrel in 2015; the refined product basket price was US\$50.1 per barrel versus US\$63.4 per barrel in 2015; and the natural gas price was US\$23.5 per barrel equivalent in 2016 versus US\$22.0 per barrel equivalent in 2015. 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.

Impairment charges for non-current assets in 2016 amounted to COP\$928,747 million before taxes as a result of the evaluation of the recoverable amount of the assets' value which includes the variation in estimations of future prices under the current scenarios of OPEC's oil quota agreements and the impact resulting from changes on specifications issued by the International Marine Organization agreement regarding marine pollution, Marpol, on crude and fuels with high sulfur content. For additional information about this impairment charges, see Notes 14, 17 and 28 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 is 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, 2016 our U.S. dollar-denominated total debt was US\$15.2 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\$12 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 the 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, 88%, or \$10.5 billion, of Ecopetrol S.A.'s debt in U.S. dollars 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 7.05% against the U.S. dollar in 2014, 37.28% in 2015 and 11.18% in 2016. Additionally, as of December 31, 2016, the Colombian Peso appreciated 4.72%, but depreciated as of December 31, 2015 and 2014, 31.64% and 24.17%, respectively, from year-end exchange in the previous year. In addition, given the political uncertainty surrounding the United States of America following the recent presidential election and the unpredictability in the economic performance of some developed countries, there is no clear view of how the U.S. dollar 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, as the U.S. currency will respond immediately to any new opportunities or challenges to the U.S. economy.

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 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 31.2 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 and the US Gulf of Mexico, where we both 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 which 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—Exploration Activities—Exploration Activities Outside of Colombia* for a summary of our current deep-water drilling activities.

As a result of the oil spill in the Macondo field operated by British Petroleum 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.

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. Financial problems experienced by our customers could result in the impairment of our assets, a decrease in our operating cash flows and may also reduce or curtail 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.***

In recent years, particularly during the last quarter of 2015 and the first quarter of 2016, due to significant decrease in oil prices, domestic and global financial markets and economic conditions have been weak and volatile and have contributed significantly to a substantial deterioration in the credit markets. A new financial crisis, remaining volatility in prices in the oil and gas sector, the spread in protectionist policies in the United States and Europe, the lack of consensus among OPEC members 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 also 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. On January 18, 2016, our senior unsecured debt ratings were downgraded to Baa3 from Baa2 by Moody's Investors Service, and Standard & Poor's (S&P) and Fitch Ratings revised our outlook from stable to negative on January 29 and July 26, 2016, respectively. 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 16, 2016, S&P revised the outlook of the Republic of Colombia to negative. While on March 14, 2017, Fitch Ratings upgraded our outlook from negative to stable following the upgrade from the Republic of Colombia from negative to stable also in March 2017, 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. Interest rates in the United States may continue rising due to Federal Reserve's monetary policy, which is looking for economic activity expansion at a moderate pace, labor market conditions strengthening and inflation stability to 2% over the medium term.

As of December 31, 2016, approximately 31%, or US\$5.4 billion (COP\$16.2 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 you 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, 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.***

As part of our strategic plan, we operate through business partners, subsidiaries or affiliates outside of Colombia. We currently have investments, joint ventures and subsidiaries incorporated in Peru, Brazil, Bermuda, Panama, the Cayman Islands, Switzerland, Germany, 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 you that future governments will maintain policies favorable to foreign investment or repatriation of capital.

We began exploration activities outside Colombia in 2006 through our Brazilian subsidiary, Ecopetrol Óleo e Gás do Brasil Ltda. Our foreign subsidiaries have subsequently entered into a number of joint venture exploration agreements with regional and international oil companies to explore acreage in Brazil and the U.S. Gulf Coast. We have limited experience exploring outside Colombia. 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 improvements in the production and transportation of heavy crude oil, the exploitation of mature fields, and reductions in our operating cost. If we do not develop the right technology or do not obtain the expertise to operate new technology or to improve our processes, do not have access to, or do not deploy the knowledge necessary to apply and improve such technology effectively, the execution 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 development and deployment of new technologies but also in the response of the reservoir to the application of this recovery technology.

***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 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 creativity and determination.

***Our operations may not be able to keep pace with the increasing domestic demand for natural gas.***

According to the Colombian Energy and Gas Regulatory Commission (CREG) Resolution 089 of 2013, a supplier of natural gas must possess sufficient economically viable natural gas reserves before executing a natural gas delivery contract with a customer. In the long term, we may not be able to keep up with increasing local demand for natural gas if demand outpaces the rate of growth of our natural gas supply, especially because of the decline of our main fields. As a result, we may lose market share, which may negatively impact our financial condition and results of operations.

Additionally, we are currently party to a number of natural 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. In 2016, we paid a penalty due to a cut in operations that occurred on October 12, 2016. This cut was caused by an operational failure in the ignition system of the Guajira B compression train, which caused an unavailability of gas supply, which in turn affected gas demand in a portion of the industrial and thermal sectors.

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 2016, we cannot assure you 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.

We are prohibited by law from holding more than 25% of the equity of any natural gas transportation company. 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 in 2018, we can offer no assurance that they prove successful.

***Our operations have and may continue to be affected by reactions of labor unions, social organizations and contractors to organizational changes and other management decisions.***

Due to the volatility of the markets and the existing low oil price environment, we have and will continue to undertake measures to enhance operating cost efficiency. Such measures involve changes in cost structure, downsizing our staff (including direct and indirect employees), and budget cuts, among others. Unions, contractors and social organizations in the communities where we have operations have in the past and may continue to oppose such measures causing work stoppages or decreasing productivity, which could have an adverse effect on our operations and financial condition.

In addition, our current collective bargaining agreement has been in effect since 2014 and has a term of five years, expiring June 30, 2018. There will be no changes to these terms until 2018; therefore, we do not expect any adverse reactions from our labor unions relating to this matter. However, we cannot assure you 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, and (ii) increased temperatures, which could have a direct impact on our workers’ health given an increased occurrence of heat waves and the increased occurrence of epidemics and diseases. 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 carry out activities in areas classified by the Government as indigenous reserves (*resguardos*) and Afro-Colombian lands (*territorios colectivos*). 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 disparate 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 (v) the economic and regulatory environment in countries in which we have made acquisitions and (vi) crude oil prices. 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 additional financial support to Bioenergy and Reficar in spite of the recent completion of their projects***

Reficar raised US\$3.5 billion through a limited-recourse project financing in which Ecopetrol S.A. provided both construction support and debt service guarantee and was also the sponsor of the financing. If Reficar experiences any situation that might affect the fulfillment of its financial obligations, Ecopetrol S.A. must provide financial support to Reficar, through capitalizations, subordinated loans or even the assumption of the debt. These situations might be related, but are not limited to, labor productivity, failure of the upgraded refinery to reach the expected performance level in terms of the quality of products and/or volumes produced. See the section *Business Overview—Refining and Petrochemicals—Refining—Reficar*.

Also, Bioenergy's ethanol plant, that was financed with COP\$123 billion through bilateral loans for its agricultural component and COP\$382 billion through an infrastructure leasing for its industrial component, may also meet situations such as social unrest, strikes or other operational difficulties that could negatively impact its operation and financial results. Although Ecopetrol is not the sponsor and has not provided financing guarantees to Bioenergy, some additional financial support might be needed to assure the stabilization of the project.

Any situation that could affect the operations of these subsidiaries may have a negative impact on their profitability as well as their ability to pay their debt, 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 is a corporation majority owned by the Colombian Government that administers public resources and Reficar and Bioenergy are subsidiaries of Ecopetrol. Ecopetrol's employees have a statutory responsibility to ensure the proper use of public resources. Reficar and Bioenergy's employees also have a duty for proper management of public resources. The conduct of Ecopetrol, Bioenergy and Reficar's employees are generally subject to the control and supervision of the Colombian State control entities. See the section *Risk Review—Legal Proceedings and Related Matters* for additional information.

The investigations concerning Reficar and Bioenergy that are described in the section *Risk Review—Legal Proceedings and Related Matters* remain ongoing. Because these actions are in their early stages, it is still not possible to estimate the duration, scope or results of these investigations or related inquiries and requests for information by Colombian State control entities. 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.

As described in the section *Risk Review—Legal Proceedings and Related Matters*, the Prosecutor's Office is conducting a confidential investigation regarding Reficar's expansion and modernization project. On April 27, 2017, the Prosecutor's Office announced its intention to pursue charges against eight individuals, including five past officers of Reficar or Ecopetrol, for the alleged crimes of document forgery, illegal interest in the execution of agreements, misappropriation of public funds and unjust enrichment. The Prosecutor's Office has not yet made public the factual basis for such charges, and accordingly we are not in a position to predict the outcome of the Prosecutor's Office's investigation or the disposition of any charges that the Prosecutor's Office may bring.

In connection with this investigation or any other investigation carried out by any other authority, there can be no assurance that we will not be required to pay penalties, or incur in additional costs and expenses, and 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 *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 business partners or their third-party service providers, as many of our operations are executed under joint venture agreements.***

Many of our operations are performed through joint ventures with our business partners. Consequently, we depend on the performance of our business partners. The poor performance of any of them, especially in those projects in which we do not act as operator, could negatively impact oil and natural gas production, 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, communication 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 2016, our internal cyber security systems identified several cyber security attacks such as brute force login attacks designed to identify valid credential in IT infrastructure and seventeen ransomware attacks-only one of them with data loss (low level confidentiality) at Ecopetrol S.A.-Our platforms also identified and controlled certain malware events and SQL injection attacks.

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 2016 was 6,948 GWh/year, of which 65% was supplied through self-generation, and the remaining 35% through power grid. Our demand is 10.5% of the total energy demand in Colombia.

Several producing fields are connected to the national transmission system and depend on its expansion and reliability to keep steady production levels and to accommodate future growth. The national electricity market is volatile due to changes in hydrology and availability of fuels (natural gas, diesel etc.); and the grid expansion projects which are executed by power distribution contractors have experienced delays due to licenses and limited execution capability. To mitigate these risk the Ecopetrol Group decided to centralize the management of power sources and uses in order to optimize the energy availability, quality and cost, for the short, medium and long term. While the intention is to enhance system reliability by timely execution of electrical projects and to launch energy efficiency programs in all of our segments, we cannot offer any assurance that we will prove successful.

***Rising water production levels may affect or constrain our crude oil production.***

During 2016, we produced approximately 9.36 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.***

Pursuant to Articles 58 and 59 of the Colombian constitution, the Government can exercise its eminent domain powers in respect of Ecopetrol's 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 (*expropiación ordinaria o judicial*), or (ii) an administrative expropriation (*expropiación administrativa*). 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 (*expropiación en caso de guerra*), which does not 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 2016, the attacks against our pipeline infrastructure decreased by 35% in relation to 2015 (80 attacks in 2015 compared with 52 attacks in 2016), however they were strategically targeted and more severe. This situation especially affected the infrastructure located in Nariño, Arauca and Norte de Santander and the following pipelines: Caño Limón Coveñas and Transandino. During the first quarter of 2017, 29 attacks against the infrastructure of the Caño Limón – Coveñas system have taken place, impacting our operations in this pipeline and resulting in deferred crude oil production of 603 thousand barrels. On several occasions, guerilla attacks have resulted in unscheduled shutdowns of transportation systems in order to repair or replace sections of pipelines or production facilities that have been damaged and deferral of production in certain fields, as well as caused us to undertake environmental remediation. For the pipeline infrastructure managed by Ecopetrol S.A., the direct cost of repair pipeline infrastructure due to terrorist attacks in 2016 was approximately COP\$41.7 billion (US\$13.9 million, with a 3,000.71 Colombian Peso/U.S. dollar exchange rate as of December 31, 2016). Also, our production was impacted by approximately 3,215 bpd due to events related to attacks on our infrastructure that limited our production. Guerrilla groups and other illegal armed groups also attacked natural gas transportation infrastructure that have affected our natural gas production in the past. These activities, 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.

Likewise, theft of refined products and crude oil, resulting from security issues, may impact our results in the future. Theft of refined products, which reached a peak of approximately 7,270 bpd in 2002, was reduced to approximately 28.5 bpd in 2016. The theft of crude oil increased from approximately 646 bpd in 2015 to approximately 1,830 bpd in 2016.

***Despite the peace agreement between the Colombian government and the FARC and the ongoing peace negotiation process 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 in recent months, which we believe is an attempt to show its presence and influence in some regions and put pressure on the ongoing peace negotiations which formally began in February 2016.

Despite the progress made with the FARC and the ongoing negotiations with the ELN, some guerrilla groups may continue their illegal and terrorist activities, resulting in a deterioration of Colombia's national security and, consequently, negatively impacting 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.***

Diplomatic relations between Colombia and some of its neighboring countries, in particular Venezuela, have been tense in the past. Although relations with Venezuela have stabilized and improved with Colombia's current administration, economic differences between Colombia and Venezuela, mainly due to Venezuela's current public disorder and internal political tension, could affect our diplomatic relations, impact border cities and therefore have a negative impact on Colombia's economy and general security situation.

***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.

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 Argentine 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.

***The Ministry of Mines and Energy has not calculated or liquidated the corresponding Net Positions for Ecopetrol as refiner and/or importer and for each fuel (gasoline and motor fuel oil) to be recognized by the FEPC to Ecopetrol for the second half of 2016***

Under current Colombian regulations, the Ministry of Mines and Energy is required to periodically (initially by quarters, now twice a year) calculate and liquidate each refiner and/or importer of fuel's Participation Differential (i.e. this arises when the international parity price is lower than the reference price established by the Ministry of Mines and Energy), leading to a "Net Position". However due to changes in law and the Ministry methodologies we have still not received the calculations or liquidations for the second semester of 2016.

We do not know and we cannot anticipate the terms and conditions that will be established by the Ministry of Mines and Energy for future liquidations. For more information regarding the FEPC, see the section *Business Overview—Applicable Laws and Regulations—Regulation of Refining and Petrochemical Activities—Regulation Concerning Production and Prices.*

***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 additional taxes such as the *Impuesto sobre la Renta para la Equidad* ("CREE surtax"), 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 new tax reform, which became effective in 2017. For a description of taxes affecting our results of operations and financial condition in 2016, see the 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 recently, 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. The withholding tax rates applicable to dividends paid to non-resident shareholders are: (i) a 5% dividend tax on dividends distributed from profits taxed at the corporate level; (ii) a 35% withholding tax rate on dividends distributed from profits not taxed at the corporate level; and (iii) an additional 5% dividend tax rate after applying the initial 35% 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.

### **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 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 the 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 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.

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 projects drilling 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 sanctions function.

If we fail to comply with any of these national or regional environmental regulations or authorities, 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 the 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.

We are subject to foreign environmental regulations for the exploratory activities conducted by us outside 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 on our financial condition and results of operations.

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. For instance, the credit facility executed by Reficar for the financing of its expansion and modernization project includes an obligation to comply with the U.S.-Exim Environmental Procedures and Guidelines and the Organization for Economic Co-operation and Development (OECD) Common Approaches on Environment and Officially Supported Export Credits, and a credit agreement executed by Ecopetrol S.A. to finance purchases of U.S. goods and services requires Ecopetrol S.A. to comply with the U.S.-Exim Environmental Procedures and Guidelines.

In addition, we may be subject to foreign health and safety and environmental regulations for our upstream activities conducted outside Colombia. 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.

***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. For example, as of December 31, 2016, Ecopetrol S.A. was a party to 2,774 legal proceedings relating to civil, administrative, environmental, tax, and labor claims filed against us of which 341 met the accounting threshold for an accrual provision. Additionally, Ecopetrol S.A.'s subsidiaries were a party to 1,136 legal proceedings relating to civil, administrative, environmental, tax, and labor claims filed against them of which 86 met the accounting threshold for 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 23—Accrued liabilities and provisions to our consolidated financial statements and see the section *Risk Review—Legal Proceedings and Related Matters*. In addition, in accordance with Colombian law, we are subject to surveillance and investigations by certain administrative control entities in Colombia, which are intended to determine whether public funds have been 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 the 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 shares. As set forth in the deposit agreement, dated September 16, 2008, among Ecopetrol S.A., JP Morgan Chase Bank, N.A., as depositary, and all holders from time to time of our American Depositary Receipts (the “Deposit Agreement”), ADSs may instruct our current depositary, JP Morgan Chase Bank, N.A., to vote on shareholder matters prior to a shareholders’ meeting. Colombia law does not, however, require Ecopetrol to request proxies from existing shareholders. Thus, shareholders may not become aware of some matters in time to instruct the depositary to vote their shares.

The Deposit Agreement provides ADSs with the right to instruct the depository to vote common shares separately. The viability of this contractual provision is unclear. This is because regulatory agencies have advanced inconsistent positions regarding whether a depository must vote common shares as a single block or may vote them separately. Going forward, the Colombian regulatory authorities may change their interpretation as to how the voting rights should be exercised by ADS holders, 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 Resolution 8 of 2000 and External Circular No. 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 authorized foreign exchange market intermediaries. Any income or expenses under our American Depositary Receipt, or 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 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 (*Superintendencia Financiera de Colombia*). 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 depository 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 the 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 the 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, those benefits relating to dividends and profits derived from sale of Colombian common shares. For further information see the 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, 2016, the Colombian Stock Exchange (*Bolsa de Valores de Colombia*, or "BVC") had a market capitalization of approximately COP\$311,384 billion (US\$103,770 million using the closing rate for 2016), a 12% increase when compared with the amount at the end of 2015, a daily average trading volume of approximately COP\$194,116 million (US\$64.69 million, using the average exchange rate for 2016), a 42% increase when compared with the volume in 2015. By comparison, the New York Stock Exchange (the "NYSE") had a market capitalization of US\$19.6 trillion as of December 31, 2016, and a daily trading volume of approximately US\$68.9 billion in 2016.

As of December 31, 2016, our shares represented the highest market capitalization of the BVC accounting for as of 7.6% 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. 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 State Ownership

*Our controlling shareholder's interests may be different from those of our minority shareholders.*

Colombian Law 1118 of 2006 requires the Nation to maintain the majority of our outstanding capital stock. 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 shareholders' meeting to elect the members of our Board of Directors. The Nation may propose and approve decisions that are in its own interest and in furtherance of its own economic and political interests that do not necessarily benefit minority shareholders.

Our controlling shareholder may approve dividends at the ordinary general shareholders' meeting, notwithstanding the interest of 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, given our controlling shareholder's interests, it may undertake projects, approve decisions or make announcements about its intentions related to its holding of our capital 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 impact 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 objective 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 semiannually.

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 and deficiencies and to ensure continuous improvement of processes.

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 on a monthly basis. The management of those risks is led by a member of the Management Committee; 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 strategic objectives. At this level, each process has its own identified risks with respective mitigation methods, including financial and non-financial control, treatment plans and/or monitoring indicators.

Our risk management approach is based around the risk management cycle, consisting in five main stages: planning, identifying, evaluating, treatment and monitoring risks, as well as communication across 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, in 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 proactive decision making in order to avoid risk materialization.

Ecopetrol has defined guidelines and minimum requirements to implement an Internal Control System framework for its subsidiaries. These guidelines provide different classifications according to three important variables: the size of the organizational structure, the scope of SOX and the asset value of each subsidiary. The classification of each subsidiary determines the scope of implementation (Basic, Intermediate and Complete) of our Internal Control System. Under those guidelines, each subsidiary must report its performance to its enterprise management committee, audit committee, or board of directors (or whoever is acting on their behalf). In addition, they have to report it annually to Ecopetrol S.A. To ensure compliance with the above measures, the subsidiaries have methodological support from Ecopetrol S.A. when it is requested.

### **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, 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 information security area with the participation of industrial control systems specialists, has been understanding the new challenges of cybersecurity risk; developing activities to identify critical digital assets and its security threats. During 2016, Ecopetrol S.A., as a NOC (National Oil Company), reported to the Cyber Defense Command Unit (*Comando Conjunto Cibernético*, an entity under the control of the Colombian Ministry of Defense) the first basic inventory of its critical cybernetic infrastructure to be included in the classified catalogue of national critical cybernetic infrastructure.

Although Ecopetrol S.A. is still at an early stage of managing its cybersecurity risks, the working group has developed some activities in order to advance in the incorporation of cybersecurity practices to enhance the awareness about these risks at an operational level and adjust current information security practices considering the new cyberthreat context. Likewise, as a result of this process, we are currently incorporating elements relative to management of the cyber security threat, including, among others, policies, cybersecurity insurance coverage, and specialized monitoring and control mechanisms.

Currently, Ecopetrol S.A. has incorporated a Security Operations Center service, which enhances our 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.

### **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 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, 2016 our U.S. dollar-denominated total debt was US\$15.2 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\$12 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 operations 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. On October 1, 2015, Ecopetrol S.A. adopted hedge accounting as part of its risk management strategy, using the natural hedge between exports and dollar-denominated debt. 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 S.A. 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. The remaining portion, 12% of Ecopetrol S.A.'s 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 the accounting policy and Note 31.2 for details of the hedge accounting adopted). With the adoption of hedge accounting, the effect of volatility of foreign exchange rate on the 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 18.9%, 8.2% and 3.5%, respectively, of the nominal debt balance as of December 31, 2016). Thus, volatility in interest rates may affect the fair value of and cash flows related to our investments and floating rate debt. In 2016, our analysis of credit risk events and global financial markets drove us to decide not to hedge interest rate risk. Nevertheless, our treasury 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 941 of 2002 and Decree 1861 of 2012, 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 22.2 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 through an analysis of an issuer's creditworthiness, stock price behavior, spreads on credit default swaps and the probability of default.

## **Investment Guidelines**

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

Following the promulgation of Decree 1525 of 2008, which provides general rules on investments for public entities, 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.

In order to diversify risk in our Colombian Peso portfolio, Ecopetrol S.A. 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.

Ecopetrol S.A.'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.A.'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.

### **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, 2016, Ecopetrol S.A. was a party to 2774 legal proceedings relating to civil, administrative, environmental, tax and labor claims filed against us in the Colombian courts and arbitration tribunals, of which 341 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 23 – Accrued liabilities and provisions 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 of Cucuta has jurisdiction to conduct the case, which is in the probatory stage.

The Regional Environmental authority of Norte de Santander, or Coporación Autónoma Regional de la Frontera Nororiental (CORPONOR) has filed a lawsuit against Ecopetrol at the First Administrative Court of Cucuta 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 probatory stage.

Ecopetrol and national and local authorities are developing a project for the development of an alternative to the water supply in the intake of the aqueduct in Cúcuta, which was approved by the Company's Board of Directors in December 2011 as part of the strengthening of its contingency plans and its relationship with its stakeholders. Currently local authorities are attempting to acquire the necessary economic resources for the project and Ecopetrol has finalized the basic and detailed engineering.

### *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 1208 informal traders and fishermen as claimants.

On March 10, 2017, a mandatory conciliatory hearing was held in order to seek an agreement but it was declared unsuccessful.

### *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, the control entities investigations are ongoing. Throughout 2016, Colombia authorities issued several judgments in connection with former PetroTiger directors, a retired employee of Ecopetrol and other persons involved.

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, 13 lawsuits related to this incident are active for an approximately worth of COP\$16.2 billion.

### *Environmental Administrative Proceedings*

As of December 2016, Ecopetrol S.A. was party to 209 environmental administrative proceedings, of which 193 were initiated before 2015, and 16 during 2016. During 2016, six proceedings were concluded, in four of them we were subject to monetary fines through Resolutions Corporinoquia Resolution 200.41-16-0551 of May 3, 2016, Corporinoquia Resolution 200.41-16-0873 of July 18, 2016, Cam Resolution 2134 of July 25, 2016 and Corpoamazonia Resolution 1162 of September 9, 2016. However, these four proceedings were 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*

Ecopetrol is a corporation majority owned by the Colombian Government that administers public resources and Reficar is a wholly owned subsidiary of Ecopetrol. Ecopetrol's employees have a statutory responsibility to ensure the proper use of public resources. Reficar's employees also have a duty for proper management of public resources.

The conduct of Ecopetrol's and Reficar's 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*) is the state entity entrusted to ensure the proper 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*) is the entity that supervises compliance with applicable law by public employees and private sector employees that carry out public functions. The Office has the responsibility for investigating and disciplining individuals in respect of any failure to so comply.
- The Prosecutor's Office (*Fiscalía General de la Nación*) is the entity in charge of investigating potential crimes and prosecuting 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:

As a result of the modifications of the schedule and budget related to Reficar's expansion and modernization project (the "Project"), the Office of the General Comptroller 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.

As a result of the findings described above the Office of the General Comptroller recently opened actions for financial responsibility (*proceso de responsabilidad fiscal*) against 36 individuals and the six companies involved in the Project, including current and former members of Ecopetrol's Board of Directors; former members of Reficar's Board of Directors; current and 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. The current members of Ecopetrol's board and senior management subject to these proceedings are Juan Carlos Echeverry Garzón, Chief Executive Officer; and Joaquín Moreno Uribe, Horacio Ferreira and Mauricio Cárdenas Santamaria, all of them members of the Board of Directors. These actions pertain to an eventual reduction of the value of state assets due to a lower than expected profitability at Reficar as a result of the modifications of the schedule and budget of the project.

On January 2017, the Office of the General Comptroller initiated another special audit in Reficar. As of the date of this annual report, the audit is in its preliminary stage.

## 2. The Attorney General's Office investigations:

The Attorney General's Office currently has two ongoing investigations relating to the Project: (i) the first, initiated in 2012 against members of Reficar's Board of Directors at the time, as well as certain current and former officers of Reficar; and (ii) a more recent investigation regarding delays in the completion of the Project, focusing on the role of current and former officers of Ecopetrol, as well as current and former members of Ecopetrol's Board of Directors.

## 3. The Prosecutor's Office investigations:

The Prosecutor's Office is conducting a confidential investigation. In connection therewith, on April 27, 2017, the Prosecutor's Office announced in a press release its intention to pursue charges for the alleged crimes of document forgery, illegal interest in the execution of agreements, misappropriation of public funds and unjust enrichment against: (i) four former executives and officials of Ecopetrol and Reficar (ii) one current employee of Ecopetrol who was assigned to work in Reficar between 2012 and 2016, (iii) two executives of CB&I and (iv) Reficar's statutory auditor from 2013-2015. According to the announcement the total amount involved in the alleged charges is estimated at COP 610 billion pesos (equivalent to approximately US\$ 209 million at the Representative Exchange Rate as of May 26, 2017 of COP 2,911.66 per US\$).

The Ecopetrol and Reficar executives and officials are: Orlando José Cabrales Martínez (Reficar CEO, 2009-12); Reyes Reinoso Yañez (Reficar CEO, 2012-16), current employee of Ecopetrol; Felipe Laverde Concha (Reficar General Counsel, 2009-March 2017); Pedro Alfonso Rosales Navarro (Ecopetrol Downstream Executive Vice President, 2008-15); and Nicolás Isaksson Palacios (Reficar Lead Legal Counsel, 2013-January 2017).

The Prosecutor's Office has not yet made public the factual basis for such charges, and accordingly we are not in a position to predict the outcome of the Prosecutor's Office's investigation or the disposition of any charges that the Prosecutor's Office may bring. 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.

In the press release, the Prosecutor's Office also announced that in order to conclude the next phases of the investigation, related to, among others, the selection of the strategic partner, the exit of Glencore and the selection of the contractor, it would be interviewing executives of Ecopetrol, Reficar, Glencore and the supervisory joint venture conformed by Foster Wheeler USA Corporation and Process Consultants Inc.

In connection with the Prosecutor's Office press release, on May 9, 2017, the Audit Committee of the Board of Directors 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.

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.

In March 2016 Reficar filed a Request for Arbitration before the International Chamber of Commerce against Chicago Bridge & Iron Company N.V., CB&I (UK) Limited, and CBI Colombiana S.A. with respect to the Engineering, Procurement, and Construction Contract 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 proceeding and seeks no less than US\$2 billion in damages plus lost profits from CB&I. On May 25, 2016, CB&I filed an answer and counterclaim of approximately USD \$213 million. On June 27, 2016, Reficar filed its reply to CB&I's counterclaim denying any liability to CB&I. On April 28, 2017, Reficar submitted its Non-Exhaustive Statement of Claim and CB&I submitted its Statement of Counterclaim. The ICC proceeding is currently in its preliminary stage and is scheduled for a hearing in October 2018. The outcome of these actions is unknown.

### *Bioenergy Special Audit*

The Office of the General Comptroller, in exercise of its fiscal monitoring duties and authority as set forth in Article 267 of the Political Constitution and the law, has undertaken audits of the performance of the Bioenergy S.A and Bioenergy Zona Franca S.A.S. investments.

On February 6, 2017 the Office of the General Comptroller initiated a Special Intervention (Special Audit) of Bioenergy Zona Franca S.A.S. and Bioenergy S.A. The Company is cooperating with the oversight and control entities and has responded to the information requirements that have been requested to date.

## 6. Shareholder Information

### 6.1 Shareholders' General Assembly

Our Shareholders' General Assembly was held on March 31, 2017 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 twenty-three pesos (COP\$23). This dividend to shareholders was paid in one installment on April 28, 2017.
- Appointed Ernst & Young as external auditor of Ecopetrol for fiscal year 2017.
- The new composition of the Board of Directors for the year 2017 as follows:

**Non Independent Directors:**

- Minister of Finance and Public Credit
- Ana Milena López Rocha

**Independent Directors:**

- Mauricio Cabrera Galvis
- Yesid Reyes Alvarado
- Jaime Ardila Gómez
- Carlos Cure Cure
- Joaquín Moreno Uribe
- Horacio Ferreira Rueda (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 2016, the Board of Directors approved as a dividend policy under which we are to distribute the distribution of 40% of net income before the effect of impairment of non-current assets (net of taxes) at the corporate group level. This policy cannot exceed the maximum amount to be distributed and should keep the Company's debt metrics in line with an investment grade rating. 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 shareholders' meeting. In the absence of this special majority, at least 50% of the net profits must be distributed.

On March 31, 2017, our shareholders at the ordinary general shareholders' meeting 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 Ordinary General Stockholder Meeting held on March 31, 2016, approved that there was no distribution of profits for the fiscal year ended December 31, 2015. Pursuant to Article 456 of the Code of Commerce the Company absorbed the net loss for the fiscal year ended December 31, 2015 through its legal reserve. In 2014 and 2015, the shareholders approved the distribution of 80.1% and 70% of 2013 and 2014 net income, respectively. See the 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**

Starting 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 after in an ordinary meeting held on January 27, 2016, during which the Board of Directors made the decision to delist from the TSX. This decision was based on the Board of Director's assessment of, among other factors, 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), both of which enable interested investors to acquire a participation in Ecopetrol S.A. 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, Ecopetrol's ADRs were delisted from the TSX. After delisting from the TSX, 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.

The following table sets forth reported high and low closing prices in Colombian Pesos for our shares and the reported average daily trading volume of our shares on the BVC for the periods indicated. The table also sets forth information on the trading price of our shares in Colombian Pesos and U.S. dollars, as well as the average trading volume.

**Table 55 – Shares Traded on the Bolsa de Valores de Colombia**

	Shares Traded on the BVC				
	Colombian Pesos per share		U.S. dollars per share <sup>(1)</sup>		Average number of shares traded
	High	Low	High	Low	Per day
2012	5,850	4,200	3.3236	2.1619	8,396,801
2013	5,710	3,695	3.2091	1.8992	7,018,859
2014	4,030	1,815	2.0556	0.7546	8,222,596
2015	2,305	1,090	0.8402	0.3973	10,109,301
2016	1,465	881	0.4802	0.2888	13,077,105
<b>Most recent quarters</b>					
First quarter 2015	2,305	1,800	0.9335	0.7289	12,054,021
Second quarter 2015	2,085	1,625	0.8337	0.6497	10,056,874
Third quarter 2015	1,675	1,285	0.5706	0.4377	9,516,211
Fourth quarter 2015	1,515	1,090	0.4953	0.3563	8,805,595
First quarter 2016	1,425	881	0.4386	0.2712	17,971,092
Second quarter 2016	1,465	1,220	0.4892	0.4074	14,267,136
Third quarter 2016	1,410	1,170	0.4786	0.3971	10,403,945
Fourth quarter 2016	1,385	1,240	0.4593	0.4112	9,760,236
First quarter 2017	1,415	1,290	0.4842	0.4414	10,004,466
<b>Most recent six months</b>					
November 2016	1,330	1,240	0.4276	0.3987	10,179,339
December 2016	1,385	1,305	0.4602	0.4336	8,629,345
January 2017	1,415	1,360	0.4811	0.4624	8,948,342
February 2017	1,395	1,310	0.4844	0.4549	11,907,449
March 2017	1,350	1,290	0.4588	0.4384	9,282,601
April 2017	1,400	1,340	0.4865	0.4656	13,581,125
May 2017 (through May 26, 2017)	1,480	1,335	0.5054	0.4559	18,112,368

(1) U.S. dollars per common share translated at the Representative Market Exchange Rate as of each period.

The following table sets forth reported high and low closing prices in U.S. dollars for our ADSs and the average daily trading volume of our ADSs on the NYSE for the periods indicated. The table also sets forth information on the trading price of our ADSs in U.S. dollars, as well as the average trading volume.

**Table 56 – Shares Traded on the New York Stock Exchange**

	ADSs Traded on NYSE		
	U.S. dollars per ADS <sup>(1)</sup>		Average number of ADSs Traded per day
	High	Low	
2012	67.48	44.52	551,410
2013	63.80	37.93	464,193
2014	41.16	14.77	603,083
2015	19.80	6.50	960,193
2016	10.04	5.40	1,160,901
<b>Most recent quarters</b>			
First quarter 2015	19.80	13.89	1,083,162
Second quarter 2015	17.48	12.85	809,096
Third quarter 2015	12.72	8.28	915,918
Fourth quarter 2015	10.63	6.50	937,078
First quarter 2016	9.22	5.40	1,559,605
Second quarter 2016	10.04	7.89	1,257,883
Third quarter 2016	9.80	7.83	914,424
Fourth quarter 2016	9.37	7.85	926,722
First quarter 2017	9.67	8.60	986,373
<b>Most recent six months</b>			
November 2016	8.80	7.85	1,042,780
December 2016	9.25	8.58	866,147
January 2017	9.56	9.28	984,122
February 2017	9.67	9.01	1,118,084
March 2017	9.33	8.60	879,525
April 2017	9.72	9.06	1,210,834
May 2017 (through May 26, 2017)	10.24	8.97	1,307,921

(1) Represents the right to receive 20 of our common shares.

### *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 shares evidenced in electronic form required to be negotiated through the Colombia Stock Exchange. In Colombia, only the relevant stockbrokers called *sociedades comisionistas de bolsa* are authorized to make the transfers of shares through the Colombia Stock Exchange. The transfers of shares are 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 for a value equivalent to or higher than 66,000 UVR (the UVR was COP\$ 242.4513 as of December 31, 2016) must be made through the BVC if the shares are registered with the BVC. Otherwise, shareholders can freely negotiate a transfer of shares.

Nevertheless, the following transfers are not required to be executed through the BVC:

- Transfers between shareholders who are considered to be the same beneficial owner;
- Transfers of shares owned by financial institutions, under supervision of 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 extinguishment of the debt;
- Transfers of shares made by the Nation or the Financial Institutions Warranty Fund (*Fondo de Garantías de Instituciones Financieras*) or FOGAFIN;
- Transfers of shares issued abroad by Colombian companies, provided they take place outside Colombia;
- Transfers of shares issued by foreign companies, offered through a public offer 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 treated as 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 ADRs 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 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 ADS holders, by any party depositing or withdrawing shares or by any party surrendering ADSs 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 US\$1.50 per ADR or ADRs for transfers of certificated or direct registration ADRs;
- A fee of up to US\$0.02 per ADS for any cash distribution made pursuant to the Deposit Agreement;
- A fee of US\$0.05 per ADS per calendar year (or portion thereof) for services performed by the Depositary in administering our ADR program (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);
- Any other charge payable by the Depositary, or any of the Depositary's agents, including, without limitation, the custodian, or the agents of the Depositary's agents in connection with the servicing of our shares or other deposited securities (which charge shall be assessed against registered holders of our 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 registered holders or by deducting such charge from one or more cash dividends or other cash distributions);
- 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 shares) but which securities or the net cash proceeds from the sale thereof are instead distributed by the Depositary to those holders entitled thereto;
- Stock transfer or other taxes and other governmental charges;

- Cable, telex and facsimile transmission and delivery charges incurred at the ADS holder's request;
- 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;
- Expenses of the Depositary in connection with the conversion of foreign currency into U.S. dollars; and
- Such fees and expenses as are incurred by the Depositary (including, without limitation, expenses incurred in connection with compliance with foreign exchange control regulations or any law or regulation relating to foreign investment) in delivery of deposited securities or otherwise in connection with the Depositary's or its custodian's compliance with applicable laws, rules or regulations.

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 2014, reimbursements were made in the amount of approximately US\$3,093,346 for expenses related to investor relations activities. In 2015, reimbursements were made in the amount of approximately US\$2,069,202 for expenses related to investor relations activities. In 2016, reimbursements were made in the amount of approximately US\$2,366,395 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, as well as their permanent establishments in Colombia, who are not deemed to be residents in Colombia for tax purposes are subject to income tax in Colombia only with respect to their national-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 tax.

Dividends paid by Colombian companies are deemed Colombian income. However, whether they are taxed or not depends on an imputation system set forth in articles 48 and 49 of the Colombian Tax Code (hereinafter "CTC"). According to this system, dividends are taxable when paid out of non-taxed profits, in which case a 35% withholding applies when paid to non-resident shareholders. Conversely, they are non-taxable when paid out of taxed profits.

One of the novelties introduced by law 1819 of December 29 of 2016 (the “Tax Reform”) was the creation of 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. According to the Tax Reform, dividend payments made to foreign shareholders will be subject to a 5% withholding. This new tax will only apply to dividends paid from profits accrued as from fiscal year 2017.

Note that the dividend tax will apply simultaneously with the aforementioned imputation system. Accordingly, dividends paid from non-taxed profits will be subject to a 35% withholding for income tax, and an additional 5% dividend tax on the balance. This means that the overall burden in this scenario is 38.25% (e.g.  $\$100 * 35\% = \$35$ , plus  $\$65 * 5\% = \$3.25$ ).

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:

- 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.
- 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, permanent establishments are considered Colombian taxpayers in connection with the Colombian-source income and Colombian-source taxable gains attributed to said 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. As of taxable year 2017, a withholding tax on dividends is triggered for dividends paid to non-resident shareholders. Withholding tax rates on dividends varies as follows: (i) 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 not taxed at the company's level, plus an additional 5% dividend tax rate after having applied and deducted the initial 35% withholding. As of fiscal year 2017, for Colombian individuals, dividends will be taxed between 5% and 10% depending on the dividend amount. Profits that did not pay tax at the corporate level would be subject to a 35% withholding tax at the time of distribution. In this case, the base amount subject to the dividend tax would be the remaining amount after the 35% withholding tax. Dividends tax will be applicable to profits generated as of 2017. Finally, dividends paid to local corporations are not subject to this tax.

Further to the above, the applicable withholding tax rate for an entity or a non-resident individual investing through a Foreign Funds Administration Account (FFAA) is 25%, since its investment qualifies as portfolio investments and the dividends that are distributed by the Colombian entity are not taxed at the corporate level (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.

In addition to the above, the new dividend tax will apply at a 5% rate.

##### *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, as of taxable year 2017, a withholding tax on dividends is triggered for dividends paid to non-resident shareholders. Withholding tax rates on dividends varies as follows: (i) 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 not taxed at the company's level, plus an additional 5% dividend tax rate after having applied and deducted the initial 35% withholding. As of fiscal year 2017, for Colombian individuals, dividends will be taxed between 5% and 10% depending on the dividend amount. Profits that did not pay tax at the corporate level would be subject to a 35% withholding tax at the time of distribution. In this case, the base amount subject to the dividend tax would be the remaining amount after the 35% withholding tax. Dividends tax will be applicable to profits generated as of 2017. Finally, dividends paid to local corporations are not subject to this tax.

For fiscal year 2017 if the shareholder is a non-resident entity or a non-resident individual investing directly, it will be taxed upon distribution, by means of the withholding tax mechanism, provided that its investment does not qualify as portfolio investments and dividends that are distributed are not taxed at the corporate level. In this case, dividends will be subject to a 35% withholding tax.

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.

In addition to the above, the new dividend tax will apply at a 5% rate.

### *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 Article 18 of Decree 2634 of 2012, 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.

If the above-mentioned 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 taxable at approximately 40% in fiscal year 2017, approximately 37% for fiscal year 2018, and 33% as from fiscal year 2019.

## ***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 ten percent or more of our shares (taking into account shares held directly or through depositary arrangements), 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 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 is 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 will generally 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 Depositary (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 Depositary (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 so 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 2016 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 2017 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 will generally 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 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 28% 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). As of 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 the 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 May 26, 2017, the Representative Market Exchange Rate was COP\$2,911.66 per US\$1.00. The Federal Reserve Bank of New York does not report a noon-buying rate for Colombian Pesos. The *Superintendencia Financiera*, or 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.

The following table sets forth the high, low, average and period-end exchange rate for Colombian Peso/U.S. dollar Representative Market Exchange Rate for each of the last five years and for the last six months.

**Table 57 – Colombian Peso/U.S. dollar Representative Market Exchange Rate**

	Exchange Rates			
	High	Low	Average	Period-End
2012	1,942.70	1,754.89	1,798.23	1,768.23
2013	1,952.11	1,758.45	1,868.90	1,926.83
2014	2,446.35	1,846.12	2,000.68	2,392.46
2015	3,356.00	2,360.58	2,746.47	3,149.47
2016	3,434.89	2,833.78	3,053.42	3,000.71
<b>Most recent six months</b>				
November 2016	3,187.97	2,984.78	3,106.40	3,165.09
December 2016	3,085.60	2,964.56	3,009.53	3,000.71
January 2017	3,000.71	2,908.53	2,944.65	2,936.66
February 2017	2,921.90	2,851.98	2,881.68	2,896.27
March 2017	3,004.43	2,880.24	2,943.49	2,880.24
April 2017	2,944.31	2,837.90	2,872.82	2,944.31
May 2017 (through May 26, 2017)	2,967.44	2,873.22	2,929.30	2,911.66

Source: Superintendence of Finance for historical data. *Banco de la República*, or the Colombian Central Bank, for averages.

## 6.8 Major Shareholders

### 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, 2017:

**Table 58 – Major Shareholders**

Shareholders	At March 31, 2017	
	Number of shares	% Ownership
Nation <sup>(1)</sup> – Ministry of Finance and Public Credit	36,384,788,817	88.49
Public float	4,731,905,873	11.51
<b>Total</b>	<b>41,116,694,690</b>	<b>100.00</b>

(1) Includes 2,000 shares owned by other state entities.

All our common shares have identical voting rights.

As of March 31, 2017, 1.8% of our common shares were held of record in the form of American Depository Shares. As of March 31, 2017, we had 41 registered holders and as of February 23, 2017 we had 11,970 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% of our capital stock at all times.

## 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. PSA15-10392, 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 above-mentioned 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.
- Accomplish the highest corporate governance standards.

### 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, organization to which Colombia is in the process of access, the National Government begun to implement the practice of reducing the participation of Directors with a ministerial level in Ecopetrol's Board of Directors. Thus, in 2017 in the ordinary Shareholders' Assembly, the National Government nominated only one (1) non-independent Director with a ministerial level and in 2018 no director of ministerial rank will be nominated.

- *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 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 Shareholders' General 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, and Deed No. 1049 of May 19, 2015, issued by the Notary Second of Bogotá.

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 *—Board Committees*.

### **General Meeting of Shareholders**

Shareholders' meetings may be ordinary or extraordinary. Ordinary meetings will take place in our legal domicile located in Bogota, 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' meeting. The call for the general shareholders' meeting 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). The call for the general shareholders' meeting is also sent electronically to shareholders.

In the ordinary general shareholders' meeting, 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 shares 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' meeting;
- 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 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 *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 and corporate governance code 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 July 26, 2007 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' meeting 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 July 26, 2007, 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 and corporate governance code 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 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 and except that the Nation must hold a minimum of 80% of our capital stock at all times.

#### **Restrictions on Change of Control Mergers, Acquisitions or Corporate Restructuring of the Company**

Under Colombian law and our bylaws, the general shareholders' meeting has full authority to approve any corporate restructuring, including any mergers, acquisitions or spin-offs. Corporate restructurings are also subject to the requirement that the Nation must hold a minimum of 80% of our common stock at all times. So long as Law 1118 of 2006 is in effect, there cannot be any restructuring that result in a change of control of our Company.

#### **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 Superintendence 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, our external auditor shall not be appointed for more than five consecutive one-year terms by us. However, an external auditor may be hired again after two terms have passed since the conclusion of its last term of appointment. At the ordinary general shareholders' meeting on March 31, 2017, the shareholders appointed Ernst & Young as external auditor of Ecopetrol for the fiscal year 2017.

#### **7.2 Code of Ethics**

We have adopted a code of ethics, which complies with applicable U.S. and Colombian law. Our code of ethics 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 our compliance manuals.

Our code of ethics is available on our website at [http://www.ecopetrol.com.co/especiales/codigoEtica\\_/index.html](http://www.ecopetrol.com.co/especiales/codigoEtica_/index.html).

If we amend the provisions of our code of ethics or if we grant any waiver of such provisions, we will disclose such amendment or waiver on our website at the same address.

### **7.3 Board of Directors**

The information below sets forth the names and business experience of each of our current Directors elected at the shareholders' ordinary meeting held on March 31, 2017 for terms of one year beginning on that date, as of the date hereof:

*Minister of Finance and Public Credit, Mauricio Cárdenas Santamaría (54)* is the Minister of Finance and Public Credit since September, 2012. He was the Minister of Mines and Energy of Colombia from September 26, 2011 to September 3, 2012. He has served as Senior Fellow and Director at the Latin America Initiative of the Brookings Institution in Washington D.C. Previously, Mr. Cárdenas served as Executive Director of Fundación para la Educación Superior y el Desarrollo (FEDESARROLLO), CEO of Empresa de Energía Eléctrica de Bogotá, Minister of Economic Development, Minister of Transport, and Director of the National Planning Agency of Colombia. Mr. Cárdenas holds a B.A. and master degree in economics from the University Andes and a Ph.D. in economics from the University of Berkeley, California. In 2001, Mr. Cárdenas was a visiting scholar at Harvard University's Center for International Development. Mr. Cárdenas has also served as a member of the board of directors of various organizations, including the Latin American and Caribbean Economic Association (LACEA), University Andes and the Colombia Stock Exchange (BVC). Currently he is a Director of Banco de la República. Mr. Cárdenas has served as a Director of Ecopetrol's Board since March 27, 2008. Currently Mr. Cárdenas is a non-independent Director of Ecopetrol's Board.

*Mauricio Cabera Galvis (65)* currently serves as Director of the firm Cabrera & Bedoya Investment Bankers. He has been President of the FES Foundation and Banco de Occidente. He has served as Director of INCORBANK S.A. and as Public Credit Director in the Finance and Public Credit Ministry of Colombia. He has been Technical Vice President of the Banking Association of Colombia and Head of the Global Programming Unit of the National Planning Department. He was Dean of the Faculty of Economics of the Universidad Externado de Colombia and an economist in the Western Hemisphere Department of the International Monetary Fund. He holds a degree in Philosophy from the Universidad Javeriana and holds a Master's Degree in Economics from Universidad de los Andes. He attended the Ph.D. program at the London School of Economics. He is a Director of Industrias de Licores del Valle, Clínica DIME, ASTORGA and Fabricato. Mr. Cabrera has served as a Director of Ecopetrol's Board since March 31, 2017. Currently Mr. Cabrera is an independent Director of Ecopetrol's Board.

*Yesid Reyes Alvarado (58)* has been a professor at the Universities Externado, Libre, Santo Tomás, Autónoma of Madrid and Los Andes. He has acted as Associate Judge in the Tribunal Superior de Bogotá, Consejo Superior de la Judicatura, Supreme Court and Constitutional Court. He has also been a columnist for the newspaper El Espectador. He served as Minister of Justice and Law of Colombia during August 2014 to April 2016. He is currently Director of the Center for Research in Philosophy and Law at the University Externado. Mr. Reyes holds a degree in law and a specialization and Master in Criminal, Criminological and Criminalistics Sciences in the same university. He holds a PhD in Law from the University Autónoma of Madrid and had a research fellowship in Alexander von Humboldt Stiftung at the University of Bonn (Germany). Mr. Reyes has served as a Director of Ecopetrol's Board since September 14, 2016. Currently Mr. Reyes is an independent Director of Ecopetrol's Board.

*Ana Milena López Rocha (36)* serves as the Director of Public Credit and National Treasury at the Colombian Ministry of Finance since April 2015. She was a Partner at asset manager Newfoundland Capital Management and an external advisor to Fiduciaria Alianza and Alianza Valores. She held leadership positions at Sociedades Bolívar S.A. and J.P. Morgan Chase Bank. Ms. López holds a B.A. in Economics from Harvard University and a Master's Degree in Business from Columbia Business School. She is a member of the Board of Directors of Interconexión Eléctrica S.A. E.S.P. - (ISA) and Financiera de Desarrollo Nacional. Ms. López has served as a Director of Ecopetrol's Board since September 14, 2016. Currently Ms. López is a non-independent Director of Ecopetrol's Board.

*Jaime Ardila Gómez (61)* was president of General Motors for South America and has held various positions within General Motors. Among these, he acted as President for Brazil and Mercosur; CFO for Latin America, Africa and the Middle East; CEO and Managing Director in Argentina; CEO and Managing Director in COLMOTORES, CEO and Managing Director in Ecuador; Omnibus BB, CFO in Chile; and Treasurer in Mexico, among others. He also served as Managing Director in Colombian Operations for N.M Rothschild and Sons and Secretary General of the Ministry of Industry and Trade in Colombia. Mr. Ardila holds a B.A. in economics from the University of Bogotá Jorge Tadeo Lozano and a master degree in economics from the London School of Economics. He is a member of the Board of Directors of Goldman Sachs BDC, Accenture, Council of the Americas and the Chamber of Commerce of Brazil. Mr. Ardila has served as a Director of Ecopetrol's Board since March 31, 2016. Currently Mr. Ardila is an independent Director of Ecopetrol's Board.

*Carlos Alfredo Cure Cure (72)* was Ambassador of Colombia to Venezuela. He was CEO of Bavaria S.A., the largest brewery in Colombia. He also served as an advisor to the Board of the Olympic Group S.A. and member of the Board of Avianca S.A. (Colombia's national airline). He acted as deputy financial manager of Cementos del Caribe, CEO of Cementos Toluviejo and CEO of Astilleros Unión Industrial. Mr. Cure holds a degree in Civil Engineering from the National University of Medellín. Mr. Cure has served as a Director of Ecopetrol's Board since September 5, 2015. Currently Mr. Cure is an independent Director of Ecopetrol's Board.

*Joaquín Moreno Uribe (68)* earned a degree in civil engineering from Universidad Industrial de Santander and completed a The Advanced Management Program (AMP) at The Harvard University Business School. Mr. Moreno worked initially as Director for Constructions and Engineering of Urbanas, in Bucaramanga, Colombia. He then joined the Royal Dutch/Shell Group of companies for more than 33 years. His career with Shell included various positions at technical, managerial and leadership levels, in different sectors of the Oil & Gas Industries (Upstream and Downstream), Chemicals, Metals and Coal. He worked in different countries in America and Europe, including several appointments at regional, global and corporate levels at the Headquarters of the RDS Group in London and The Hague. Mr. Moreno has also served as Country Chairman and President for Shell in Mexico, Colombia and Venezuela, as well as Regional CEO for the Northern Latin American Region. On his return to Colombia, he was appointed by the Presidency of the Country, as High Presidential Commissioner –Ad Honorem- in charge of coordinating the reconstruction of the areas affected by the heavy rain season and floods of early 2005, in the Region of Santander and Northern Santander. Mr. Moreno has been a member of the boards of directors of various local and international companies, as well as educational and leadership institutions and initiatives. Mr. Moreno has served as a Director of Ecopetrol's Board since March 27, 2008. Currently Mr. Moreno is an independent Director of Ecopetrol's Board.

*Horacio Ferreira Rueda (47)* is an executive leader with more than 20 years of international experience in the oil industry. His knowledge and expertise stem from positions as CEO and President of an oilfield services company in Houston, TX to application of state of art technologies in the oil industry. He has led and executed numerous reservoir engineering projects in the Americas, Europe, Africa, Middle East and Far East and has conducted research in optimization of multiphase meters, underbalanced reservoir engineering, real time reservoir and production analysis, reservoir simulation and waterflood techniques with horizontal wells. He holds a BS in Petroleum Engineering from Universidad América, master and doctoral degrees in Petroleum Engineering from Texas A&M University and a business graduate degree in Management of International Corporations from Texas A&M University. Mr. Ferreira has served as a Director of Ecopetrol's Board, nominated by the hydrocarbon producing provinces of Colombia, since January 23, 2014. Currently Mr. Ferreira is an independent Director of Ecopetrol's Board, nominated by the hydrocarbon producing provinces of Colombia.

*Carlos Gustavo Cano Sanz (70)* currently serves as Professor in the Master of Corporate Finance at CESA. He was Director of Banco de la República from February 4, 2005 to January 31, 2017. He was Minister of Agriculture between August 7, 2002 and February 3, 2005. He served as an external consultant to the Alternative Development and Competitiveness for the Andean Region from 1999 to 2002. He represented Colombia at the Inter-American Institute for Cooperation on Agriculture (IICA) from 1997 to 1999. He acted as President of COMUNICAN S.A. from 1996 to 1997, Caja Agraria from 1995 to 1996 and Sociedad de Agricultores de Colombia (SAC) from 1990 to 1991. He was General Manager of the National Federation of Rice Growers (FEDEARROZ) and the Agroindustrial Complex of Tolima S.A. (CATSA). Mr. Cano is an Economist from the University of Los Andes with a master degree in Economics from the University of Lancaster, England. He has a postgraduate degree in Government, Business and International Economics from Harvard University and from the Institute of Higher Business Management (INALDE). He has served as a member of various boards of directors, including the Comisión Nacional de Crédito Agropecuario, FINAGRO, Banco Agrario, ICA, CORPOICA, the National Coffee Growers Committee, among others. He doesn't serve as a Director of joint-stock company. Mr. Cano has served as a Director of Ecopetrol's Board, nominated by the minority shareholders with the greatest share participation, since March 31, 2017. Currently Mr. Cano is an independent Director of Ecopetrol's Board, nominated by the minority shareholders with the greatest share participation.

### **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 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 shareholders' meeting 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, Directors are elected for a one-year term, and the positions are filled either by person or by position. Members of the Board may be reelected indefinitely. Currently, we have one Director appointed by his position: the Minister of Finance and Public Credit. Our current Directors were elected at the ordinary shareholders' meeting held on March 31, 2017. Directors may be removed without cause at any moment by a majority of the shareholders present at a general shareholders' meeting.

Our CEO is appointed by the Board of Directors and has 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' meeting. 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 competition with the company, unless authorized at a general shareholders' meeting. 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 shareholders' meeting. If the director or executive officer who has the conflict is a shareholder, his or her vote must be excluded. We disclose 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 four committees (audit and risk committee, corporate governance and sustainability committee, compensation and nomination committee and business committee), which establish guidelines, set specific actions and evaluate and submit proposals designed to improve performance in the areas under their supervision and control. These committees are comprised of members of the Board of Directors who are also appointed by the members of the Board of Directors and 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 65 – Composition of committees of the Board of Directors as of April 20, 2017**

<b>Audit and Risk Committee</b>	<b>Compensation and Nomination Committee</b>	<b>Corporate Governance and Sustainability Committee</b>
Horacio Ferreira Rueda	Minister of Finance and Public Credit	Minister of Finance and Public Credit
Jaime Ardila Gómez	Carlos Cure Cure	Horacio Ferrerira Rueda
Joaquín Moreno Uribe	Ana Milena López Rocha	Carlos Cure Cure
Yesid Reyes Alvarado	Joaquín Moreno Uribe	Yesid Reyes Alvarado
Carlos Gustavo Cano Sanz	Mauricio Cabrera Galvis	Jaime Ardila Gómez
		Carlos Gustavo Cano Sanz
		Mauricio Cabrera Galvis
<b>Business Committee</b>		
Minister of Finance and Public Credit		
Horacio Ferreira Rueda		
Joaquín Moreno Uribe		
Carlos Cure Cure		
Jaime Ardila Gómez		
Carlos Gustavo Cano Sanz		
Mauricio Cabrera Galvis		

#### **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. Occasionally, the audit and risk committee will have no doubt that these additional services do not compromise the external auditor’s independence. When in doubt, the committee will request the opinion of the internal auditor.

## 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.

### 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.

##### ***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.

#### 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 seven independent Directors and two non-independent Directors.

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 bylaws and 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 bylaws and board charter, this committee shall be composed of a majority of independent Directors.

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**NYSE Standards*****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.

***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.

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**Our Corporate Governance Practices**

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.

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>.

*Juan Carlos Echeverry (54)* has served as the Chief Executive Officer of Ecopetrol, Colombia's National Oil Company, since April 2015. From 2010 to 2012, he was Colombia's Minister of Finance. During his mandate, four international publications (The Banker, América Economía, Emerging Markets, and Institutional Investor) awarded him as Best Finance Minister of the Americas. Prior to his current role, Mr. Echeverry represented Colombia in the Board of Directors of the Inter-American Development Bank (Washington D.C.). He also served as Dean of Economics at University of the Andes (Bogotá). From 2000 to 2002 he was the Director of Economic Planning of Colombia. In 2002, Mr. Echeverry founded Econcept, a Bogotá based economics and business consultancy, and was partner of Global Source, a New York based consultancy. He is the author of several books about the Colombian economy and co-author of publications focusing on developing economies. Mr. Echeverry received a Ph.D. in Economics from New York University, a graduate studies degree in International Economics from Kiel Institute of the World Economy and B.A. in Economics from the University of the Andes (Bogotá).

*Felipe Bayon Pardo (51)* has served as the Executive Vice-President of Ecopetrol since February 2016. Mr. Bayon holds a degree in Mechanical Engineering from the Universidad de Los Andes (Bogotá). He has over 25 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.

*María Fernanda Suárez (42)* has served as the Chief Financial Officer of Ecopetrol since August 2015. Ms. Suárez holds a degree in Business Administration from CESA and a master's degree in Policy Management from Georgetown University. Ms. Suárez has 20 years of experience in the public and private sectors. She has held various positions in these sectors, including Director of Public Credit and National Treasury at Ministry of Finance and Public Credit in the Treasury Department, Investment Chief Officer at Porvenir and other high-level positions at Citibank, ABN AMRO and Bank of America. She has served on the board of directors for ISA, Isagen, XM, FEN, Cenit, among others.

*Hector Manosalva (54)* joined Ecopetrol in 1986 and has served as Vice-President for Development and Production since July, 2014. Mr. Manosalva holds a degree in Petroleum Engineering from the Universidad de America (Bogotá), completed post-graduate studies in finance at the Universidad EAFIT and Executive Management at the Universidad de los Andes. 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.

*Max Torres (59)* has served as Exploration Vice-President since September 2014. Mr. Torres holds a B.S. degree in Geology from Universidad Nacional of Tucumán in Argentina and an M.S. in Stratigraphy from Georgia State University. He has more than 28 years of experience in oil and gas exploration and production and is a proven world class oil and gas finder and a champion of Latin American oil and gas exploration. Among his many professional accomplishments, Mr. Torres was directly responsible for the 16 Tcfg Perla gas field discovery in Venezuela, the 275 Tcfg super giant Galkynysh gas field discovery in Turkmenistan, as well as other oil and gas discoveries. Prior to joining Ecopetrol, Mr. Torres worked at Repsol from 1997 to 2013 as Exploration Director for Europe and the Middle East, Exploration Director for Europe and Africa and Exploration Director for Latin America.

*Rafael Espinosa (49)* has served as Vice-President of Transportation since September 2016. Mr. Espinosa holds a bachelor's degree in Civil Engineering from Universidad Santo Tomas in Colombia and a MBA from University of the Andes (Bogotá). He has worked for Ecopetrol for the last 23 years and has held various positions within the company, including Pipeline Operations and Maintenance General Manager, Pipelines Manager, Central Operation Superintendent, Chief of Operations Department, Plant Coordinator, Pipeline Maintenance Engineer and Community Relationships Engineer.

*Rafael Guzman (50)* joined Ecopetrol in 2010 and has served as Technical Vice-President since May 2013. Mr. Guzman holds a B.S. degree in Petroleum Engineering from Universidad America in Colombia (1995), a M.S. in Petroleum Engineering and a PhD in Petroleum Engineering with minor in Mathematics both from Stanford University. Mr. Guzman has been with Ecopetrol since October 2010, where he has held several positions as regional production manager. Prior to that, Mr. Guzman worked with ENI in managerial positions in Europe and Latin America.

*Luisa Fernanda Lafaurie (56)* has served as Cenit's Chief Executive Officer since September 2016. Ms. Lafaurie holds a degree in Economics from the Universidad Javeriana with a Master's Degree in Business Administration and a Degree in Finance and Senior Management from Los Andes University (Bogotá). Ms. Lafaurie has accumulated extensive experience in the energy sector, both in the public and private sector, serving as Minister of Mines and Energy (2001-2002) and Deputy Minister of Mines and Energy (1998-2000), and in the private sector as an external advisor to mining and fuel distributors companies. She was a founding member of Sumatoria, a firm where she worked as an advisor on corporate strategies and business issues. As chief executive officer of HJDK (2009-2013), German Efromovich's business group in Colombia, Ms. Lafaurie led the development of hospitality and agribusiness companies. She was also an advisor for the Synergy Group corporations in Colombia with the exception of Avianca. Ms. Lafaurie worked at Carbocol (1985-1996) and has served as a member of the board of different companies such as Ocesa, Ecopetrol, Carbocol, Minercol, Ecogas, ISA, Almacenes Exito, ISAGEN, and Concreto in Colombia, and CTEEP in Brazil. Currently, she is member of the board of directors of Avianca, Financiera de Desarrollo Nacional (FDN), Emgesa, Ocesa and Oleoducto Bicentenario.

*Tomas Hernandez (62)* has served as Vice-President of Refining and Industrial Processes since February 2016. He has over 37 years of international experience in the oil and gas sector. He has served 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 joint venture in which Chevron participates. Mr. Hernandez holds a degree in Chemical Engineering from the University of Missouri – Rolla (University of Science and Technology Missouri).

*Jürgen Loeber (59)* 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 specialization in Project Management. He joined the Army Corps of Engineers as reserve officer and reached a captain rank. He has over 30 years of experience in the Oil & Gas industry. 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. From 1992 to 2001 he worked for BP in various countries as project manager, construction manager and project control engineer. He began his career in 1985 in Exxon as financial analyst.

*Pedro Manrique (52)* was named Commercial and Marketing Vice President as of April 2017. Mr. Manrique holds a bachelor's degree in Electrical Engineering from the Industrial University of 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. His previous position was as 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 based in Bogotá, Colombia. During his career he also worked Enron Energy Services as Risk Manager, out of their headquarter offices in Houston, Texas. He has also served as member of the Leadership Team of Chevron Latin America and as member of the national operations council of natural gas in Colombia, among many other responsibilities.

*Carlos Alberto Vargas Medina (47)* has served as Vice-President of Transformation since December 2015. Mr. Vargas holds a degree in Petroleum Engineering from America University. He has 23 years of experience across the integrated oil and gas value chain with a focus in drilling and well interventions and an expertise in exploration, appraisal, development and production onshore and offshore wells. He has held management positions in the United Kingdom, Argentina, Bolivia and Colombia, where he has developed key skills in strategy, performance management systems, risks management, HSE and integration of multicultural and multidisciplinary teams. Prior to taking his current position, he was the Vice-President of Drilling and Completions at Equion.



*Fernán Ignacio Bejarano Arias (60)* 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 the American University (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 at 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, 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 arbitrator before the Center for Arbitration and Conciliation of the Bogotá Chamber of Commerce.

*María Juliana Albán (41)* 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. Since 2007, Ms. Alban has 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 (57)* 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 a 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 a Global Human Resources Division T&O, among others. Mr. Arango holds a degree in Strategic Marketing from CESA School of Business and a bachelor's degree in Theology from the Universidad Hochschule Sankt Georgen (Frankfurt) and a bachelor's degree in Philosophy from Javeriana University.

*Andrés Mantilla (46)* 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, 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 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.

*Eduardo Uribe Botero (57)* has served as Vice-President of Sustainable Development and Environmental since August 2015. Mr. Uribe holds a degree in Agricultural Engineering from Caldas University, a master's of science in Soil Chemistry and a Ph.D. in Fertility and Management of Tropical Soils. He has over 25 years of experience in the private and public sectors. In 1994, he was appointed the first Vice-Minister of the Environment in Colombia. In recent years he has served as a strategic, environmental and social advisor to companies and organizations in the fields of hydrocarbons, mining, energy, forestry, environmental and agribusiness through the consulting firm Optim Consulting.

*Alberto Consuegra Granger (57)* has served as Vice-President of Supply and Services since August 2016. Mr. Consuegra holds a degree in Civil Engineering from Cartagena University and has a master's degree in Pavements and Construction Management from Texas A&M University. His latest position was Vice-President of Exploration and Production at Equion Energia Limited, where he also served as the Vice-President for Projects and Production. Alberto 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, working in the project group, afterwards, he went on to BP Exploration, where he worked for 16 years starting 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.

*Mónica Jiménez González (41)* has served as Secretary General of Ecopetrol SA since July 2016. Ms. Jiménez holds a law degree from University of the Andes (Bogotá) and has been allowed to practice 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 (LSE). Before studying abroad, Ms. Jimenez worked as a lawyer at a Colombian law firm and then as lawyer advising the Minister and the Deputy Minister of Defense of Colombia in matters related to international law. Prior to returning to Colombia, she lived in Canada for 13 years, time during which she worked as a lawyer in a boutique law firm specialized in international law and then, in a major Canadian law firm in Vancouver, BC.

None of our Directors or executive officers has any familial relationship with any Director or executive officer.

#### **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\$4.1 million for 2016 and COP\$3.9 million for 2015. Fees for attendance at virtual meetings are set at 50% of the in-person meeting fee.

The total compensation paid to our Directors, executive officers and senior management active as of December 31, 2016 during 2016 amounted to COP\$13,901 million.

Only one of our executive officers is eligible to receive pension and retirement benefits from us. The total amount set aside to provide pension and retirement benefits to our eligible executive officers totals COP\$4,674 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.

**Table 59** – The following Directors and executive officers own shares of Ecopetrol:

<b>Director</b>	<b>Shares</b>	<b>%</b>
Joaquín Moreno Uribe	127,988	0.0003113%
Mauricio Cárdenas Santamaría	2,000	0.0000049%
Juan Carlos Echeverry Garzón	33,420	0.0000813%
<b>Executive Officer</b>	<b>Shares</b>	<b>%</b>
Héctor Manosalva	49,380	0.0001201%
Rafael Espinosa Rozo	7,200	0.0000175%

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, 2016, 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 affected 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, 2016, 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 year ended December 31, 2016 were audited by Ernst & Young Audit S.A.S. Our consolidated financial statements for the fiscal years ended December 31, 2015 were audited by PricewaterhouseCoopers Ltda.

The following table sets forth the fees billed to us by Ernst & Young Audit S.A.S. during the fiscal year ended December 31, 2016.

**Table 60 – Fees Billed to us by Ernst & Young Audit S.A.S.**

	<b>As of December 31, 2016</b>
	<b>(in millions of Colombian Pesos, excluding 16% value added tax)</b>
Audit fees	7,800
Audit-related fees	538
Tax fees	916
All other fees	-
<b>Total</b>	<b>9,254</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.* The tax fees listed in the table above correspond to (i) advising some subsidiaries about the tax consequences associated with new or proposed legislation, and (ii) rendering advice to some subsidiaries on the likely tax consequences of proposed transactions and the appropriate methods of structuring and reporting.

The following table sets forth the fees billed to us by PricewaterhouseCoopers Ltda. during the fiscal year ended December 31, 2015.

**Table 61 – Fees Billed to us by PricewaterhouseCoopers Ltda.**

	<b>As of December 31, 2015</b>
	<b>(in millions of Colombian Pesos, excluding 16% value added tax)</b>
Audit fees	8,199
Audit-related fees	606
Tax fees	-
All other fees <sup>(1)</sup>	5
<b>Total</b>	<b>8,810</b>

(1) These fees are comprised of coaching sessions in management skills dictated to officers of some affiliates as well as participation in open training courses.

*Audit Fees.* The audit fees listed in the table above are the aggregated fees billed by PricewaterhouseCoopers Ltda. in connection with their audits of our annual consolidated financial statements (IFRS), interim consolidated financial statements (under IFRS), subsidiary audits (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 PricewaterhouseCoopers Ltda. in connection with their agreed-upon procedures of our variable compensation bonus system as well as the audit of the joint operation agreement of ECP Oil and Gas Germany GmbH.

*Tax Fees.* The tax fees listed in the table above correspond to (1) assisting some subsidiaries in the preparation and filing of appropriate tax returns with the tax authorities (including electronic filings), (2) advising some subsidiaries about the tax consequences associated with new or proposed legislation and (3) rendering advice to some subsidiaries on the likely tax consequences of proposed transactions and the appropriate methods of structuring and reporting.

**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, 2016 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, 2016, please see Note 36 – Subsequent events to our consolidated financial statements.

8. **Financial Statements**

**Ecopetrol S. A.**  
Consolidated Financial Statements  
At December 31, 2016 and 2015 and for three years ended December 31, 2016, 2015 and 2014

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## Report of Independent Registered Public Accounting Firm

The Board of Directors and Shareholders of Ecopetrol S.A. and subsidiaries

We have audited the accompanying consolidated statement of financial position of Ecopetrol S.A. and subsidiaries as of December 31, 2016 and the related consolidated statements of profit or loss, other comprehensive income, changes in equity and cash flows for the year ended December 31, 2016. These financial statements are the responsibility of the Company's management. Our responsibility is to express an opinion on these financial statements based on our audit.

We conducted our audit in accordance with the standards of the Public Company Accounting Oversight Board (United States). Those standards require that we plan and perform the audit to obtain reasonable assurance about whether the financial statements are free of material misstatement. An audit includes examining, on a test basis, evidence supporting the amounts and disclosures in the financial statements. An audit also includes assessing the accounting principles used and significant estimates made by management, as well as evaluating the overall financial statement presentation. We believe that our audit provide a reasonable basis for our opinion.

In our opinion, the financial statements referred to above present fairly, in all material respects, the consolidated financial position of Ecopetrol S.A. and subsidiaries at December 31, 2016, and the consolidated results of their operations and their cash flows for the year ended December 31, 2016, 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), Ecopetrol S.A. and its subsidiaries' internal control over financial reporting as of December 31, 2016, 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 May 30, 2017 expressed an unqualified opinion thereon.

/s/ Ernst & Young Audit S.A.S.  
Bogota, Colombia  
May 30, 2017



## Report of Independent Registered Public Accounting Firm

The Board of Directors and Shareholders of Ecopetrol S.A. and subsidiaries

We have audited Ecopetrol S.A. and subsidiaries' internal control over financial reporting as of December 31, 2016, 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). Ecopetrol S.A. and subsidiaries' 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 Ecopetrol S.A. and subsidiaries' internal control over financial reporting based on our audit.

We conducted our audit in accordance with the standards of the Public Company Accounting Oversight Board (United States). 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.

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.

In our opinion, Ecopetrol S.A. and subsidiaries maintained, in all material respects, effective internal control over financial reporting as of December 31, 2016, based on the COSO criteria.

We also have audited, in accordance with the standards of the Public Company Accounting Oversight Board (United States), the consolidated statements of financial position of Ecopetrol S.A. and subsidiaries as of December 31, 2016 and the related consolidated statements of profit or loss, other comprehensive income, changes in equity and cash flows for the year ended December 31, 2016 of Ecopetrol S.A. and subsidiaries and our report dated May 30, 2017 expressed an unqualified opinion thereon.

/s/ Ernst & Young Audit S.A.S.  
Bogota, Colombia  
May 30, 2017

**Report of Independent Registered Public Accounting Firm**

To the Board of Directors  
And Shareholders of Ecopetrol S. A.

In our opinion, the accompanying consolidated statement of financial position and the related consolidated statement of profit and loss, other comprehensive income, changes in equity and cash flows present fairly, in all material respects, the financial position of Ecopetrol S. A. and its subsidiaries (the "Company") at December 31, 2015, and the results of their operations and their cash flows for each of the two years in the period ended December 31, 2015 in conformity with International Financial Reporting Standards as issued by the International Accounting Standards Board. These financial statements are the responsibility of the Company's management. Our responsibility is to express an opinion on these financial statements based on our audits. We conducted our audits of these statements in accordance with the standards of the Public Company Accounting Oversight Board (United States). Those standards require that we plan and perform the audit to obtain reasonable assurance about whether the financial statements are free of material misstatement. An audit includes examining, on a test basis, evidence supporting the amounts and disclosures in the financial statements, assessing the accounting principles used and significant estimates made by management, and evaluating the overall financial statement presentation. We believe that our audits provide a reasonable basis for our opinion.

As discussed in Note 2.8 to the consolidated financial statements, the Company has elected to change the manner in which it presents dry wells in the consolidated statements of cash flows in 2016.

/s/ PricewaterhouseCoopers Ltda.  
Bogotá, Colombia

April 28, 2016, except for the change in the manner in which the company presents dry wells in the consolidated statements of cash flows in 2016 as discussed in Note 2.8 to the consolidated financial statements, as to which the date is May 30, 2017.

**Ecopetrol S.A.**  
**Consolidated statements of financial position**  
(Figures expressed in millions of Colombian pesos)

	Notes	As of December 31,	
		2016	2015
<b>Assets</b>			
<b>Current assets</b>			
Cash and cash equivalents	6	8,410,467	6,550,450
Trade and other receivables, net	7	4,212,701	3,427,412
Inventories, net	8	3,841,901	3,057,958
Other financial assets	9	5,315,537	329,227
Tax assets	10	1,129,098	4,501,734
Equity instruments measured at fair value	11	51,610	913,488
Other current assets	12	1,035,632	1,090,324
		<b>23,996,946</b>	<b>19,870,593</b>
Assets held for sale	13	132,216	242,745
<b>Total current assets</b>		<b>24,129,162</b>	<b>20,113,338</b>
<b>Non-current assets</b>			
Investments in associates and joint ventures	14	1,552,694	1,931,934
Trade and other receivables, net	7	729,410	584,571
Property, plant and equipment	15	62,328,502	65,105,073
Natural and environmental resources	16	22,341,047	24,043,297
Intangibles	18	272,132	388,051
Deferred tax assets	10	5,726,961	8,239,472
Other financial assets	9	1,371,358	1,256,152
Goodwill	19	1,159,922	1,159,922
Other non-current assets	12	826,736	766,380
<b>Total non-current assets</b>		<b>96,308,762</b>	<b>103,474,852</b>
<b>Total assets</b>		<b>120,437,924</b>	<b>123,588,190</b>
<b>Liabilities</b>			
<b>Current liabilities</b>			
Loans and borrowings	20	4,126,203	4,573,620
Trade and other payables	21	6,854,363	7,757,277
Provisions for employee benefits	22	1,974,496	1,392,266
Tax liabilities	10	2,130,940	2,803,559
Accrued liabilities and provisions	23	821,954	653,497
Other financial liabilities		-	101,319
Other liabilities		439,274	144,441
		<b>16,347,230</b>	<b>17,425,979</b>
Liabilities related to assets held for sale	13	40,128	17,628
<b>Total current liabilities</b>		<b>16,387,358</b>	<b>17,443,607</b>
<b>Non-current liabilities</b>			
Loans and borrowings	20	48,095,824	48,649,718
Trade and other payables	21	23,893	6
Provisions for employee benefits	22	3,901,082	2,459,849
Deferred tax liabilities	10	3,118,650	6,026,050
Accrued liabilities and provisions	23	5,095,916	5,423,850
Other non-current liabilities		254,700	484,147
<b>Total non-current liabilities</b>		<b>60,490,065</b>	<b>63,043,620</b>
<b>Total liabilities</b>		<b>76,877,423</b>	<b>80,487,227</b>
<b>Equity</b>			
Ecopetrol shareholders' equity	24	42,026,858	41,225,908
Non-controlling interests		1,533,643	1,875,055
<b>Total equity</b>		<b>43,560,501</b>	<b>43,100,963</b>
<b>Total liabilities and equity</b>		<b>120,437,924</b>	<b>123,588,190</b>

**Ecopetrol S.A.****Consolidated statements of profit or loss**

(Figures expressed in millions of Colombian pesos, except for the net earnings (loss) per share, expressed in Colombian pesos)

		<b>For the years ended December 31,</b>		
	<b>Notes</b>	<b>2016</b>	<b>2015</b>	<b>2014</b>
Sales revenue	25	48,485,561	52,347,271	65,971,888
Cost of sales (before impairment of non-current assets)	26	34,251,423	36,994,516	42,975,128
<b>Gross profit (excluding impairment)</b>		<b>14,234,138</b>	<b>15,352,755</b>	<b>22,996,760</b>
Administration expenses	27	1,923,268	1,700,985	1,031,035
Operation and project expenses	27	2,751,687	4,034,268	5,520,325
Impairment of non-current assets	28	928,747	7,864,875	2,304,567
Other operating income and (expenses), net	29	(274,112)	(378,538)	(308,194)
<b>Operating income</b>		<b>8,904,548</b>	<b>2,131,165</b>	<b>14,449,027</b>
Financial result, net	30			
Financial income		1,311,743	621,924	399,818
Financial expenses		(3,463,540)	(2,718,414)	(1,640,294)
Foreign exchange gain (loss), net		976,430	(5,566,614)	(2,270,193)
		<b>(1,175,367)</b>	<b>(7,663,104)</b>	<b>(3,510,669)</b>
Share of profit (loss) of associates and joint ventures	14	61,345	(46,687)	166,070
<b>Income before income tax expense</b>		<b>7,790,526</b>	<b>(5,578,626)</b>	<b>11,104,428</b>
Income tax expense	10	(4,543,046)	(710,353)	(5,434,855)
<b>Net income (loss) for the period</b>		<b>3,247,480</b>	<b>(6,288,979)</b>	<b>5,669,573</b>
<b>Net income (loss) attributable to:</b>				
Company's shareholders		2,447,881	(7,193,859)	5,046,517
Non-controlling interests		799,599	904,880	623,056
		<b>3,247,480</b>	<b>(6,288,979)</b>	<b>5,669,573</b>
<b>Earnings (loss) per share (basic and diluted)</b>	24.6	<b>59.5</b>	<b>(175.0)</b>	<b>122.7</b>

**Ecopetrol S.A.**  
**Consolidated statements of other comprehensive income**  
(Figures expressed in millions of Colombian pesos)

	Notes	For the years ended December 31,		
		2016	2015	2014
<b>Net income (loss) of the year</b>		<b>3,247,480</b>	<b>(6,288,979)</b>	<b>5,669,573</b>
<b>Other comprehensive income</b>				
<b>Items that may be reclassified subsequently to profit or loss (net of tax):</b>				
Unrealized gain (loss) on hedges:				
Cash flow hedge for future exports	31	461,424	(217,291)	-
Hedge of a net investment in a foreign operation	31	(155,359)	-	-
Cash flow hedge with derivative instruments	31	33,869	(60,083)	-
Gain (loss) on equity instruments measured at fair value	11	126,205	(106,911)	76,435
Realized gain on proceeds from sales of equity instruments measured at fair value		(68,497)	(19,405)	-
Foreign currency translation		(925,981)	5,979,644	3,398,374
		<b>(528,339)</b>	<b>5,575,954</b>	<b>3,474,809</b>
<b>Items that will not be reclassified subsequently to profit or loss (net of tax):</b>				
Remeasurement (loss) gain on defined benefit plans		(1,153,442)	1,404,602	743,793
Others (losses) gains		(46,826)	58,643	-
		<b>(1,200,268)</b>	<b>1,463,245</b>	<b>743,793</b>
<b>Other comprehensive income</b>		<b>(1,728,607)</b>	<b>7,039,199</b>	<b>4,218,602</b>
<b>Total comprehensive income</b>		<b>1,518,873</b>	<b>750,220</b>	<b>9,888,175</b>
<b>Attributable to:</b>				
Ecopetrol shareholders		784,658	(328,604)	9,114,221
Non-controlling interests		734,215	1,078,824	773,954
		<b>1,518,873</b>	<b>750,220</b>	<b>9,888,175</b>

**Ecopetrol S.A.**

**Consolidated statements of changes in equity**

(Figures expressed in millions of Colombian pesos)

	Notes	Subscribed and paid-in capital	Additional paid-in capital	Reserves (1)	Other comprehensive income	Retained earnings (1)	Equity attributable to Company's shareholders	Non-controlling interests	Total equity
<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 income		-	-	-	-	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	24	-	-	(3,869,907)	-	3,869,907	-	-	-
Appropriation of reserves, net		-	-	(117,819)	-	117,819	-	-	-
Other movements		-	-	-	-	(23,637)	(23,637)	(6,086)	(29,723)
Other comprehensive income		-	-	-	-	-	-	-	-
Gain (loss) on hedging instruments:		-	-	-	-	-	-	-	-
Cash flow hedge for future exports	31	-	-	-	461,424	-	461,424	-	461,424
Hedge of a net investment in a foreign operation	31	-	-	-	(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	11	-	-	-	57,708	-	57,708	-	57,708
Foreign currency translation		-	-	-	(811,345)	-	(811,345)	(114,636)	(925,981)
Actuarial valuation losses	22	-	-	-	(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>

	Notes	Subscribed and paid-in capital	Additional paid-in capital	Reserves (1)	Other comprehensive income	Retained earnings (1)	Equity attributable to Company's shareholders	Non-controlling interests	Total equity
<b>Balance as of December 31, 2014</b>		<b>10,279,175</b>	<b>6,607,612</b>	<b>17,963,370</b>	<b>3,980,749</b>	<b>8,192,040</b>	<b>47,022,946</b>	<b>1,511,282</b>	<b>48,534,228</b>
Net income (loss)		-	-	-	-	(7,193,859)	(7,193,859)	904,880	(6,288,979)
Dividends declared	24	-	-	-	-	(5,468,521)	(5,468,521)	(715,051)	(6,183,572)
Appropriation of reserves, net		-	-	2,344,095	-	(2,344,095)	-	-	-
Capitalization of reserves		14,760,895	-	(14,760,895)	-	-	-	-	-
Other movements		(3)	87	-	-	3	87	-	87
Other comprehensive income		-	-	-	-	-	-	-	-
Loss on hedging instruments:		-	-	-	-	-	-	-	-
Cash flow hedge for future exports	31	-	-	-	(217,291)	-	(217,291)	-	(217,291)
Cash flow hedge with derivative instruments		-	-	-	(43,590)	-	(43,590)	(16,493)	(60,083)
Net fair value (loss) on equity instruments measured at fair value	11	-	-	-	(126,316)	-	(126,316)	-	(126,316)
Foreign currency translation		-	-	-	5,789,207	-	5,789,207	190,437	5,979,644
Actuarial valuation gains	22	-	-	-	1,404,602	-	1,404,602	-	1,404,602
Other movements		-	-	-	58,643	-	58,643	-	58,643
<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>

(1) For comparative purposes, the initial balances of reserves and accumulated profits were reclassified, without changing the equity attributable to the shareholders of Ecopetrol. See note 2.8.

**Ecopetrol S.A.****Consolidated statements of changes in equity**

(Figures expressed in millions of Colombian pesos)

	Notes	Subscribed and paid-in capital	Additional paid-in capital	Reserves (1)	Other comprehensive income	Retained earnings (1)	Equity attributable to Company's shareholders	Non-controlling interests	Total equity
<b>Balance as of January 1st, 2014</b>		<b>10,279,175</b>	<b>6,607,540</b>	<b>15,300,725</b>	<b>(86,956)</b>	<b>16,498,512</b>	<b>48,598,996</b>	<b>1,265,573</b>	<b>49,864,569</b>
Net income		-	-	-	-	5,046,517	5,046,517	623,056	5,669,573
Dividends declared	24	-	-	-	-	(10,690,342)	(10,690,342)	(516,331)	(11,206,673)
Appropriation of reserves, net	24	-	-	2,662,645	-	(2,662,645)	-	-	-
Other movements		-	72	-	-	(2)	70	(11,914)	(11,844)
Other comprehensive income									
Net fair value gain (loss) on equity instruments measured at fair value	11	-	-	-	76,435	-	76,435	-	76,435
Foreign currency translation		-	-	-	3,247,477	-	3,247,477	150,898	3,398,375
Actuarial valuation gains	22	-	-	-	743,793	-	743,793	-	743,793
<b>Balance as of December 31, 2014</b>		<b>10,279,175</b>	<b>6,607,612</b>	<b>17,963,370</b>	<b>3,980,749</b>	<b>8,192,040</b>	<b>47,022,946</b>	<b>1,511,282</b>	<b>48,534,228</b>

(1) For comparative purposes, the initial balances of reserves and accumulated profits were reclassified, without changing the equity attributable to the shareholders of Ecopetrol. See note 2.8.

**Ecopetrol S.A.**

**Consolidated statements of cash flows**

(Figures expressed in millions of Colombian pesos)

		<b>For the years ended December 31,</b>		
	<b>Note</b>	<b>2016</b>	<b>2015</b>	<b>2014</b>
<b>Cash flow provided by operating activities:</b>				
Net income (loss) for the period		3,247,480	(6,288,979)	5,669,573
Adjustments to reconcile net income (loss) to cash provided by operating activities:				
Income tax	10	4,543,046	710,353	5,434,855
Depreciation, depletion and amortization	15,16,18	7,607,000	6,770,358	6,417,207
Foreign exchange loss	30	(976,430)	5,566,614	2,270,193
Finance costs recognised in profit or loss		3,345,515	2,396,445	1,405,331
Dry wells	2.8 - 16	342,691	1,266,440	1,563,384
Loss on disposal of non-current assets		78,990	59,932	231,899
Impairment of assets		1,003,140	7,856,177	2,381,413
Fair value (gain) loss on financial assets valuation		(59,593)	(109,673)	135,427
(Gain) loss on share of profit of associates and joint ventures	14	(61,345)	46,687	(166,070)
(Gain) on sale of equity instruments measured at fair value		(47,129)	(72,339)	-
Realized foreign exchange cash flow hedges	25	(33,074)	(7,646)	-
Net changes in operating assets and liabilities		-		
Accounts and notes receivable		(1,400,583)	751,031	1,507,923
Inventories		(217,198)	(183,231)	610,843
Accounts payable		(619,131)	(2,202,808)	(322,819)
Taxes payable		2,547,232	(1,964,995)	(3,124,887)
Labor obligations		(11,677)	(206,444)	(259,043)
Estimated liabilities and provisions		(827,153)	(216,939)	(146,499)
Other assets		118,523	654,960	(653,196)
Income tax paid		(4,347,364)	(3,148,028)	(4,819,169)
<b>Net cash provided by operating activities</b>		<b>14,232,940</b>	<b>11,677,915</b>	<b>18,136,365</b>
<b>Cash flows from investing activities:</b>				
Investment in property, plant and equipment	15	(3,646,929)	(8,548,933)	(8,923,568)
Investment in natural and environmental resources	2.8 - 16	(2,121,295)	(6,856,761)	(6,601,680)
Additions to intangibles	18	(69,253)	(112,255)	(112,018)
Proceeds from sales of equity instruments measured at fair value	11	966,715	613,998	-
(Purchases) sales of other financial assets		(5,446,507)	1,208,898	1,313,837
Interest received		386,001	293,507	286,527
Dividends received		437,803	423,856	720,217
Proceeds from sales of property, plant and equipment		109,896	166,211	184,424
<b>Net cash used in investing activities</b>		<b>(9,383,569)</b>	<b>(12,811,479)</b>	<b>(13,132,261)</b>
<b>Cash flows from financing activities:</b>				
Proceeds from borrowings		4,594,640	10,985,933	9,094,818
Repayment of borrowings		(3,149,917)	(4,903,592)	(2,693,104)
Interest paid		(2,495,446)	(1,981,127)	(1,231,392)
Capitalizations		-	3	41
Dividends paid	24	(1,712,298)	(5,493,400)	(12,516,566)
<b>Net cash used in financing activities</b>		<b>(2,763,021)</b>	<b>(1,392,183)</b>	<b>(7,346,203)</b>
Exchange difference in cash and cash equivalents		(226,333)	1,458,019	1,155,187
Net increase (decrease) in cash and cash equivalents		1,860,017	(1,067,728)	(1,186,912)
Cash and cash equivalents at the beginning of the year	6	6,550,450	7,618,178	8,805,090
<b>Cash and cash equivalents at the end of the year</b>		<b>8,410,467</b>	<b>6,550,450</b>	<b>7,618,178</b>
<b>Non-cash transactions</b>				
Capitalization of reserves		-	14,760,895	-
Payment of income tax through offset of recoverable balances		656,121	894,451	-



## **1. Reporting entity**

Ecopetrol S.A. is a mixed economy company, with a commercial nature, formed in 1948 in Bogotá – Colombia, headquarters of the Ecopetrol Business Group. Its corporate purpose is to develop commercial or industrial activities arising from or related to the exploration, production, refining, transportation, storage, distribution, and selling of hydrocarbons, their by-products and associated products on its own or through its subsidiaries (hereafter “Ecopetrol”, the “Company” or Ecopetrol Business Group).

An 11.51% of Ecopetrol S.A.’s shares are publicly traded on the Stock Exchanges of Colombia, New York, USA and Lima, Peru. 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 S.A. is Bogotá – Colombia, Carrera 13 No. 36 - 24.

## **2. Basis of presentation**

### **2.1 Statement of compliance and authorization of the financial statements**

These consolidated financial statements of Ecopetrol for the years ended on December 31, 2016, 2015 and 2014 have been prepared in accordance with International Financial Reporting Standards (IFRS) and their interpretations, issued by the International Accounting Standards Board (IASB). The Ecopetrol Business Group adopted IFRS starting January 1, 2015, with a transition date of January 1, 2014.

Accounting policies described in Note 4 have been applied consistently in all periods.

These consolidated financial statements were approved by Ecopetrol’s Management on May 30, 2017.

### **2.2 Basis for consolidation**

The consolidated financial statements were prepared by consolidating all companies set out in Exhibit 1, which are those where Ecopetrol exercises direct or indirect control. Control is achieved when the Company:

- Has power over the investee;
- 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 occurs when the Company 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 Company 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 Company's voting rights regarding to the size and division of the shares of other vote holders;
  - b) Potential voting rights held by the Company, other vote holders or other parties;
  - c) Rights arising from other contractual arrangements; and
  - d) Any additional facts and circumstances that indicate that the Company 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, using consistent accounting policies.

All inter-company assets and liabilities, equity, income, expenses and cash flows relating to transactions between entities of the 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’s shareholders.

**Ecopetrol S.A.**  
Notes to Consolidated Financial Statements  
(Figures expressed in millions of Colombian pesos, unless otherwise stated)

In 2015, the Board of Directors of Ecopetrol S.A authorized the creation of a Colombian company indirectly wholly owned by Ecopetrol S.A. This Company will develop offshore activities in Colombia, which the company currently carries out as operator and non-operator, and take advantage of the benefits of Decree 2682/14, "pursuant to which the conditions and requirements are established for declaring the existence of Permanent Offshore Free Trade Zones". At December 31, 2015, the legal proceedings were pending to formalize the establishment of the subsidiary.

The following are the subsidiaries that were incorporated in 2016:

- a) **Ecopetrol Costa Afuera S.A.S.:** Subsidiary engaged in the production and exploration segment with a 100% ownership by the Group and that was created with the purpose of carrying out offshore activities in Colombia, which Ecopetrol is currently conducting as operator and non-operator of permits.
- b) **Sento S.A.S.:** Subsidiary engaged in the transport segment that was created for transferring 100% of the equity share held by Equion in Oleoducto de Colombia S.A.

### 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 through 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 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 functional currency of each group's company is determined in relation to the main economic environment where they operate. The consolidated financial statements are presented in Colombian pesos, which is the Group's functional and presentation currency.

The statement of profit or loss and statement of cash flows of subsidiaries with functional currencies different from Ecopetrol's functional currency are translated at the exchange rates on the dates of the transaction or at 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. Upon disposal of all or part of an interest in a subsidiary, the portion of the cumulative translation adjustment related to the company is recognized in the consolidated statement of 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**

In the preparation of the financial statements of Ecopetrol, transactions in currencies other than the Company's functional currency are recognized at the rates of exchange prevailing at the date of the transactions. At the end of each reporting period, monetary items denominated in foreign currencies are translated at the rates prevailing at the period end and variations presented on translation are recognized in financial results, net, except those resulting from the conversion of loans and borrowings designated as cash flow hedges or net investment in a business abroad, which are recognized in other comprehensive income within equity. When the hedged item affects the results, exchange differences accumulated in equity are reclassified to the consolidated statement of profit or loss as part of the operating result.

Non-monetary items carried at fair value that are denominated in foreign currencies are translated using the rates prevailing at the date when the fair value was determined.

Net investment in foreign operations includes equity financing and long-term inter-company loans for which settlement is neither planned nor likely to occur in the foreseeable future. The exchange differences derived from the translation of net investment in a foreign operation are accumulated in the other comprehensive income.

## **2.6 Classification of assets and liabilities as current and non-current**

In the consolidated statement of financial position, assets and liabilities are classified in accordance with their maturities between current, those with maturity equal to or less than twelve months, and non-current, those with maturity exceeding twelve months.

## **2.7 Earnings (loss) per share (basic and diluted)**

Basic earnings (loss) per share is calculated by dividing the profit for the year attributable to ordinary equity holders of the parent by weighted average number of ordinary shares outstanding during the year. There is no potential dilution of shares.

## **2.8 Changes in presentation policies and reclassifications**

- a) Subsequent to the issuance of the consolidated financial statements as of December 31, 2015, the Company modified its presentation policy in the cash flows statements to dry wells, for better understanding and comparability respect to the amount invested in exploration activities; the above is aligned with the policy of successful efforts described in Note 4.7 which states that the costs of exploratory wells are initially capitalized until it is determined if they are commercially viable, additionally, it allows alignment of the information presented with the annual investment budget published by the Company, which includes investments to be made during the period, whether commercially viable or not. With this change, starting in 2016, investments that could result in dry wells are added back to net income in determining cash flows provided by operations and are included in cash flows used in investing activities. The following is the detail of the mentioned change:

**Ecopetrol S.A.**  
Notes to Consolidated Financial Statements  
(Figures expressed in millions of Colombian pesos, unless otherwise stated)

	<b>December 31, 2015 as previously reported</b>	<b>Reclassifications</b>	<b>December 31, 2015 as adjusted</b>
Cash provided by operating activities:			
Dry wells	-	1,266,440	1,266,440
<b>Total cash provided by operating activities</b>	<b>10,411,475</b>	<b>1,266,440</b>	<b>11,677,915</b>
Cash provided by operating activities::			
Investment in natural and environmental resources	(5,590,321)	(1,266,440)	(6,856,761)
<b>Total cash used in investing activities</b>	<b>(11,545,039)</b>	<b>(1,266,440)</b>	<b>(12,811,479)</b>
<b>Cash and cash equivalents at the end of the year</b>	<b>6,550,450</b>	<b>-</b>	<b>6,550,450</b>

	<b>December 31, 2014 as previously reported</b>	<b>Reclassifications</b>	<b>December 31, 2014 as adjusted</b>
Cash provided by operating activities:			
Dry wells	-	1,563,384	1,563,384
<b>Total cash provided by operating activities</b>	<b>16,572,981</b>	<b>1,563,384</b>	<b>18,136,365</b>
Cash provided by operating activities:			
Investment in natural and environmental resources	(5,038,296)	(1,563,384)	(6,601,680)
<b>Total cash used in investing activities</b>	<b>(11,568,877)</b>	<b>(1,563,384)</b>	<b>(13,132,261)</b>
<b>Cash and cash equivalents at the end of the year</b>	<b>7,618,178</b>	<b>-</b>	<b>7,618,178</b>

- b) For comparison purposes, the Company reclassified certain amounts from prior periods, in the concepts that comprise the statement of changes in equity, as well as, the reconciliation of the income tax expense related in the note 10 - Taxes, to allow better comparability with the current period. These reclassifications do not impact either profit or loss or equity.

### 3. Significant estimates and accounting judgments

The preparation of the financial statements requires estimates from Company management to quantify some assets, liabilities, sales revenues, costs and commitments recognized in the financial statements. These estimates have been made based on the best available data for realized facts. Uncertainty on the assumptions and estimations could result into material future changes that could affect the value of assets or liabilities. The changes to such estimates are recognized in a prospective manner during the period in which the estimate is reviewed.

The following are accounting judgments and estimates with the most significant effect for preparing the financial statements:

#### 3.1 Oil and Gas reserves

Measurements relating to depreciation, depletion, amortization, impairment and asset abandonment obligations are determined, in part, based on the Company's estimated reserves of oil and natural gas. Reserves estimation is an inherently complex process and it involves professional judgments.

The reserves estimation is conducted annually at 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 in 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 other, the proved reserves estimate also changes. Generally, our prove reserves decrease as prices go down and increase when prices go up.

Reserves estimations are prepared using geological, technical and economic factors, including projections of future production rates, oil prices, engineering data and length and amount of future investments with a certain degree of uncertainty. These estimations reflect the regulatory and market conditions existing on the date of 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 in estimates of proved 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 proved reserves would increase, prospectively, depreciation, depletion and amortization expenses, 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 15 and 16.

### **3.2 Asset impairment (recovery)**

The Company uses its professional judgment in assessing the existence of evidence of impairment, based on internal and external factors. If impairment indicators exist, Company estimated the recoverable amount of the cash generating units, which is considered to be the higher of the fair value less costs of disposal and value in use. The assessments require the use of estimates and assumptions including: (1) Estimation of the volumes and market value of oil and natural gas reserves; (2) production profiles for oilfields and future production of refined and chemical products; (3) investments, taxes and future costs; (4) useful life of assets; (5) future prices, and (6) discount rate, which is revised annually and determined as the weighted average cost of capital (WACC), (7) changes in environmental regulation, among other factors. The recoverable amount is compared to the carrying amount of the asset or the cash generating unit, to determinate if the asset is impaired.

Future price assumptions are estimated at current market conditions. Expected production volumes, which comprise proved and unproved 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 that available for mature reservoirs.

Changes in estimates and judgments may impact these projections, which may impact the recoverable amount of the cash generating units and, as a consequence, may also impact the recognition or recovery of asset impairment

### **3.3 Exploration and evaluation costs**

Certain exploration and evaluation costs are initially capitalized when it is expected that an economically viable extraction operation can be established. The Company uses its professional judgment of future events and circumstances and makes estimates in order to assess annually the generation of future economic benefits for extracting the oil resources, as well as technical and commercial analyses to confirm intent of continuing their development. Changes regarding available information such as drilling success level or changes in the project's economics, production costs, investment levels, and others, may result in capitalized exploration drilling costs being recognized as a cost in profit or loss for the period. Since 2016, dry wells are treated as investment activities in the 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 interpretations regarding the integration between assets, the existence of active markets, similar exposure to market risk, shared infrastructure, and the way in which management monitors the operations. See Note 4.12 - Impairment in the value of assets for more information.

### **3.5 Asset retirement obligation**

According to environmental and oil regulations, the Company must recognize 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.

The estimated costs of dismantling and abandonment of these facilities are recorded in the functional currency of each company at the time of the installation of assets. The estimated obligation created for the abandonment and dismantling are subject to annual reviews and adjusted to reflect the best available estimation due to technological changes, political, economic, and environmental and security issues, as well as relationships with stakeholders.

The determination of these estimations is complex and involve significant judgment by Management, such as internal projections of costs, changes in reserve estimates, future inflation and discount rates. The Company considers that the abandonment 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 financial statements.

### **3.6 Pension plan and other benefits**

The calculation of expenses, liabilities and adjustments relating to pension plans and other defined retirement benefits requires management to use judgment in the actuarial assumptions used in such calculation. The actuarial assumptions include estimates regarding future mortality, retirement, changes in compensation and discount rate in order to reflect the value of money over time, in addition to the rate of return on the plan's assets. Due to the complexity of the valuation of these variables, as well as the long term nature, the obligations that are defined are quite sensitive to any change of these assumptions.

These assumptions are reviewed on an annual basis for purposes of actuarial valuations and may differ materially from actual results due to changing economic and market conditions, regulatory events, judicial rulings, higher or lower retirement rates, or longer or shorter life expectancies among employees. The calculation of pension bonds is maintained for compliance with the Company's pension obligations, in accordance with current regulations.

### **3.7 Goodwill impairment**

The Company performs an annual impairment test of goodwill to assess if its carrying amount is recoverable. Goodwill is allocated to each of the cash-generating units (or groups of cash-generating units) expecting to benefit from the synergies of the combination.

The determination of the recoverable value is described in note 4.12 and its calculation requires assumptions and estimations. The Company 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, different assumptions and estimations may be used which would 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 Company is subject to claims for regulatory and arbitration proceedings, tax assessments and other claims arising in the ordinary course of business. Management evaluates these claims based on their nature, the likelihood that they materialize, and the amounts involved, to decide on any changes to the amounts accrued and/or disclosed in the financial statements. This analysis, which may require considerable judgment, includes assessment of current legal proceedings brought against the Company and claims not yet initiated. A provision is recognized when the Company has a present obligation as a result of a past event, it is probable that an outflow of resources embodying economic benefits will be required to settle the obligation and a reliable estimate can be made of the amount of the obligation.

### **3.9 Taxes**

Calculation of the income tax provision requires interpretation of the tax law in the jurisdictions where the Ecopetrol Business Group operates. Significant judgment is required to determine estimates for income tax and to evaluate the recoverability of deferred tax assets, which is based on estimates of future taxable income and the ability to generate sufficient results during the periods in which such deferred taxes are deductible. Liabilities for deferred taxes are recorded in accordance with estimates of net assets that in the future will not be tax deductible.

To the extent that actual future cash flows and taxable income differ significantly from the estimates, the Company's capacity to recover recorded deferred tax assets could be affected.

Additionally, changes in tax rules could limit the capacity of the Company to obtain tax deductions in future years, as well as new potential liabilities resulting from questioning by the reviews of tax authorities.

Tax positions used imply a thorough evaluation by Management, and these are reviewed and adjusted in response to situations such as expiry in application of laws, closing of tax audits, additional disclosures caused by any legal issue or a court decision related to a particular tax issue. The Company creates provisions based on the estimation of a potential adverse decision 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 rules by tax-paying entities and tax authorities. The actual results may differ from recorded amounts.

### **3.10 Hedge Accounting**

The process of identifying hedge relations among hedging elements and instruments (derivative and non-derivative such as long term debt in foreign currency), and the related effectiveness requires management judgment. The Company periodically assesses alignment between identified hedges and its risk management policy.

## **4. Accounting policies**

The accounting policies below have been consistently applied in all the periods presented, unless otherwise indicated.

### **4.1 Financial instruments**

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 the statement of profit or loss.

Financial assets with changes in profit or loss and other comprehensive income are stated at fair value. Financial instruments such as, loans and trade receivables, other receivables and financial assets held-to-maturity are stated at amortized cost using the effective interest method.

Available for sale equity investments that do not have a market quoted price and which fair value cannot be reliably measured are measured at cost less any loss for impairment identified at the end of each reporting period.

#### Fair value measurement

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 either in the principal market for the asset or liability or in absence of a principal market, in the most advantageous market for the asset or liability.

All assets and liabilities for which fair value is measured or disclosed in the financial statements are categorized within the fair value hierarchy, 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 and liabilities. For the Company, level-1 inputs include marketable securities that are actively traded.
- Level 2: Entries different from those of Level 1 that are observable, either directly or indirectly. For the Company, Level-2 entries 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 term of the contract.
- Level 3: Unobservable inputs. The Company does not use Level-3 inputs for the measurement of financial assets and liabilities. The Company may use Level-3 inputs for the determination of fair value associated with certain measurements of non-financial assets to determine their recoverable amount.



Effective interest method

The effective interest 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 Company assesses, at each reporting date, whether there is objective evidence that a financial asset or a group of financial assets is impaired. Financial assets are assessed for 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.

De-recognition of financial assets and liabilities

Ecopetrol derecognizes a financial asset only upon expiration of the contractual rights to receive cash flows from the financial asset or, when it has transferred its rights to receive cash flows from the asset or has assume an obligation to pay the received cash flows in full without material delay to a third party and either (a) it has transferred substantially all the risks and rewards inherent in the ownership of the financial asset or (b) it has neither transferred nor retained substantially all the risks and rewards of the asset, but has transferred control of the asset.

When the Company neither transfer nor retain substantially all the risks and rewards of the asset nor transferred control of the asset, the Company continues recognizing the transferred asset, to the extent of it continuing involvement, and also recognizes an associated liability.

**4.1.1 Cash and cash equivalents**

Cash and cash equivalents include cash on hand and at banks and short-term investments with original maturity dates of 90 days or less, which are subject to insignificant risks of changes in value.

**4.1.2 Financial assets**

The Company 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. Financial assets at fair value through profit or loss are carried at fair value with net changes in fair value 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 material influence thereon and where the Company management is not intended to negotiate with them in the short-term. These instruments are recognized for their fair value and unrealized losses or gains are recognized in other comprehensive income. The sales revenues received by these equity instruments are recognized as financial sales revenues in the period results.

At the time of sale or recognition of losses for impairment in its value, the cumulative adjustment for valuation in the other comprehensive income and the profit or loss in sale are recognized in the statement of profit or loss.

c) Loans and receivables

Loans and receivables are non-derivative financial assets with fixed or determinable payments that are not quoted in an active market. Loans and receivables are classified as current, except when their maturity is longer than twelve months as of the date of the statement of financial position, in which case they are classified as non-current. Loans and receivables, including trade and other receivables, are initially measured at fair value and subsequently at amortized cost using the effective interest rate method, less impairment.

Loans to employees are initially recognized 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.

**4.1.3 Financial liabilities**

Financial liabilities correspond to the financing obtained by the Company through bank credit facilities and bonds, accounts payable to suppliers and creditors.

Bank credit facilities and bonds are initially recognized at their fair value, net of transactions costs incurred. The difference between the amount received and its nominal value is recognized in the results of the period during the time of amortization of the financial obligation, using the effective interest rate method. The effective interest method amortization is included as financial expense in the statement of profit or loss.

Accounts payable to suppliers and creditors are short term financial liabilities recorded at their nominal value, which does not differ significantly from their fair value.

A financial liability is derecognized when the obligation under the liability is discharged or cancelled expires. When an existing financial liability is replaced by another from the same lender, on substantially different terms, or the terms of an existing liability are substantially modified such an exchange or modification is treated as the derecognition of the original liability and the recognized as a new liability. The difference in the respective carrying amounts is recognized in the statement of profit or loss.

**4.1.4 Derivative financial instruments and hedging activities**

Financial derivative instruments are initially recognized in the statement of financial position as assets or liabilities and are measured at fair value on the date the derivative is entered into and are subsequently measured at fair value. Changes in the fair value of derivatives are recognized as gain or loss in the statement of profit or loss, except for the effective portion of cash flow hedges, which is recognize in other comprehensive income and later reclassified to profit or loss when the hedge item affects profit or loss.

The profit or loss of derivative contracts, neither qualified nor designated as hedges, including forward sale and purchase contracts of commodities in trading for delivery or physical receiving of the commodity are registered in profit or loss.

Embedded derivatives in contracts that do not yet require being recognized at fair value and that are not directly related to the host contract in terms of economics characteristics and risks are separated from their host contract and recognized at fair value; associated gains and losses are recognized in profit or loss.

#### 4.1.5 Hedging operations

For purpose of hedge accounting, hedges are classified as:

- Fair value hedges, when hedging the exposure to changes in fair value of a recognized asset or liability, or an unrecognized firm commitment, or an identifiable portion of such asset, liability or firm commitment.
- Cash flow hedges when hedging of 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.
- Hedges of a net investment in a foreign operation.

At the inception of a hedge relationship, the Company formally designates and documents the hedge relationship to which it wishes to apply hedge accounting, including the relationship between the hedging instrument and the hedged item, the risk management objectives and strategy to perform hedging transactions. Furthermore, 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 that they actually have been highly effective throughout the financial reporting periods for which they were designated.

Hedging instruments are classified as non-current assets or liabilities when their expiration is more than 12 months from the statement of financial position date, otherwise they are classified as current assets or liabilities.

##### 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, while any ineffective portion is recognized in the statement of profit or loss, in the net financial results line item.

The amounts previously recognized in other comprehensive income are transferred to profit or loss. When the hedged item is a non-financial asset or liability, the amounts previously recognized in other comprehensive income are transferred and included in the initial carrying amount of the cost of the non-financial 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 transaction is recognized in profit or loss. When it is no longer expected that the initially hedged transaction occurs, any profit or loss accumulated in equity is immediately recognized in profit or loss.

Ecopetrol designates long term loans as hedging instrument for their exposure to the exchange risk in future oil exports. See Note 31 for further information.

##### 4.1.5.2 Hedge of a net investment in a foreign operation

Hedges of net investment in a foreign operation are accounted for in a way similar to the cash flow hedges.

Gains or losses on of the hedging instrument related to the effective portion of the hedge are recognized in other comprehensive income, while any gains or losses relating to the ineffective portion are recognized in the statement profit or loss. Cumulative gains or losses recorded in equity is transferred to profit or loss when the foreign subsidiary is partially or totally disposed of.

Ecopetrol uses long term loans as a hedge of its exposure to foreign exchange risk on its investment in subsidiaries whose functional currency is the U.S. dollar. See Note 31 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).p

The cost of crude oil is the production costs, including transportation costs.

The crude required to bring the pipeline into working order, is treated as part of the related pipeline.

The cost of other inventories is determined based on the weighted average 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 Company has considered as related parties, associates, joint ventures, key management, entities managing resources for payment of employee post-employment benefit plans, and some relevant transactions with Colombian government entities, such as the purchase of hydrocarbons and the fuel price stabilization fund. See note 4.16.

##### **4.3.1 Investments in associates**

An associate is an entity over which the Group has significant influence but not control. Significant influence is the power to participate in the financial and operating policy decisions of the investee, but is not control or joint control over those policies. Generally, these entities are those in which an equity interest is maintained from 20% to 50% of the voting rights. See Exhibit I - Consolidated companies, associates and joint ventures for further details..

Investments in associates are accounted for using the equity method. Under the equity method, the investment in an associate is initially recognized at cost. The carrying amount of investment in associates includes goodwill identified on acquisition, which is not tested for impairment separately.

The Company's share of the results of operations of the associate is recognized in the consolidated statement of profit or loss. Any changes in other comprehensive income of the associates is recognized in the Company's other comprehensive income.

After application of the equity method, the Company determines if it is necessary to recognize an impairment loss on its investment in its associate. At each reporting date, the Company determines whether there is objective evidence that the investment in the associate is impaired. If there is such evidence, the Company calculates the amount of impairment as the difference between the recoverable amount of the associate and its carrying value, and then recognizes the loss in the statement of profit or loss.

When necessary, the Company makes adjustments to the accounting policies of associates to ensure consistency with the policies adopted by the Company. In addition, the equity method of these companies is measured on their most recent financial statements.

#### **4.3.2 Joint ventures**

A joint venture is a joint arrangement whereby two or more 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 in order 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 expense and investment budget and report to partners according to their participation interests. Furthermore, each party takes its share of the hydrocarbons (crude oil or gas) produced according to their production share.

When Ecopetrol participates as a non-operator partner, it records the assets, liabilities, sales revenues, costs and expenses based on the operators' report. When Ecopetrol is the direct operator of the joint venture contracts, it records its percentage of the assets, liabilities, sales revenues, costs and expenses, based on each partner's participation interests in the items corresponding to assets, liabilities, expenses, costs and sales revenues.

#### **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 date of classification 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 disposal costs.

#### 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 item is recognized in profit or loss of the period.

##### Subsequent disbursements

They 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 when 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.

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 are as follows:

Plant and equipment	7 - 56 years
Ducts, networks and lines	10 - 53 years
Buildings	19 - 72 years
Other	3 - 38 years

Land is recorded separately from buildings and facilities and they are 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 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 profit or loss as dry wells expense. Other expenditures are recognized as expenses when incurred.

An exploration and evaluation asset shall no longer be classified as such when the technical feasibility and commercial viability of extracting a mineral resource are demonstrable. Exploration and evaluation assets shall be assessed for impairment, and any impairment loss recognised, before reclassification.

All capitalized costs are subjected to technical and commercial revisions at least once a year to confirm continuity to develop and produce such fields; otherwise, these costs are transferred 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 accumulated acquisition and exploration costs is 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.

##### *Production costs*

Production costs are those incurred to operate and maintain productive wells, and are part of the corresponding equipment and facilities. The 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 in profit and 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. Amortization factors are reviewed annually, based on the reserve report and the impact of changes of such factors on the amortization is recognized prospectively in the financial statements.

Reserves are audited by internationally recognized external consultants and approved by the Company'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 recoverable amount. See notes 3.2 – Asset impairment (recovery) and 4.12 - Impairment in the value of 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 Company and costs can be measured reliably. Other borrowing costs are recognized as finance costs in the period in which they are incurred. Projects that have been suspended but that the Company intends to continue pursue their developing in the future, are not considered qualifying assets for the purpose of capitalization of borrowing costs.

#### **4.9 Intangibles assets**

Intangible assets with a defined useful life, which were acquired separately, 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 the 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 recognised for non-controlling interests 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 annually tested for impairment.

#### **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 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 expenses are recognized immediately in the statement of 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 in the value of assets**

In order to evaluate the recoverable amount of tangible and intangible assets, Ecopetrol compares the 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.

In order to make an impairment analysis, 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 group 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 segment of Exploration and Production, each CGU corresponds to each one of the different contractual areas commonly called "fields"; by exception, in those cases in which the cash inflows generated by several fields are interdependent on each other, those fields are grouped into a single CGU. In the case of the Refining and Petrochemicals segment, the CGU's correspond to each one of the refineries of the group and for the segment of Transportation each pipeline is taken as an independent CGU.

The recoverable amount of the asset is the higher 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 a loss for impairment of value in the results of the period.

The fair value less costs of disposal will be greater than the value in use for the asset's production segment due to use of the value in use methodology has some significant restrictions included in future cash flows, as the following: 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 on a higher discount rate.. The recoverable amount of assets in the business segments is the highest between the fair value less costs of disposal and value in use.

The 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 future cash flows used in the evaluation of impairment of assets are made with projections of commodity prices, supply and demand estimations and the margins of the products. In case of assets or cash generating units engaged in the evaluation and exploration of reserves, proved, probable and possible reserves are considered, with a risk factor associated to them also being considered.

The calculations are verified with valuation multiples, quoted prices of stock in companies comparable to Ecopetrol.

Once a loss for impairment of value has been recorded, future amortization expense is calculated on the basis of the adjusted recoverable amount. Impairment losses may be reversed only if the reversal is related to a change in estimations used after the loss for impairment was recognized. These reversals shall not exceed the carrying amount of the assets net of depreciation or amortization that would have been determined if neither the impairment had ever been recognized, nor the recoverable amount on the date of assessment of the impairment.

In the reclassification of any non-current asset to assets held-for-sale, the carrying amount of these assets is revised 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 disposal is lower than the carrying amount.

#### **4.13 Provisions and contingent liabilities**

Provisions are recognized when Ecopetrol has a current obligation (legal or implied) 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 liability specific risk.

Disbursements related to the conservation of the environment for current or future operations, are accounted for as expenses or assets, as the case may be. Disbursements related to operations of the past that do not contribute to the obtaining of current or future income, are charged to expenses.

The creation of these provisions coincides with the identification of an obligation related to environmental remediation and Ecopetrol has adequate information to determine a reasonable estimation of the related cost.

Contingent liabilities are not recognized but are subject to disclosure in the explanatory Notes whenever the outflow of resources is possible; including those which values cannot be estimated.

Whenever expected that the provision is reimbursed, either in whole or in part, for example by virtue of an insurance contract, the reimbursement is recognized as a separate asset only in cases in which such reimbursement is almost certain. The expense corresponding to any provision is presented in the profit or loss statement in the line that best reflects the nature of the provision, net of any related reimbursement, to the extent that it 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 to the retirement of assets are recognized when there are current obligations, either legal or implied, related to the abandonment and dismantling of wells, facilities, pipelines, buildings and equipment. The obligation is usually acquired when the assets are installed or the surface or the environment are altered at the operating sites. These liabilities are recognized using the discounted cash flow method, at all rate before taxes reflecting current market evaluations of a similar risk liability 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 sufficient information available to make the best estimation.

The carrying amount of the provision is reviewed and adjusted annually considering changes in the variables used for its estimation, using a rate that reflects the liability specific risk. 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 recognised the Consolidated statement of profit or loss. The financial cost of updating these liabilities is recognized in results for the period as 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 tax is recognized in equity. Income tax assets and liabilities are presented separately in the Consolidated Statement of Financial Position except where there is a right of set-off within fiscal jurisdictions and an intention to settle such balances on a net basis.

##### 4.14.1 Current income tax

The Company 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 the income tax). 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 accounted for according to the liability method. Deferred tax assets and liabilities are recognized for future tax consequences attributable to 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 tax losses to be amortized, insofar as there is a reasonable expectation that the Company will have future tax profits with which it may offset such temporary differences.

Deferred taxes on assets and liabilities are calculated based on tax rates that will be applied to taxable income 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 estimated probable that there will not be enough future taxable profit that allows the total or partial recovery of the asset.

Consolidated deferred tax, is calculated as the sum of the deferred tax in the individual financial statements of the companies of the Ecopetrol Business Group adjusted by deferred taxes on business combinations, inter-company transactions or other adjustments at a consolidated level.

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, does 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 Group companies and, therefore, will not be distributed to Ecopetrol.

##### 4.14.3 Other taxes

The Company 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 for Ecopetrol staff are governed by the Collective Labor (Agreement 01 of 1977), and, by the Substantive Labor Code. In addition to the legally mandated benefits, 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 compensations is provided for when special circumstances arise resulting in the non-voluntary termination of the contract, without just cause, and in periods other than the probationary period.

Ecopetrol belonged to the special pension regime under which allowances are a Company's responsibility and not a 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 said regime and that from thereon employees would be part of the General Pension Regime. Consequently, allowances for employees pensioned until July 31, 2010 are still Ecopetrol's responsibility. Likewise, these 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 the Company before 1990 are Ecopetrol's responsibility, without the involvement of any social security entity or institution. The cost of health services for the employee and his/her relatives registered with the Company is determined by means of a mortality table, prepared based on facts occurring during the year.

For employees who joined the Company subsequent to the entry into effect of Act 50 of 1990, the Company makes periodic contributions for severance payments, pensions and labor risks to the respective funds.

In 2008, Ecopetrol partially commuted the value corresponding to monthly pension payments from its pension liabilities, transferring such liabilities and their underlying amounts to pension-related autonomous equities (PAP, for its acronym in Spanish). The funds transferred, and returns on those funds, cannot be redirected nor they can be returned to the Company until all of the pension obligations have been fulfilled. The commuted obligation covers allowances and pension bonds payments; while health and education remains under the labor liability in charge 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 correspond to the periodic payments for severance, pensions and labor risk payments that the Company 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 Company 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 in respect of these benefit plans are 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 the discount rate, future salary increases, mortality rates and future pension increase. 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 variables are revised at the close of the reported period.

When 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, which latest version 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.

The amounts recognized in profit or loss related to employees defined benefit plans are comprised mainly by service cost and the net interest. 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 interest 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 liability or asset resulting from actuarial profits and losses, the asset ceiling effect and the asset profitability, excluding the value of recognized in the profit or loss, are recognized in other comprehensive income.

There is no service cost for the pension plan of employees because in their capacity as pensioners there is no service time to which the pension benefit can be charged; in other words, the benefit is 100% cost and is not in the cumulative stage.

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.

c) Other long term benefits

Other long-term benefit is 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 Company recognizes in profit or loss the service cost, the net financial cost and the adjustment to the obligation of the defined benefit plan.

d) Termination benefits

Termination benefits are recognized only when a detailed plan exists for such process and there is no possibility to withdraw the offer. The Company 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 Sales revenue recognition

Sales revenue from crude oil and natural gas sales is recognized at the time of transfer of title to the buyer, including risks and rewards of ownership. In the case of refined and petrochemical products, sales revenue is recognized when products are shipped by the refinery and subsequently adjusted in accordance with price changes when dealing with regulated price products. Sales revenue from transportation services is recognized when products are transported and delivered to the buyer in accordance with sale terms. In all other cases, sales revenue is recognized at the time it is earned and a true, probable and quantifiable right to demand its payment arises.

Under current regulations, Ecopetrol and Refinería de Cartagena S.A., sell regular gasoline and mid-distillates at a regulated price.

In accordance with Decree 1068 of 2015, the Ministry of Mines and Energy calculates semi-annually 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 is calculated by adding all differentials throughout the six-month period and the result is an amount in Colombian pesos in favor of the Company and chargeable to the FEPC. The differential is calculated as the volume reported by the Company at the time of sale multiplied by the difference between the international parity price and the regulated price. The international 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. Therefore, this difference represents a higher or lower value of sale sales revenues for Ecopetrol and *Refinería de Cartagena S.A.*

#### 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 Financial income (expenses)

The financial income and expenses include mainly: a) cost of interest on loans and financing, except for those that are capitalized as part of the asset cost, b) valuation of profits and losses of financial instruments measured at fair value with changes in profit or loss, c) exchange differences of financial assets and liabilities, except for debt instruments designated as hedging instruments, d) expenses for financial updating of 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 respective disclosures relative to its business segments in its consolidated financial statements in accordance with paragraph 4 of IFRS 8 - Operation segments.

The operation of the Ecopetrol Business Group is performed through three business segments: 1) Exploration and production, 2) Transport and logistics, and 3) Refining, petrochemical and biofuels. This segmentation is based on management of objectives and corporate strategic plan, considering that these businesses: (a) are engaged in differential commercial activities, which generate sales revenues and incur costs and expenses; (b) the operational results are revised regularly by the 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 registered and presented at market prices.

- 1) **Exploration and production.** This segment includes activities related to the exploration and production of oil and gas. Sales 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.
- 2) **Transport and logistics-** This segment includes sales revenues and costs associated with the transport and distribution of hydrocarbons, derivatives and products operation.
- 3) **Refining and petrochemicals-** This segment mainly includes activities performed at the Barrancabermeja and Cartagena refineries, where crude from production fields is transformed. The sales revenues from products are realized to other segments and 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.

**5. New standards issued by the IASB**

The following rules, interpretations and amendments issued by the IASB are applicable to yearly periods commencing on January 1, 2017 and thereon:

- IFRS 9 "Financial Instruments" gathers all the phases of the financial instruments project and will replace IAS 39 "Financial Instruments: Recognition and Measurement"; it is effective for annual periods starting on January 1, 2018. IFRS 9 introduces new requirements of classification, measurement, impairment, derecognition and hedge accounting. This standard does not require retroactive application or modify comparative information.
- IFRS 15 "Sales revenues from Ordinary Activities in Contracts with Customers" and its amendments provide a five-step model to measure sales revenues derived from contracts with customers. In accordance with IFRS 15, the sales revenue is recognized as an amount reflecting the offsetting that an entity expects to be entitled to in exchange for transferring goods or services to a customer. The principles of IFRS 15 suppose a more structured approach to value and register sales revenues. A full or partial retroactive application is required for periods commencing on January 1, 2018. The Company plans to adopt the new standard by using the modified retrospective method and keeps assessing its impact on the consolidated financial statements.

This new standard is applicable to all entities and will derogate all previous standards on sales revenue recognition.

- IFRS 16 "Leases", which will be effective as of January 2019, with limited possibilities for early implementation. It provides a comprehensible model for identification of lease agreements and their treatment in the financial statements, both of lessees and lessors. Oil and gas companies must recognize more assets and liabilities, derived mostly from rental of construction equipment and offices.
- Amendments to IFRS 10 and IAS 28: Asset sale or contribution between the investor and its associates or joint ventures. The amendments address the conflict between IFRS 10 and IAS 28 as to the treatment of control loss of a subsidiary that is sold or contributed to an associate or joint venture. The amendments clarify that the gain or loss resulting from the asset sale or contribution that is a business, as defined in IFRS 3, between the investor and its associate or joint venture, is recognized in its entirety. Any gain or loss resulting from an asset sale or contribution that is not a business; however, is recognized only up to the interests of investors who are not related to the associate or joint venture. The effective date is still to be defined by the IASB.
- Amendments to IAS 12: Recognition of Assets for Deferred Taxes for Unrealized Losses. These amendments clarify how to register assets for deferred taxes corresponding to debt instruments measured at fair value. This rule is effective for annual periods commencing on January 1, 2017.

Ecopetrol is not expecting to adopt the aforementioned standards before their date of implementation. The impact from these standards is being evaluated by Company Management, particularly IFRS 16, which could affect the recognition of assets and liabilities in the financial situation statement, as well as the recognition of lease charges in the profit or loss of the period.

There are no new or amended standards or interpretation adopted in 2016 that had a material impact on the consolidated financial statements.



**6. Cash and cash equivalents**

The balance of cash and cash equivalents at December 31, 2016 and 2015 is comprised as follows:

	2016	2015
Banks and corporations	3,319,465	4,483,900
Short-term investments	5,090,048	2,065,731
Cash	954	819
	<b>8,410,467</b>	<b>6,550,450</b>

As of December 31, 2016, it includes restricted cash for COP\$114,206 (2015 - COP\$108,348), intended for the exclusive payment of principal and interest on loans contracted by Oleoducto Bicentenario and Oleoducto de los Llanos. The use of short-term financial investments depends on the liquidity requirements of the Company.

The fair value of cash and cash equivalents approximates their carrying amount due to their short-term nature and their high liquidity.

The average return on cash and cash equivalents as of December 31, 2016 was 3.5% (2015 - 2.6%). The credit quality of issuers and counterparties in transactions involving cash and cash equivalents is described in Note 31.3 – Credit risk.

**7. Trade and other receivables, net**

The balance of trade and other receivables, net of provision is comprised as follows at December 31, 2016 and 2015:

	2016	2015
<b>Current</b>		
Customers		
Foreign	1,366,322	1,126,511
Domestic	1,180,577	1,731,547
Fuel price stabilization fund (1)	1,203,811	155,789
Related parties (Note 32)	97,730	64,724
Industrial services	60,025	34,987
Employee loans (2)	42,407	50,667
Other	261,829	263,187
<b>Total current</b>	<b>4,212,701</b>	<b>3,427,412</b>
<b>Non-current</b>		
Employee loans (2)	425,468	432,450
Related parties (Note 32)	170,121	-
Fuel price stabilization fund (1)	77,510	77,510
Other	56,311	74,611
<b>Total non-current</b>	<b>729,410</b>	<b>584,571</b>

- (1) Accounts receivable from the Ministry of Finance and Public Credit, arising from regular motor gasoline and diesel price differentials pursuant to Resolution 180522 issued on March 29, 2010. The Ministry of Finance and Public Credit makes the payment based on the resolution for the net liquidation position in favor of Ecopetrol of receivables for months with pending payments. During the month of March 2017, the Company received COP\$542,718 of this amount.
- (2) The administration, management and control of loans granted to employees by Ecopetrol were transferred to Cavipetrol (“Corporación de los trabajadores de la Empresa Colombiana de Petróleos Ecopetrol S.A.”), which manages the details per employee of such loans and their related conditions.

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The following shows the changes in allowance for doubtful accounts related to trade and other receivables, provisioned in full, at December 31:

	<b>2016</b>	<b>2015</b>
<b>Opening balance</b>	<b>160,406</b>	<b>245,114</b>
Additions (recovery) of allowances	19,438	(74,378)
Accounts receivable write-off and uses	(35,515)	(10,330)
<b>Closing balance</b>	<b>144,329</b>	<b>160,406</b>

**8. Inventories, net**

The balance of Inventories, net of a provision at December 31, 2016 and 2015 is comprised as follows:

	<b>2016</b>	<b>2015</b>
Crude	1,557,267	1,007,275
Fuels and petrochemicals	1,270,870	1,487,217
Materials for the production of goods	1,013,764	563,466
<b>Total</b>	<b>3,841,901</b>	<b>3,057,958</b>

The following shows a breakdown of the changes in the provisions for inventories:

	<b>2016</b>	<b>2015</b>
<b>Opening balance</b>	<b>198,539</b>	<b>151,997</b>
Additions (recoveries), net	41,957	53,205
Foreign currency translation	50,053	13,670
Uses	(25,114)	(20,333)
<b>Closing balance</b>	<b>265,435</b>	<b>198,539</b>

**9. Other financial assets**

The balance of other financial assets at December 31, 2016 and 2015 is comprised as follows:

	<b>2016</b>	<b>2015</b>
Assets measured at fair value through profit or loss		
Investment portfolio – Local currency	2,519,311	385,992
Investment portfolio – Foreign currency	4,116,987	1,189,667
	<u>6,636,298</u>	<u>1,575,659</u>
Assets measured at amortized cost	4,152	9,364
Hedging instruments	46,445	356
<b>Total</b>	<b><u>6,686,895</u></b>	<b><u>1,585,379</u></b>
Current	5,315,537	329,227
Non-current	1,371,358	1,256,152
	<u>6,686,895</u>	<u>1,585,379</u>

The average return on investments in Colombian pesos and US dollars portfolio was 8.1% (2015 - 5.5%) and 0.8% (2015 - 0.5%), respectively. The credit quality of issuers and counterparties in transactions involving the other financial assets is described in Note 31.3 – Credit risk.

The fair value measured is recognized against financial result (see note 30).

**9.1 Restrictions**

As of December 31, 2016, no resource of the investment portfolio was restricted. As of December 31, 2015, COP\$699,832 related to the Santiago de las Atalayas process were restricted.

On November 6, 2016, through the Ministries of Mines and Energy and Finance and Public Credit the termination of Ecopetrol's condition as sequester in the process for nullity and re-establishment of rights filed against the Comuneros de Santiago de las Atalayas was confirmed. In view of the foregoing, the restricted resources related to this case belong to Ecopetrol (see Note 23.3 - Provisions and contingencies, for further information).

**9.2 Maturity**

The following are the maturities of other financial assets at December 31, 2016 and 2015:

	<b>2016</b>	<b>2015</b>
Up to 1 year	5,315,537	329,227
1 - 2 years	838,786	739,337
2 - 5 years	497,204	470,375
> 5 years	35,368	46,440
	<u>6,686,895</u>	<u>1,585,379</u>

**9.3 Fair value**

The classification of other financial assets at fair value, corresponding to the investment portfolio is as follows at December 31, 2016 and 2015:

	<b>2016</b>	<b>2015</b>
Level 1	25,066	975,262
Level 2	6,611,232	600,397
	<u>6,636,298</u>	<u>1,575,659</u>

There were no transfers between hierarchy levels during the years 2016 and 2015.

The securities comprising Ecopetrol's portfolio are valued on a daily basis pursuant to the provisions issued by the Financial Superintendence of Colombia. To this end, the Company uses the information provided by the entities authorized for this purpose, which collect data from active markets. For cases in which market data is not available other directly or indirectly observable data is used.

For dollar-denominated investments the information provider is Bloomberg while for investments denominated in pesos, Infovalmer, an entity authorized by the Financial Superintendence of Colombia.

For the process of establishing levels of the fair value for investments, in addition to the information used for valuation, other relevant aspects are also taken into account, such as the issuer rating, investment rating and issuer risk analysis performed by Ecopetrol, thus making it possible to establish the appropriate hierarchy level for investments.

## 10. Taxes

### 10.1 Current tax assets and tax liabilities

The balance at December 31, 2016 and 2015 of current tax assets and tax liabilities is comprised as follows:

	2016	2015
<b>Current tax assets</b>		
Income tax	308,868	3,403,190
Credit tax balance (1)	598,140	1,098,544
Other taxes	222,090	-
<b>Total</b>	<b>1,129,098</b>	<b>4,501,734</b>
<b>Current tax liabilities</b>		
Income tax	1,478,294	2,120,398
National tax on gasoline and surtax on gasoline	324,402	314,723
Other taxes (2)	328,244	368,438
<b>Total</b>	<b>2,130,940</b>	<b>2,803,559</b>

(1) Consists primarily of VAT balance in favor.

(2) Consists primarily of the industry and commerce tax payable.

Income tax asset is related with prepayments made by the group companies which cannot be offset with the income tax liability because they are generated by different companies.

### 10.2 Income tax

The current tax regulations applicable to Ecopetrol for the taxable year 2016 establish that:

- (a) As of January 1, 2013 until December 31, 2016, taxable income in Colombia is taxed at 25% on account of income tax plus 9% as the surtax on income for equality-CREE, excluding tax payers who, based on specific provisions are subject to special rates and a 10% capital gains tax; the companies in the free trade zone pay 15%; and those not generating net income or net income that is lower than the presumptive rate declare over presumptive income at 3% on equity at beginning of the year.

On December 23, 2014, through Law 1739, a surtax on income for equality - CREE was established for the years 2015, 2016, 2017 and 2018, which is applicable for taxpayers with taxable base above COP\$800 million, at rates of 5%, 6%, 8% and 9% per year, respectively.

For taxable year 2016, the Ecopetrol Group has companies that measure taxes at the ordinary income tax rate of 40%. Companies in free trade zones are subject to tax at 15%, some have taxable income calculated based on presumptive income, as explained above, and others with foreign income are taxed at the respective foreign income tax rates.

- (b) Regarding to current expense for income tax, as of December 31, 2016 and 2015, Bioenergy S.A., Bioenergy Zona Franca and the Cartagena Refinery are companies that are part of the Ecopetrol Group and present tax losses carryforwards with a net value of COP\$3,384,346 and COP\$1,524,148, respectively, originated between 2009 and 2016. In accordance with current tax rules, tax losses incurred from the year 2007 can be offset, or tax adjusted, at any time, with future net taxable income without limitation. Corporation losses will not be transferred to the partners. However, in accordance with article 290 of Law 1819 of 2016, the tax losses accumulated up to December 21, 2016, which have not been offset, are subject for offsetting to the application of a formula contained in said article.

The impact of tax losses in the Bioenergy and Bioenergy Zona Franca with respect to deferred tax is mentioned in this Note under the chapter titled "Deferred Tax on Income".

Effective for the year 2015, in accordance with that provided for in Law 1739 of December 2014, tax losses and minimal CREE base surplus can be offset with future income originated in the income tax for equality - CREE, considering the same rules set out for income and supplementary taxes. In accordance with article 290 of Law 1819 of 2016, the presumptive income surplus and minimal base surplus generated before 2017 on income tax and CREE that have not been offset, are subject for offsetting to the application of a formula contained in said article and subject to the term established in article 189 of the Tax Code.

The Colombian government issued Law 1819 of 2016 (Structural Tax Reform), whereby it is established that companies can offset tax losses originated on or after 2017 with ordinary net income to be obtained in the next twelve (12) taxable periods. Reficar and Bioenergy ZF, as they entered into a legal stability agreement that included offsetting tax losses, do not have time limits and are not subject to this restriction insofar as the contract is still in force.

#### **Statute of limitation of review of tax returns**

Tax returns may be reviewed by the tax authorities within the next 5 years following the filing date and/or amendment, considering that the returns reflected tax losses.

According to law 1819 the general rule extended from 2 to 3 years the statute of limitation of tax returns. Tax returns extemporarily filed will have a 3 year statute of limitations from the day the tax return was filed. The statute of limitations for income tax returns subject to the transfer pricing regime is 6 years. Tax returns with balances in favor, the statute of limitation will be 3 years starting from the date when the offset or refund request is filed. Tax returns in which tax losses are originated, will have a statute of limitation period of 12 years, which will be extended to 15 years if losses are offset within the last 2 years of the 12 year period.

Tax returns in which tax losses are offset will have a 6-year statute of limitation period.

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Presumptive income

The taxable income of the tax payer cannot be lower than 3% of its net equity as of December 31 of immediately preceding taxable period. As of the year 2017, it will be at a rate of 3.5%.

Income tax expense

The following table shows a breakdown of the income tax recognized in profit or loss for the years ended December 31, 2016, 2015 and 2014:

	2016	2015	2014
Current income tax	4,517,336	3,510,546	6,389,978
Deferred income tax	25,710	(2,800,193)	(955,123)
<b>Income tax expense</b>	<b>4,543,046</b>	<b>710,353</b>	<b>5,434,855</b>

Reconciliation of the income tax expense

The reconciliation between income tax expense and the tax determined based on the official tax rate applicable to the Company in Colombia is as follows:

	2016	2015	2014
Net income (loss) before income tax	7,790,526	(5,578,626)	11,104,428
Statutory rate	40%	39%	34%
<b>Income tax at statutory rate</b>	<b>3,116,210</b>	<b>(2,175,664)</b>	<b>3,775,506</b>
ETR reconciliation items:			
Effect in changes in tax rates and effect in tax base (CREE)	807,989	2,063,782	(151,244)
Non deductible wealth tax	229,375	253,422	(21,233)
Foreign currency translation and exchange difference	(234,316)	310,657	609,130
Prior year taxes	140,630	(21,233)	
Non deductible expenses	486,300	251,246	378,218
Valuation of investments	-	48,129	922,028
Non taxable income	(3,142)	(19,986)	(17,352)
Others	-	-	(60,198)
<b>Income tax calculated</b>	<b>4,543,046</b>	<b>710,353</b>	<b>5,434,855</b>
Current	4,517,336	3,510,546	6,389,978
Deferred	25,710	(2,800,193)	(955,123)
	<b>4,543,046</b>	<b>710,353</b>	<b>5,434,855</b>

The effective tax rate (ETR) as of December 31, 2016 was 58.3% (2015: 12.7%). The increase compared to the previous year is mainly due to the following: a) The effect of the increase of unrecognized deferred tax assets on tax carryforwards in the group that according to the financial projections will not be able to be recovered in a predictable future, and b) the increase in non-deductible expenses due to the amendment of the 2015 income tax.

Income tax returns for taxable years 2012 to 2015 and CREE of taxable years 2013 to 2015 are open to review in accordance with the applicable statute of limitations. The auditing of those tax returns may result in additional taxes, or interest, or penalties which could give rise to administrative proceedings with applicable authorities. Management of the Group Companies considers that the amounts accounted as a liability for the tax payable is supported by tax law, regulations and official opinion in order to address any legal claim that could be requested by the tax authority. The strategy's Company is do not take aggressive or risk tax positions that could put into question these tax returns.

**Deferred income tax**

The balance at December 31, 2016 and 2015 of deferred taxes is comprised as follows:

	<b>2016</b>	<b>2015</b>
Deferred tax asset	5,726,961	8,239,472
Deferred tax liability	3,118,650	6,026,050
<b>Total deferred income tax</b>	<b>2,608,311</b>	<b>2,213,422</b>

Deferred tax is measured at the tax rates that are expected to be applied to temporary differences when they reverse, using tax rates enacted or substantively enacted at the reporting date.

The table below shows an analysis of the Company's deferred tax assets and liabilities:

	<b>2016</b>	<b>2015</b>
<b>Deferred tax assets</b>		
Property, plant and equipment and Natural and environmental resources (1)	2,185,792	4,094,250
Provisions	1,875,964	1,867,461
Employee benefits (2)	656,997	-
Loss carry forwards	477,808	238,193
Accounts payable	311,646	726,256
Borrowings and other financial liabilities	-	986,689
Accounts receivable	135,092	17,927
Others (3)	83,662	308,696
<b>Total</b>	<b>5,726,961</b>	<b>8,239,472</b>
	<b>2016</b>	<b>2015</b>
<b>Deferred tax liabilities</b>		
Property, plant and equipment and Natural and environmental resources (1)	2,406,106	3,888,751
Goodwill	345,288	262,291
Borrowings and other financial liabilities	113,497	1,527,501
Others (3)	253,759	347,507
<b>Total</b>	<b>3,118,650</b>	<b>6,026,050</b>

- (1) For tax purposes, natural resources and property, plant and equipment have specific useful lives and a methodology of capitalization different from those determined under IFRS. This difference will result in a difference in the depreciable basis for accounting and tax purposes.
- (2) Difference in valuation of the actuarial liability.
- (3) Investments, inventories and intangible assets.

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The movements of deferred income tax for the years ended December 31, 2016 and 2015 is as follows:

Deferred tax assets:

	Property, plant and equipment and natural resources	Provisions	Employee benefits	Tax losses	Accounts payable	Accounts receivable	Borrowings and other financial obligations	Others	Total
<b>December 31, 2014</b>	<b>1,007,559</b>	<b>1,814,433</b>	<b>352,720</b>	<b>227,078</b>	<b>111,300</b>	<b>113,889</b>	<b>268,210</b>	<b>350,227</b>	<b>4,245,416</b>
Recognized in deferred income tax expense	3,086,691	53,028	370,863	11,115	614,956	(95,962)	718,479	(41,531)	4,717,639
Recognized in other comprehensive income	-	-	(723,583)	-	-	-	-	-	(723,583)
<b>December 31, 2015</b>	<b>4,094,250</b>	<b>1,867,461</b>	<b>-</b>	<b>238,193</b>	<b>726,256</b>	<b>17,927</b>	<b>986,689</b>	<b>308,696</b>	<b>8,239,472</b>
Recognized in deferred income tax expense	(1,908,458)	8,503	40,300	239,615	(414,610)	117,165	(986,689)	18,282	(2,885,892)
Recognized in other comprehensive income	-	-	616,697	-	-	-	-	(243,316)	373,381
<b>December 31, 2016</b>	<b>2,185,792</b>	<b>1,875,964</b>	<b>656,997</b>	<b>477,808</b>	<b>311,646</b>	<b>135,092</b>	<b>-</b>	<b>83,662</b>	<b>5,726,961</b>

Deferred tax liabilities:

	Property, plant and equipment and natural resources	Goodwill	Financial obligations	Others	Total
<b>December 31, 2014</b>	<b>2,933,009</b>	<b>473,293</b>	<b>571,105</b>	<b>190,737</b>	<b>4,168,144</b>
Recognized in deferred income tax expense	1,074,825	(211,002)	788,797	264,826	1,917,446
Recognized in other comprehensive income	-	-	167,599	-	167,599
Foreign exchange	(119,083)	-	-	(108,056)	(227,139)
<b>December 31, 2015</b>	<b>3,888,751</b>	<b>262,291</b>	<b>1,527,501</b>	<b>347,507</b>	<b>6,026,050</b>
Recognized in deferred income tax expense	(1,482,645)	82,997	(1,414,004)	(46,530)	(2,860,182)
Foreign exchange	-	-	-	(47,218)	(47,218)
Recognized in other comprehensive income	-	-	-	-	-
<b>December 31, 2016</b>	<b>2,406,106</b>	<b>345,288</b>	<b>113,497</b>	<b>253,759</b>	<b>3,118,650</b>

Deferred tax assets and liabilities are offset if there is a legally enforceable right to offset current tax liabilities and assets, and they relate to taxes levied by the same tax authority on the same taxable entity, or on different tax entities, but they intend to settle current tax liabilities and assets on a net basis or their tax assets and liabilities will be realized simultaneously.

In accordance with the current tax law losses generated in income and supplementary taxes and/or income tax for equality - CREE before 2017 must be offset with the net income obtained in 2017 and subsequent periods, taking into account the formula set out in article 290 of Law 1819 of 2016. Tax losses determined must not be tax re-adjusted.

Starting in 2017 companies can offset tax losses obtained in the current period, with taxable income generated through the next 12 taxable periods, following the attainment of said tax losses, without prejudice of the period's presumptive income.

The asset for deferred tax related to tax losses generated by Bioenergy S.A. and Bioenergy Zona Franca were written off in 2016 because, even though they can be offset in the long term, Management concluded that it is not likely that the asset deferred tax related to such tax losses would be recoverable in the short term. If the Ecopetrol Group could have recognized the deferred tax asset that was not recognized the income for the period ended on December 31, 2016 would have increased by COP\$83,595.



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As per Colombian tax law, excess of presumptive income can be carried forward for 5 years. As of December 31, 2016, Ecopetrol Group has unrecognized deferred tax assets on cumulative excess of presumptive income of COP 49,155, which expires between 2017 and 2020. The Deferred tax assets have not been recognized in respect of these carryforwards, as they may not be used to offset taxable profits in the Group.

In accordance with tax provisions applicable until December 31, 2016 the surplus of presumptive income and minimal base generated before 2017 in income and supplementary taxes and in the income tax for equality - CREE, respectively, can be offset with ordinary net income obtained by the Company in the next five years, using for such purpose the formula set out in number 6, article 290 of law 1819 of 2016.

The movements of deferred income tax for the years ended December 31, 2016 and 2015 are as follows:

	<b>2016</b>	<b>2015</b>
<b>Opening balance</b>	2,213,422	77,272
Deferred tax recognized in profit or loss	(25,710)	2,800,193
Deferred tax recognized in other comprehensive income (a)	420,599	(664,043)
<b>Closing balance</b>	<b>2,608,311</b>	<b>2,213,422</b>

(a) The following is the breakdown of income tax recorded against other comprehensive income:

<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	(757,469)	296,047	(461,422)
Derivative financial instruments	(56,448)	22,579	(33,869)
Others	-	(47,217)	(47,217)
	<b>956,222</b>	<b>(345,288)</b>	<b>610,934</b>
<b>December 31, 2015</b>	<b>Pre-tax</b>	<b>Deferred tax</b>	<b>After tax</b>
Actuarial valuation gains (losses)	(2,128,184)	723,582	(1,404,602)
Cash flow hedging for future crude oil exports	344,836	(127,545)	217,291
Derivative financial instruments	100,134	(40,051)	60,083
Others	-	108,057	108,057
	<b>(1,683,214)</b>	<b>664,043</b>	<b>(1,019,171)</b>

### 10.3 Other taxes

#### 10.3.1 Tax on dividends

The new tax on dividends will be applicable to foreign companies and entities on profits generated starting 2017.

Dividends will be taxed at 5%. For Colombian individuals the rate would be up to 10%. Profits that did not pay tax at the corporate level, would be subject to a 35% withholding tax at the time of distribution. In this case, the distribution, after being reduced by the 35% withholding tax, would be subject to the dividend tax. Dividends tax will be applicable to profits generated as of 2017.

#### 10.3.2 Transfer prices

Colombian Taxpayers carrying out operations with related parties located abroad are required to submit the disclosure return of transactions with related parties. For these taxpayers it is necessary to prepare and maintain supporting documentation only for those types of operations, if the annual amount accumulated in the relevant tax year exceeds ten thousand units of taxable value units (10.000 UVT) (For 2016: COP\$ 29,753).

The Companies are required to file their transfer pricing information for the taxable year 2015 and the related supporting documents.

For fiscal year 2016 the transactions performed with foreign economically related parties, as well as the business conditions for such operations and their general structure, did not vary significantly as compared with the previous year. It is estimated that no adjustments will be required derived from the analysis of transfer pricing in 2016 which imply amendments of the income provision of taxable year 2016.

### **10.3.3 Value added tax (VAT)**

General VAT rate increased from 16% in 2016 to 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 wealth tax (“impuesto a la riqueza”) for the years 2015-2018. According to the Law, entities that own wealth in Colombia – exceeding the limits established to be considered taxpayers, this is COP\$ 1,000 million- have the obligation to file and pay the wealth tax.

The applicable rate will depend on the taxable base of each tax payer and the paid value will not be deductible nor discountable on income and supplementary taxes for income tax for equality - CREE, nor can they be offset with these, nor any other taxes.

In 2016, the wealth tax paid by the Ecopetrol Group amounted to COP\$569,756, which was recognized as an expense in the period (2015 - COP\$649,800).

**11. Equity instruments measured at fair value**

The balance at December 31, 2016 and 2015 of equity instruments measured at fair value is comprised as follows:

	<b>2016</b>	<b>2015</b>
Empresa de Energía de Bogotá (1)	51,522	478,618
Interconexión Eléctrica S.A (2)	-	434,870
Other	88	-
	<b>51,610</b>	<b>913,488</b>

- (1) Through Decree 2305 of November 13, 2014, the Company obtained authorizations from the Government to start the alienation program of its equity holding in Empresa de Energía de Bogotá S.A. E.S.P.

For the period of authorization and December 31, 2016 Ecopetrol sold in three auctions 95.5% of its equity share equivalent to 602,632,965 shares for COP\$1,067,313 as follows:

- On July 27, 2015, the sale of 352,872,414 shares took place at a selling price of COP\$1,740 per share. The operation amounted to \$613,998.
- On June 7, 2016, the second auction was performed for 191,639,698 shares at a price of COP\$1,815 for a total of COP\$347,827.
- On December 6, 2016, the third auction was performed for the sale of 58,120,853 shares, at a price of COP\$1,815 for a total of COP\$105,489.

In December 2016, the Council of Ministers approved a one extension for the terms of the alienation program, period in which Ecopetrol expects to sell the remaining 28,465,035 shares it holds.

- (2) On April 13, 2015, as part of Law 226 of 1995, the Government issued a favorable opinion on the alienation program of Ecopetrol's equity holding in Interconexión Eléctrica S.A. E.S.P, following the recommendation of Ecopetrol's Board of Directors. At December 31, 2016, Ecopetrol sold in two auctions 100% of its equity holding, which amounted to 58,925,480 shares for COP\$513,399 as follows:

- On April 12, 2016, the sale of 45,295,034 shares was performed at a price of COP\$8,325 each for a total of COP\$377,081.
- On December 14, 2016, the last auction was performed for the sale of 13,630,446 shares at a price of COP\$10,001 for a total of COP\$136,318.

The proceeds from the sale of these shares have been used to finance the Company's investment plan.

The movement of non-current assets held for sale at December 31, 2016 and 2015 is as follows:

	<b>2016</b>	<b>2015</b>
Opening balance	913,488	1,581,466
Fair value adjustments	126,205	(106,911)
Proceeds from sales of shares	(966,715)	(613,998)
(Loss) gain on sale of shares (1)	(21,368)	52,931
Closing balance	<b>51,610</b>	<b>913,488</b>

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These equity instruments are measured at fair value with changes in fair value recorded in the other comprehensive income. Its hierarchy level is 1 using the price quoted in the Stock Exchange of Colombia as a reference.

- (1) As of December 31, 2016 and 2015 the sale of shares of EEB and ISA generated a profit of COP\$47,129 and COP\$72,339, respectively; which corresponds to the amount of loss or gain on sale describe in the previous table plus the gains realization of the fair value measurements that had been accumulated in equity for COP\$68,497 in 2016 and COP\$19,405 in 2015.

**12. Other assets**

The balance at December 31, 2016 and 2015 of other assets is comprised as follows:

	2016	2015
<b>Current</b>		
Partners in joint operations	735,032	431,523
Advanced payments to contractors and suppliers	151,871	370,269
Prepaid expenses	140,606	226,842
Related parties (Note 32)	7,135	28,668
Other advances and agreements	988	33,022
<b>Total current</b>	<b>1,035,632</b>	<b>1,090,324</b>
<b>Non-current</b>		
Abandonment and pension funds (1)	312,423	274,938
Employee benefits	187,969	91,625
Judicial deposits and attachments	140,338	146,701
Trust funds (2)	87,602	125,720
Advances and deposits	63,402	18,405
Other assets	35,002	108,991
<b>Total non-current</b>	<b>826,736</b>	<b>766,380</b>

- (1) Corresponds to trusts established to support the costs of abandonment of wells and dismantling of facilities and future retirement pensions.
- (2) Consists primarily of deposits to the Oil Savings and Stabilization Fund (from the Spanish *Fondo de Ahorro y Estabilización Petrolera - FAEP*) in Ecopetrol's favor to address the remainder of the National Royalties Fund. Its sole purpose is the payment of debts and financing development programs and projects in hydrocarbon producing and non-producing municipalities and departments. Ecopetrol will make disbursements as the Ministry of Finance issues the respective approvals.

At the close of 2015, the pension resources managed by *Fiduciaria Bancolombia* (equivalent to COP\$342,951, from the termination of the Cravo Norte Partnership agreement with Occidental de Colombia) were returned to Ecopetrol S.A., since the pension obligation arising from such agreement is supported by the pension trusts described in note 22 - Provisions for employee benefits.

**13. Assets held for sale and their related liabilities**

At December 31, 2016, the balance of assets classified as non-current assets held for sale amounted to COP\$132,216 and it was comprised of:

- Assets remaining from the expansion of the oil pipeline to transport extra-heavy crude oil conducted by Oleoducto Central S.A. - Ocesa, for COP\$65,703.
- Andean assets related to Louisiana Green Fuels for COP\$36,902 corresponding to ethanol and water plants and a harvester.
- Ecopetrol's oil fields: Sogamoso, Rio Zulia, Rio de Oro and Puerto Barco, Santana, Nancy-Maxine-Burdine and Valdivia Almagro, awarded through auction offered in November 2016 for COP \$29,611.

The balance of related liabilities as of December 31, 2016 amounts to COP\$40,128 and corresponds mainly to abandonment costs and environmental commitments of these assets.

Assets held for sale at December 31, 2015 for COP\$242,745 and its related liabilities for COP\$17,628 corresponded to fields La Hocha and La Cañada, owned by Hocol S.A., on which the sale was abandoned in 2016 because the offer did not meet economic expectations.

**14. Investments in associates and joint ventures**

**14.1 Composition and movements**

The balance at December 31, 2016 and 2015 of the investments in associates and joint ventures is as follows:

	2016	2015
<b>Investments in joint ventures</b>		
Equion Energía Limited	1,156,430	1,430,206
Offshore International Group (1)	937,938	1,097,929
Ecodiesel Colombia S.A.	39,525	37,161
	<b>2,133,893</b>	<b>2,565,296</b>
Less impairment:		
Equion Energía Limited	(253,683)	(172,528)
Offshore International Group	(577,053)	(530,350)
	<b>1,303,157</b>	<b>1,862,418</b>
<b>Investments in associates</b>		
Invercolsa S.A.	243,156	61,503
Serviport S.A.	5,255	8,490
Sociedad Portuaria Olefinas	1,126	649
	<b>249,537</b>	<b>70,642</b>
Less impairment: Serviport S.A.	-	(1,126)
	<b>249,537</b>	<b>69,516</b>
	<b>1,552,694</b>	<b>1,931,934</b>

(1) According to the assessment of control carried out as of December 31, 2016, the investment in Offshore International Group was classified as joint venture from an associate, due to the existence of joint control. For comparative purposes, the balance was reclassified as of December 31, 2015 to joint ventures.

The detail of the investments, economic activity, domicile, area of operation and financial information of the investments in joint ventures and associates is shown in Exhibit I.

The following is the movement of these investments:

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	-	(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>

For the year ended December 31, 2015:

	Associates	Joint ventures	Total
<b>Opening balance</b>	<b>64,710</b>	<b>2,325,479</b>	<b>2,390,189</b>
Effects of equity method through:			
Profit or loss	45,988	(92,675)	(46,687)
Other comprehensive income	-	508,968	508,968
Dividends declared	(41,182)	(291,210)	(332,392)
Impairment	-	(588,144)	(588,144)
<b>Closing balance</b>	<b>69,516</b>	<b>1,862,418</b>	<b>1,931,934</b>

#### 14.2 Impairment on the value of investments in companies

Investments in associates and joint ventures are recorded under the equity method. Ecopetrol evaluates if such investments were impaired during the period, and assesses if there is objective evidence of a potential impairment, particularly for companies that were acquired with goodwill.

As a result, the Company recognized impairment expense in the value of its investments in companies at December 31, as follows:

	2016	2015	2014
Equion Energía Limited	81,155	172,528	-
Offshore International Group	46,703	415,616	114,734
<b>Total</b>	<b>127,858</b>	<b>588,144</b>	<b>114,734</b>

The main assumptions used for determining the fair value less costs to sell of the investments, which perform hydrocarbon exploration and production activities, include:

- Financial projections for the above companies were made taking into account the fair value less cost of disposal based on the discounted cash flow after taxes, that are derived from business plans approved by the company's management. The plans are developed based on long term macroeconomic factors such as price curves and fundamental supply and demand assumptions. The fair value category is level 3.
- The forecasts include US\$56.8/barrel for 2017, US\$67.9/barrel average for the next six years and US\$80/barrel in the long-term. Prices are based on information from recognized suppliers well known by the market and by management analysts. In 2015, the assumptions made used a price of US\$40/barrel in 2016 reaching US\$60 in the long-term. The production profiles were estimated based on third-party perspectives, which rely on their companies' vision.
- The rates used for discounting cash flows are based on the WACC methodology and reflect the specific risk of the business segment. The rate used for 2016 was 8.9% for Equion Energía Limited (2015 – 8.4%) and 8% for Offshore International Group (2015 – 8.4%).
- Certified reserves balances, in addition to prove, probable and possible reserves were also considered adjusted by different risk factors.

The impairment recognized in 2015 was caused mostly by the adverse economic context of the hydrocarbon industry, which translated into the reduction of oil price forecast and increase in the market and country risks reflected on the discount rate. For 2016, despite of better forecasts for long term oil prices, the Company recognized an additional impairment in the investment in the Offshore International Group and Equion for the return to local authorities of low-prospectively exploration blocks, high geological risk and low economic viability with respect to a new price scenario.

**14.3 Restrictions on investments**

The number of shares held by Ecopetrol in Invercolsa S.A. has been subjected to a legal dispute with another shareholder of this company. The Courts decided in favor of Ecopetrol through ruling of 2011, whereby it was determined that 324 million shares, equivalent to 11.58% of Invercolsa's social capital should be returned to Ecopetrol. The Ecopetrol's equity share in said company is 43.35%. The dividends paid in relation with the shares returned to Ecopetrol are also subject to controversy, as well as the ownership of the shares that represent 8.53% of Invercolsa. At December 31, 2016, the settlement of these claims is still pending.



**14.4 Additional information about associates and joint ventures**

The balance of assets, liabilities and results of most relevant associates and joint ventures at December 31, 2016 and 2015 is comprised as follows:

	2016		2015	
	Equion Energía Limited	Offshore International Group	Equion Energía Limited	Offshore International Group
<b>Statement of financial position</b>				
Current assets	712,078	317,700	854,445	310,677
Non-current assets	1,406,510	1,693,947	2,114,689	2,089,841
<b>Total assets</b>	<b>2,118,588</b>	<b>2,011,647</b>	<b>2,969,134</b>	<b>2,400,518</b>
Current liabilities	417,203	147,090	549,281	477,611
Non-current liabilities	170,527	671,577	352,182	409,946
<b>Total liabilities</b>	<b>587,730</b>	<b>818,667</b>	<b>901,463</b>	<b>887,557</b>
<b>Equity</b>	<b>1,530,858</b>	<b>1,192,980</b>	<b>2,067,671</b>	<b>1,512,961</b>
<b>Other complementary information</b>				
Cash and cash equivalents	300,689	22,224	340,797	25,760
Financial obligations, short-term	328,497	21,408	423,132	337,506
Financial obligations, long-term	309	356,353	751	33,025
	2016		2015	
	Equion Energía Limited	Offshore International Group	Equion Energía Limited	Offshore International Group
<b>Statement of profit or loss</b>				
Sales revenue	1,204,301	379,811	1,218,796	463,660
Costs	(969,318)	(502,107)	(958,467)	(654,095)
Administration and other expenses	(44,810)	(221,238)	(74,258)	(128,895)
Financial income (expenses)	59,143	(12,010)	37,970	(8,528)
Income tax	30,199	107,507	(209,221)	90,294
<b>Net income for the period</b>	<b>279,515</b>	<b>(248,037)</b>	<b>14,820</b>	<b>(237,564)</b>

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Included below, there is a reconciliation of equity between the most significant participations and the carrying amount of investments at December 31:

	2016		2015	
	Equion Energía Limited	Offshore International Group	Equion Energía Limited	Offshore International Group
<b>Equity of the associate</b>	<b>1,530,858</b>	<b>1,192,980</b>	<b>2,067,671</b>	<b>1,512,961</b>
% of Ecopetrol's ownership	51%	50%	51%	50%
Ecopetrol's ownership	780,738	596,490	1,054,513	756,482
Additional value of the investment	375,693	341,448	375,693	226,713
Less Impairment expense	(253,684)	(577,053)	(172,528)	(415,616)
<b>Carrying amount of the investment</b>	<b>902,747</b>	<b>360,885</b>	<b>1,257,678</b>	<b>567,579</b>

**15. Property, plant and equipment**

The following shows a breakdown of the changes in property, plant and equipment and its depreciation and impairment for the years ended December 31, 2016 and 2015:

	<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 at December 31, 2015</b>	<b>37,360,222</b>	<b>26,856,085</b>	<b>11,015,010</b>	<b>6,479,356</b>	<b>4,068,951</b>	<b>3,653,798</b>	<b>89,433,422</b>
Additions/capitalizations	1,457,547	1,383,352	(107,181)	360,596	41,202	511,413	3,646,929
(Decrease) increase in abandonment costs	(84,780)	(78,712)	-	-	-	6,137	(157,355)
Capitalized interest	-	-	205,662	-	-	37,116	242,778
Exchange differences capitalized	-	-	8,639	-	-	-	8,639
Disposals	(158,193)	(21,814)	(16,031)	(12,540)	713	(15,455)	(223,320)
Foreign currency translation	(42,870)	(298,750)	(1,629,613)	(9,832)	(69,878)	12,416	(2,038,527)
Other (reclassifications) (2)	4,076,350	1,247,621	(4,602,080)	94,177	(146,768)	(722,986)	(53,686)
<b>Balance at 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>
<b>Accumulated depreciation and impairment</b>							
<b>Balance at December 31, 2015</b>	<b>(13,469,749)</b>	<b>(8,572,373)</b>	<b>(19,566)</b>	<b>(1,698,791)</b>	<b>(13,689)</b>	<b>(554,181)</b>	<b>(24,328,349)</b>
Depreciation expense	(1,869,604)	(1,426,659)	-	(392,294)	-	(102,621)	(3,791,178)
Impairment (Note 17)	(659,223)	33,048	(3,270)	57,157	24,067	(13,517)	(561,738)
Disposals	121,382	14,022	-	7,021	15	11,524	153,964
Foreign currency translation	272,582	138,611	38,904	12,658	-	8,007	470,762
Other (reclassifications) (2)	92,617	(152,203)	(278,665)	(74,229)	(37,245)	(24,114)	(473,839)
<b>Balance at 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>
<b>Net balance at December 31, 2016</b>	<b>27,096,281</b>	<b>19,122,228</b>	<b>4,611,809</b>	<b>4,823,279</b>	<b>3,867,368</b>	<b>2,807,537</b>	<b>62,328,502</b>

- (1) The balance of work in progress at December 31, 2016, mainly includes investments for development projects in the Castilla and Chichimene, integral plan of electric energy (PIEE, for its acronym in Spanish), primary and secondary development of the project Tibú-Socuabo and modernization project of the Barrancabermeja refinery.
- (2) Corresponds mainly to transfers to: a) inventory of project materials for use in the operation for COP\$(712,967) mainly Ecopetrol and Reficar, b) opening of the intangible part of projects to natural resources for COP\$68,750 and c) other COP\$116,692.

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	Plant and equipment	Pipelines, networks and lines	Work in progress (1)	Buildings	Lands	Other	Total
<b>Cost</b>							
<b>Balance at December 31, 2014</b>	<b>16,109,035</b>	<b>19,938,115</b>	<b>24,009,694</b>	<b>5,199,417</b>	<b>3,614,237</b>	<b>3,135,873</b>	<b>72,006,371</b>
Additions	2,720,120	2,213,663	2,446,904	755,565	112,972	299,709	8,548,933
Increase (decrease) in abandonment costs	242,815	(115,608)	14,184	-	-	-	141,391
Capitalized interest	-	-	553,061	-	-	-	553,061
Exchange differences capitalized	-	-	110,485	-	-	-	110,485
Disposals	(94,227)	(187,964)	(32,842)	(5,060)	(9,786)	(70,445)	(400,324)
Foreign currency translation	5,093,932	2,526,312	159,154	258,070	354,898	190,381	8,582,747
Other (reclassifications)	13,288,547	2,481,567	(16,245,630)	271,364	(3,370)	98,280	(109,242)
<b>Balance at December 31, 2015</b>	<b>37,360,222</b>	<b>26,856,085</b>	<b>11,015,010</b>	<b>6,479,356</b>	<b>4,068,951</b>	<b>3,653,798</b>	<b>89,433,422</b>
<b>Accumulated depreciation and Impairment</b>							
<b>Balance at December 31, 2014</b>	<b>(7,446,991)</b>	<b>(6,071,305)</b>	<b>(1,209,229)</b>	<b>(1,146,453)</b>	<b>(70,332)</b>	<b>(397,054)</b>	<b>(16,341,364)</b>
Depreciation expense	(1,168,864)	(1,300,687)	-	(329,396)	-	(124,309)	(2,923,256)
Impairment (Nota 17)	(2,787,539)	(584,736)	(509,195)	(161,431)	(13,689)	(88,164)	(4,144,754)
Disposals	75,305	90,389	-	4,208	-	64,283	234,185
Foreign currency translation	(219,358)	(481,180)	(404,872)	(37,259)	-	(10,491)	(1,153,160)
Other (reclassifications)	(1,922,302)	(224,854)	2,103,730	(28,460)	70,332	1,554	-
<b>Balance at December 31, 2015</b>	<b>(13,469,749)</b>	<b>(8,572,373)</b>	<b>(19,566)</b>	<b>(1,698,791)</b>	<b>(13,689)</b>	<b>(554,181)</b>	<b>(24,328,349)</b>
<b>Net balance at December 31, 2015</b>	<b>23,890,473</b>	<b>18,283,712</b>	<b>10,995,444</b>	<b>4,780,565</b>	<b>4,055,262</b>	<b>3,099,617</b>	<b>65,105,073</b>

(1) In October 2015, the Refinería de Cartagena project started its operations. Part of the investment in this project, which had been accumulated under Construction in progress (\$13,853,231), was reclassified to different fixed asset classes to begin depreciation thereof.

The balance for projects in progress at December 31, 2015, primarily consists of investments for development projects in the Castilla, Rubiales and Chichimene fields as well as projects to modernize the Barrancabermeja refinery and the industrial services master plan.

**16. Natural and environmental resources**

The following shows a breakdown of the changes in Natural and environmental resources and its depletion and impairment for the years ended December 31, 2016 and 2015. The depletion method used is units of production.

	Oil and gas investments	Asset retirement cost	Exploration and evaluation (1)	Total
<b>Cost</b>				
<b>Balance at December 31, 2015</b>	<b>44,148,353</b>	<b>1,762,374</b>	<b>6,189,142</b>	<b>52,099,869</b>
Additions/capitalizations	3,045,474	10,391	(934,570)	2,121,295
Increase (decrease) in abandonment costs	-	566,213	(4,062)	562,151
Disposals	(26,548)	(37,942)	(121,032)	(185,522)
Dry wells (2)	-	-	(342,691)	(342,691)
Capitalized interest	-	-	98,431	98,431
Capitalized exchange differences	-	-	7,259	7,259
Foreign currency translation	(352,766)	(8,049)	(103,728)	(464,543)
Other (reclassifications)	264,583	11,928	29,375	305,886
<b>Balance at December 31, 2016</b>	<b>47,079,096</b>	<b>2,304,915</b>	<b>4,818,124</b>	<b>54,202,135</b>
<b>Accumulated depletion and impairment</b>				
<b>Balance at December 31, 2015</b>	<b>(26,874,774)</b>	<b>(1,181,798)</b>	<b>-</b>	<b>(28,056,572)</b>
Depletion expense	(3,496,998)	(208,769)	-	(3,705,767)
Impairment (Note 17)	(239,151)	-	-	(239,151)
Disposals	26,320	37,942	-	64,262
Foreign currency translation	218,898	5,171	-	224,069
Others	(104,710)	(43,219)	-	(147,929)
<b>Balance at December 31, 2016</b>	<b>(30,470,415)</b>	<b>(1,390,673)</b>	<b>-</b>	<b>(31,861,088)</b>
<b>Net balance at December 31, 2016</b>	<b>16,608,681</b>	<b>914,242</b>	<b>4,818,124</b>	<b>22,341,047</b>

- (1) The balance of exploration and evaluation mainly includes investments in production projects of direct operation in Castilla, Chichimene and Piedemonte. Additionally, it includes offshore exploration projects: Fuerte Sur, Kronos and Tayrona and Onshore: Caño Sur block, CPO 10 and non-conventional hydrocarbons program.
- (2) Includes dry wells in operation of: Ecopetrol COP\$302,965, ECP Oil and Gas Germany GmbH COP\$26,273, Ecopetrol America Inc COP\$5,032, Hocol S.A COP\$5,049, Ecopetrol Brasil COP\$3,372.
- (3) Corresponds mainly to transfers to: a) non-current assets held for sale COP\$244,387 and b) property, plant and equipment COP\$(68,898) and c) other COP\$(17,532).

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	Oil and gas investments	Asset retirement cost	Exploration and evaluation (1)	Total
<b>Cost</b>				
<b>Balance at December 31, 2014</b>	<b>37,168,922</b>	<b>1,895,149</b>	<b>6,114,019</b>	<b>45,178,090</b>
Additions/capitalizations	5,776,253	9,520	1,070,988	6,856,761
Decrease in abandonment costs	-	(139,670)	-	(139,670)
Disposals	(13,475)	-	(56,962)	(70,437)
Dry wells (2)	-	-	(1,266,440)	(1,266,440)
Capitalized interest	-	-	191,365	191,365
Capitalized exchange differences	-	-	39,416	39,416
Foreign currency translation	1,031,595	6,299	272,890	1,310,784
Other (reclassifications)	185,058	(8,924)	(176,134)	-
<b>Balance at December 31, 2015</b>	<b>44,148,353</b>	<b>1,762,374</b>	<b>6,189,142</b>	<b>52,099,869</b>
<b>Accumulated depletion and impairment</b>				
<b>Balance at December 31, 2014</b>	<b>(20,223,671)</b>	<b>(833,755)</b>	-	<b>(21,057,426)</b>
Depletion expense	(3,424,212)	(300,650)	-	(3,724,862)
Impairment (Note 17)	(2,865,077)	-	-	(2,865,077)
Disposals	9,040	-	-	9,040
Foreign currency translation	(356,815)	(61,432)	-	(418,247)
Others	(14,039)	14,039	-	-
<b>Balance at December 31, 2015</b>	<b>(26,874,774)</b>	<b>(1,181,798)</b>	-	<b>(28,056,572)</b>
<b>Net balance at December 31, 2015</b>	<b>17,273,579</b>	<b>580,576</b>	<b>6,189,142</b>	<b>24,043,297</b>

- (1) The balance for exploration and evaluation primarily includes investments in production projects (direct operation) in Castilla, Chichimene, Apiay, Tibu and Piedemonte. It also includes exploration projects: Kronos, unconventional hydrocarbons and Tayrona.
- (2) It mainly includes dry wells in Ecopetrol S.A. operations for COP\$ 912,695, Ecopetrol America Inc. for COP\$131,447, Hocol S.A. for COP\$139,362 and ECP Oil and Gas Germany GmbH for COP\$82,936.

**Accounting for suspended exploratory wells**

The following table shows the classification by ages, from the completion date, of the exploratory wells that are suspended as of December 31, 2016, 2015 and 2014:

	<b>2016</b>	<b>2015</b>	<b>2014</b>
Between 1 and 3 years	611,682	490,184	416,687
Between 3 and 5 years	197,997	100,316	25,703
More than 5 years	153,552	161,392	41,621
Total suspended exploratory wells	<b>963,231</b>	<b>751,892</b>	<b>484,011</b>
No. of projects exceeding 1 year	<b>24</b>	<b>59</b>	<b>42</b>
Wells under 1 year of suspended	90,486	280,801	259,932

It corresponds mainly to exploratory wells of Ecopetrol, OIG and Hocol.

**17. Impairment on property, plant and equipment and natural and environmental resources**

In accordance with that mentioned in section 4.12 of the accounting policies every year the Company assesses if there are any indications of impairment in its assets or cash generating units.

The Company is exposed to certain future risks derived from variations in: a) oil prices, b) refining margins and profitability, c) cost profile, d) investment and maintenance, e) amount of recoverable reserves, f) market and country risk reflected on the discount rate, g) changes in domestic and international regulations, etc. Any change in the foregoing variables to calculate the recoverable amount can have a material effect on the recognition or recovery of impairment charges. For example, the exploration and production segment is highly sensitive to variation of hydrocarbon prices, while the refining segment is highly sensitive to the discount rate given the leveraging of said segment as well as the refining margins.

Based on impairment tests conducted by the Company, the following impairment losses (reversals) were recorded for the years ended on December 31, 2016, 2015 and 2014:

	2016	2015	2014
<b>Impairment (recovery)</b>			
Exploration and production	68,590	3,649,451	853,179
Refining and petrochemicals	773,361	3,278,993	1,336,158
Transportation and logistics	(41,062)	81,387	496
	<b>800,889</b>	<b>7,009,831</b>	<b>2,189,833</b>
<b>Recognized in:</b>			
Property, plant and equipment (Note 15)	561,738	4,144,754	1,491,809
Natural resources (Note 16)	239,151	2,865,077	694,720
Intangibles (Note 18)	-	-	3,304
	<b>800,889</b>	<b>7,009,831</b>	<b>2,189,833</b>

**17.1 Exploration and production segment**

The expense (recovery) for impairment of assets of the exploration and production segment for the years ended December 31, 2016, 2015 and 2014 comprises:

**2016**

Cash-generating unit	Carrying amount	Recoverable amount	Impairment loss (reversal)
<b>Fields in Colombia</b>			
Expense	5,258,265	4,902,943	1,117,020
Recovery	17,502,391	36,704,807	(1,090,434)
<b>Fields abroad</b>			
Expense	688,895	647,272	42,004
			<b>68,590</b>

**2015**

Cash-generating unit	Carrying amount	Recoverable Amount	Impairment loss (reversal)
Fields in Colombia	10,323,500	7,645,665	2,430,923
Fields abroad	1,242,979	24,451	1,218,528
			<b>3,649,451</b>

**2014**

Cash-generating unit	Carrying amount	Recoverable Amount	Impairment loss (reversal)
Fields in Colombia	4,186,400	5,581,870	841,937
Fields abroad	477,484	466,242	11,242
			<b>853,179</b>



In 2016, as a result of revising the expected long term oil prices it was identified that some impairments recognized in previous years for oil fields should be reversed. The fields for which there was impairment reversal were mainly Chichimene, Caño Sur, Apiay and Llanito. On the other hand, the new technical information and operational aspects that gave rise to changes in investment levels resulted in the recognition of an impairment charge in Casabe, Tibú, Gunflint and Niscota fields.

The assumptions used in the model to determine the recoverable amounts include:

- The fair value less the cost of disposal of assets in the exploration and production segment was determined based on cash flows after taxes that are derived from the business plans approved by Company management; these are developed on the base of long term macroeconomic variables and fundamental supply and demand assumptions. The fair value category is level 3.
- The discount rate in real terms determined as the weighted average cost of capital of market participants (WACC) was established for each company in the segment, with rates ranging between 7.9% and 8.9% (2015 – 8.4%).
- Oil price - Brent: The forecasts include US\$56.8/barrel for 2017, US\$67.9/barrel average for the next six years and US\$80/barrel in the long-term in annual prices. Prices are based on information provided by specialized market analysts and management analysts. The variation in estimations of future prices are generated by the forecast of fundamentals made by market analysts which include current scenarios of oil quota agreements of OPEC (Organization of Petroleum Exporting Countries) and impact of changes on specifications issued by the Marpol (abbreviation of marine pollution) agreement on crude and fuels with high sulfur content.

For 2015, the estimated prices were US\$40/barrel for the short term reaching US\$60 in the medium and long term. Prices were based on information provided by specialized market analysts and management analysts.

- Certified balance of oil and gas reserves, in addition to prove reserves included in Note 37, probable and possible reserves were also considered adjusted by different risk factors.

The aggregation of assets to identify the CGU's is consistent as compared to the prior period.

In 2015, the impairment expense was caused mostly by the adverse economic context of the hydrocarbon industry, which translated into a decrease in the oil price forecast and increase in the market and country risks reflected on the discount rate and the reduction on the recoverable amount of reserves. The most representative cash generating units impacted for the foregoing factors were the oil fields operated at domestic level: Casabe, Chichimene, Tibú, CP09, Apiay, Llanito and La Hocha and the fields in the Gulf of Mexico K2 and Dalmatian.

## 17.2 Refining and petrochemicals segment

Assets impairment in the refining and petrochemicals segment for the years ended December 31, 2016, 2015 and 2014 comprises:

### 2016

Cash-generating unit	Carrying amount	Recoverable amount	Expense for impairment
Refinería de Cartagena	21,672,367	21,206,515	465,852
Bioenergy	925,955	618,446	307,509
	<b>22,598,322</b>	<b>21,824,961</b>	<b>773,361</b>

**2015**

Cash-generating unit	Carrying amount	Recoverable amount	Expense for impairment
Refinería de Cartagena	26,561,335	23,335,096	3,226,240
Bioenergy	642,139	589,386	52,753
	<b>27,203,474</b>	<b>23,924,482</b>	<b>3,278,993</b>

**2014**

Cash-generating unit	Carrying amount	Recoverable amount	Expense for impairment
Refinería de Cartagena	18,794,568	17,469,140	1,325,428
Otros menores	100,311	89,581	10,730
	<b>18,894,879</b>	<b>17,558,721</b>	<b>1,336,158</b>

**Refinería de Cartagena**

The recoverable amount for *Refinería de Cartagena* was calculated based on the fair value less cost of disposal, with level of hierarchy 3, which corresponds to the future cash flows discounted after taxes. The assumptions used in the model to determine the recoverable amounts included: a) an average gross margin of US\$18.9/barrel (2015 - US\$17.5), determined by specialists of market participants; b) adjustments associated with effects of the stabilization period; c) an actual discount rate of 6.3% (2015 - 7.2% and 2014 – 7.1%) determined under the WACC methodology; and d) extension of current conditions and benefits, or similar, as industry user of goods and services in the free trade zone and during the term of the license.

In 2016, there is an impairment loss generated mostly by adjustment of operational variables based on observed data during the stabilization period, offset by a lower discount rate and better refining margins.

The impairment expense in 2015 was caused mostly by the adverse economic context of the hydrocarbon industry, which translated into reduction of the refining market expectations in coming years, an increase country and market risk that was reflected on the discount rate.

**Bioenergy**

The recoverable amount for Bioenergy was calculated based on the value in use, which is greater than the fair value less cost of disposal and corresponds to future cash flows discounted before taxes. The assumptions used in the model to determine the recoverable amount included: a) forecast of ethanol prices based on projections made by home office specialists; and b) a 6.7% discount rate in actual terms (2015 – 6.8% in actual terms) determined under the WACC methodology.

In 2016 and 2015, the Company recorded an impairment loss, due to mainly by the updating of the start date of operations and changes in product price projections.

**17.3 Transportation and logistics segment**

In 2016, there was an impairment recovery for the transport and logistics segment for COP\$41,062 (2015 - COP\$81,387 and 2014 - COP\$496 of impairment expense) mainly by the incorporation of flows associated to the San Fernando - Apiay system project that affects the recoverable amount of the Llanos transport line, offset with greater impairment on the southern transport line. The recoverable amount of these assets was determined based on its fair value less disposal costs with level of hierarchy 3, which corresponds to discounted cash flows based on the hydrocarbon production curves and rates regulated by the Ministry of Mines and Energy and the Energy and Gas Regulating Commission - CREG. The actual discount rate used in the valuation was 4.98% (2015 - 5.9% and 2014 - 7.2%).

**18. Intangibles**

The following shows a breakdown of the changes in Intangibles and their amortization for the years ended December 31, 2016 and 2015:

	Licenses and software	Other intangibles (1)	Total
<b>Cost</b>			
<b>Balance at December 31, 2015</b>	<b>733,115</b>	<b>244,063</b>	<b>977,178</b>
Additions	63,560	5,693	69,253
Disposals	(29,099)	-	(29,099)
Foreign currency translation	(9,359)	(149)	(9,508)
Reclassifications	26,103	(110,625)	(84,522)
<b>Balance at December 31, 2016</b>	<b>784,320</b>	<b>138,982</b>	<b>923,302</b>
<b>Accumulated amortization</b>			
<b>Balance at December 31, 2015</b>	<b>(533,784)</b>	<b>(55,343)</b>	<b>(589,127)</b>
Amortization expense	(81,913)	(28,142)	(110,055)
Disposals	29,097	-	29,097
Foreign currency translation	8,527	1	8,528
Reclassifications	(5,607)	15,994	10,387
<b>Balance at December 31, 2016</b>	<b>(583,680)</b>	<b>(67,490)</b>	<b>(651,170)</b>
<b>Net balance at December 31, 2016</b>	<b>200,640</b>	<b>71,492</b>	<b>272,132</b>
Useful life	<5 years	<7 years	
<b>Cost</b>			
<b>Balance at December 31, 2014</b>	<b>575,535</b>	<b>127,519</b>	<b>703,054</b>
Additions	107,815	4,440	112,255
Disposals	(615)	-	(615)
Foreign currency translation	53,242	-	53,242
Reclassifications	(2,862)	112,104	109,242
<b>Balance at December 31, 2015</b>	<b>733,115</b>	<b>244,063</b>	<b>977,178</b>
<b>Accumulated amortization</b>			
<b>Balance at December 31, 2014</b>	<b>(425,357)</b>	<b>(32,545)</b>	<b>(457,902)</b>
Amortization expense	(66,043)	(24,196)	(90,239)
Disposals	309	23	332
Foreign currency translation	(41,318)	-	(41,318)
Reclassifications	(1,375)	1,375	-
<b>Balance at December 31, 2015</b>	<b>(533,784)</b>	<b>(55,343)</b>	<b>(589,127)</b>
<b>Net balance at December 31, 2015</b>	<b>199,331</b>	<b>188,720</b>	<b>388,051</b>
Useful life	<5 years	<7 years	

(1) It includes mainly easements and right of use of the pipeline Caño Limón - Coveñas.

**19. Goodwill**

The balance at December 31, 2016 and 2015 of Goodwill from acquisitions of controlled companies is comprised as follows:

	<b>2016</b>	<b>2015</b>
<b>Transportation and logistics</b>		
Oleoducto Central S.A.	683,496	683,496
<b>Exploration and production</b>		
Hocol Petroleum Limited	537,598	537,598
<b>Refining and petrochemicals</b>		
Andean Chemical Limited	127,812	127,812
Propilco S.A.	108,137	108,137
	<b>1,457,043</b>	<b>1,457,043</b>
Less: Impairment loss of Hocol Petroleum Ltd	(297,121)	(297,121)
<b>Total</b>	<b>1,159,922</b>	<b>1,159,922</b>

At December 31, 2016, the Company assessed the recoverability of the carrying value of goodwill generated in the acquisition of controlled companies. The recoverable amount was determined based on the fair value less cost of disposal using the present value of future cash flows for each of the companies acquired. Future cash flows was based on financial projections of each company derived from the business plans approved by management, which were developed based on long term macro-economic factors such as price curves and margins and fundamental assumptions of supply and demand. As a result of the analysis the Company did not identify any goodwill impairment.

In 2015, given the adverse economic environment faced by the hydrocarbon sector the Company was exposed to certain future risks such as a further decline in oil prices, lower refining margins, lower profit margins, changes in cost profiles, changes in levels of capital expenditures and maintenance, a reduction in recoverable reserves amount, and an increase in market and country risk that is reflected in a higher discount rate. Any significant change in the estimates and judgments used to calculate these variables can have a material effect on the recognition of goodwill impairment charges. Different variables have different impact on segments. For example, the Exploration and Production segment is highly sensitive to the price of hydrocarbons, while the Refining segment is highly sensitive to the discount rate given the leverage in that segment. As a result, at December 31, 2015 the company recognized a goodwill impairment of COP\$266,900 in Hocol Petroleum Limited, due mainly from the current adverse economic context faced by the hydrocarbon sector. Regarding goodwill allocated to the Transportation and Logistics Segment and the Refining and Petrochemicals Segment Ecopetrol did not identify the need to recognize any goodwill impairment.

**20. Loans and borrowings**

**20.1 Composition of loans and borrowings**

The balance at December 31, 2016 and 2015 is comprised as follows:

	<b>Weighted average effective interest rate at December 31, 2016 / 2015</b>	<b>2016</b>	<b>2015</b>
<b>Local currency</b>			
Bonds	8.6% / 9.8%	2,008,203	1,960,695
Syndicated loan	9.5% / 7.7%	3,828,329	4,226,454
Commercial loans and other	9.1% / 7.9%	905,266	945,331
<b>Total local currency</b>		<b>6,741,798</b>	<b>7,132,480</b>
<b>Foreign currency</b>			
Bonds	6.0% / 6.1%	29,310,165	29,121,535
Commercial loan-Refinería de Cartagena	4.1% / 4.1%	7,988,678	9,107,938
Other commercial loans	2.9% / 2.1%	7,945,693	7,101,195
Other (1)		235,693	760,190
<b>Total foreign currency</b>		<b>45,480,229</b>	<b>46,090,858</b>
<b>Total loans and borrowings</b>		<b>52,222,027</b>	<b>53,223,338</b>
Less short-term		4,126,203	4,573,620
<b>Total long-term</b>		<b>48,095,824</b>	<b>48,649,718</b>

(1) Includes financial leasing and build, operation, maintenance and transfer contracts.

**20.2 New borrowings**

The main financing operations during 2016 and 2015 were as follows:

**Bonds – Foreign currency**

- On June 8, 2016, Ecopetrol reopened its bonds maturing in September 2023 for US\$ 500 million, with payment of principal at maturity and interest payable semi-annually at a coupon rate of 5.875%. The new total outstanding amount of the bond is US\$1.8 billion.
- At June 2015, Ecopetrol S.A. issued US\$1,500 million of bonds in the international market with payment of principal at maturity (June 26, 2026) and interest payable semi-annually at a coupon rate of 5.375%.

**Commercial loans**

- On January 29, 2016, Ecopetrol entered into a commercial loan for US\$175 million with The Bank of Tokyo-Mitsubishi UFJ, Ltd. This loan has a 5 years term, is amortizable with a 2.5 years of grace period on principal and interest is payable semi-annually at a rate of 6-M Libor + 145 basis points.

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- On May 16, 2016, Ecopetrol entered into a commercial loan for US\$300 million with Export Development Canada, the Canadian government's export promotion agency. This loan has a 5-year term with principal payable at maturity and interest payable semi-annually at a rate of 6-M Libor + 140 basis points rate.
- On February 23, 2016, Ecopetrol entered into a commercial loan for COP\$990,000 with Bancolombia S.A. which was canceled in early October 2016. This loan had an 8-year term, amortizable with a 2 years grace period on capital with interest payable semi-annually at a DTF rate of TA + 560 basis points.
- In February 2015, Ecopetrol S.A. entered into a commercial loan for US\$1,925 million. The operation was conducted with the participation of 8 international banks. The loan maturity date is February 2020 payable at maturity with semiannual interest payments at Libor + 140 basis points.

For the acquisition of the above credits, no guarantees have been granted due to the support of the Colombian Government through the Ministry of Finance and Public Credit.

**Other**

During 2016, the Company fully paid the short-term remittances financed in dollars with domestic banks for the payment of imports that were in effect as of December 31, 2015 in the amount of US\$203 million with a financing rate of Libor + 65 basis points.

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The following table details the main characteristics of the most significant loans of the Ecopetrol Business Group at December 31, 2016:

Type	Company	Starting date	Currency	Initial amount at original currency (millions)	Balance at December 31,		Maturity	Interest rate	Principal payment	Interest payment
					2016	2015				
Bonds in local-currency	Ecopetrol S.A.	Dec-10	COP \$	138,700	138,700	138,700	dec-17	Floating	Bullet*	Semi-annually
		Dec-10	COP \$	479,900	479,900	479,900	dec-20	Floating	Bullet	Semi-annually
		Dec-10	COP \$	284,300	284,300	284,300	dec-40	Floating	Bullet	Semi-annually
		Aug-13	COP \$	120,950	120,950	120,950	aug-18	Floating	Bullet	Semi-annually
		Aug-13	COP \$	168,600	168,600	168,600	aug-23	Floating	Bullet	Semi-annually
		Aug-13	COP \$	347,500	347,500	347,500	aug-28	Floating	Bullet	Semi-annually
Syndicated loan in local-currency	Ecopetrol S.A. Oleoducto Bicentenario ODL Finance S.A.	Aug-13	COP \$	262,950	262,950	262,950	aug-43	Floating	Bullet	Semi-annually
		May-13	COP \$	1,839,000	1,736,833	1,839,000	may-25	Floating	Semi-annually	Semi-annually
		Jul-12	COP \$	2,100,000	1,549,625	1,717,625	jul-24	Floating	Quarterly	Quarterly
Bonds in foreign currency	Ecopetrol S.A. Oleoducto Central S.A.	Aug-13	COP \$	800,000	480,000	608,000	aug-20	Floating	Quarterly	Quarterly
		Jul-09	US\$	1,500	1,500**	1,500	jul-19	Fixed	Bullet	Semi-annually
		Sep-13	US\$	350	350**	350	sep-18	Fixed	Bullet	Semi-annually
		Sep-13	US\$	1,300	1,800**	1,300	sep-23	Fixed	Bullet	Semi-annually
		Sep-13	US\$	850	850	850	sep-43	Fixed	Bullet	Semi-annually
		May-14	US\$	2,000	2,000**	2,000	may-45	Fixed	Bullet	Semi-annually
		Sep-14	US\$	1,200	1,200**	1,200	may-25	Fixed	Bullet	Semi-annually
		Jun-15	US\$	1,500	1,500**	1,500	jun-26	Fixed	Bullet	Semi-annually
		Jun-16	US\$	500	500**	-	aug-23	Fixed	Bullet	Semi-annually
		May-14	US\$	500	500**	500	may-21	Fixed	Bullet	Semi-annually
Commercial loans in foreign currency	Refinería de Cartagena S.A. Ecopetrol S.A.	Dec-11	US\$	2,747	2,177	2,394	dec-27	Fixed	Semi-annually	Semi-annually
		Dec-11	US\$	310	246	270	dec-27	Floating	Semi-annually	Semi-annually
		Dec-11	US\$	440	374	402	dec-25	Floating	Semi-annually	Semi-annually
		Mar-13	US\$	245	171**	196	jul-23	Floating	Semi-annually	Semi-annually
		Mar-13	US\$	151	66**	105	jul-19	Floating	Semi-annually	Semi-annually
		Feb-15	US\$	1,925	1,925**	1,925	feb-20	Floating	Bullet	Semi-annually
		Feb-16	US\$	175	175	-	feb-21	Floating	Semi-annually	Semi-annually
		May-16	US\$	300	300	-	may-21	Floating	Bullet	Semi-annually

\* Bullet: Nominal value is fully paid on the maturity date.

\*\* Loans designated as hedging instrument (see Note 31).

### 20.3 Maturity of loans and borrowings

The following is the maturity profile of loans as of December 31, 2016:

	Up to 1 year	1 - 5 years	5-10 years	> 10 years	Total
<b>Local currency</b>					
Bonds	312,207	955,204	357,015	383,777	2,008,203
Commercial loans	793,743	2,375,023	659,563	-	3,828,329
Others	58,952	333,372	339,009	173,933	905,266
<b>Total local currency</b>	<b>1,164,902</b>	<b>3,663,599</b>	<b>1,355,587</b>	<b>557,710</b>	<b>6,741,798</b>
<b>Foreign currency</b>					
Bonds	1,648,707	10,956,507	12,133,576	4,571,375	29,310,165
Commercial loan Refinería de Cartagena	875,734	3,549,216	3,472,379	91,349	7,988,678
Other commercial loans	371,804	7,450,587	123,302	-	7,945,693
Other	65,056	114,226	56,411	-	235,693
<b>Total foreign currency</b>	<b>2,961,301</b>	<b>22,070,536</b>	<b>15,785,668</b>	<b>4,662,724</b>	<b>45,480,229</b>
<b>Total</b>	<b>4,126,203</b>	<b>25,734,135</b>	<b>17,141,255</b>	<b>5,220,434</b>	<b>52,222,027</b>

### 20.4 Breakdown by type of interest rate

	2016	2015
<b>Local - currency</b>		
Fixed interest rate	299,472	19,410
Floating interest rate	6,442,326	7,113,070
	<b>6,741,798</b>	<b>7,132,480</b>
<b>Foreign currency</b>		
Fixed interest rate	35,719,486	36,994,095
Floating interest rate	9,760,743	9,096,763
	<b>45,480,229</b>	<b>46,090,858</b>
<b>Total loans and borrowings</b>	<b>52,222,027</b>	<b>53,223,338</b>

Local currency loans and borrowings at floating rates are mainly indexed to the CPI (Consumer Price Index) and DTF (Fixed Term Deposit). The foreign currency loans and borrowings at floating rates are indexed mainly to Libor plus a spread.

### 20.5 Loans designated as hedging instruments

As of December 31, 2016 the Company designated US\$10,512 million of foreign currency debt as a hedging instrument; of which US\$5,312 million correspond to the cash flow hedge for future crude exports and US\$5,200 million to hedge investments in subsidiaries with the US dollar as their functional currency. See Note 31 - Risk management, for further information.



## 20.6 Guarantees and covenants

For financing obtained by Ecopetrol in the capital markets, which correspond to issuance of local and foreign bonds that, are not guaranteed due to the support of the Colombian Government through the Ministry of Finance and Public Credit.

*Refinería de Cartagena (Reficar)* carried out an international commercial loan for US\$3,497 million to finance the expansion project of Cartagena Refinery in 2011. This operation imposes restrictions on Reficar's debt ratio, except for certain conditions expressly set out in contracts about working capital needs. Regarding the financial covenants Reficar is required to maintain a coverage ratio of minimum debt service of 1.35: 1 at certain times of the loan's life. This subsidiary is in compliance with all covenants and debt commitments as of December 31, 2016.

Under the same transaction Reficar entered into a commercial trust and Security and Depositary Agreement to receive the resources of the new refinery to meet specific purposes such as operating expenses, interest and others.

In the case of financing obtained by Oleoducto Bicentenario S.A.S. for the construction of the project and startup of the pipeline the creation of a main fund was established to manage the funds for the payment of the syndicated loan.

## 20.7 Fair value of loans

The fair value of the loans is COP\$52,109,438 and COP\$49,668,119 as of December 31, 2016 and 2015, respectively.

Loans are recorded in the financial statements at their amortized cost, which is the financial amount of initial recognition less principal repayments, plus or minus the cumulative amortization using the effective interest method of any difference between that initial amount and the maturity amount.

For fair value measurement, bonds and local currency securities were valued using Infovalmer's reference prices, while for dollar-denominated bonds the Bloomberg methodology was used as the source. 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 benchmark (Libor, DTF) and the Company's credit risk (spread).

**21. Trade and other payables**

The balance at December 31, 2016 and 2015 of trade and other payables is comprised as follows:

	<b>2016</b>	<b>2015</b>
Suppliers	4,687,353	4,979,932
Partners' advances	864,971	675,527
Withholding tax	379,194	346,578
Deposits received from third parties	209,570	571,577
Related parties (Note 32)	114,420	87,463
Agreements in transport contracts (2)	111,899	33,735
Insurance and reinsurance	110,530	118,338
Dividends payable (1)	11,193	693,878
Various creditors	389,126	250,255
	<b>6,878,256</b>	<b>7,757,283</b>
Current	6,854,363	7,757,277
Non-current	23,893	6
	<b>6,878,256</b>	<b>7,757,283</b>

- (1) During the first quarter of 2016 the last installment of dividends on 2014 net profits was paid to the Ministry of Finance and Public Credit by COP\$690,177
- (2) Corresponds to the value of the debt for agreements in the contracts of transport by pipelines and poliducts calculated in the volume compensation by quality and other agreements of management of inventories.

The carrying amount of trade accounts and other accounts payable approximates their fair value due to its short-term nature.

**22. Provisions for employee benefits**

The following are the balances of provisions for employee benefits as of December 31, 2016 and 2015:

	<b>2016</b>	<b>2015</b>
Post-employment benefits		
Healthcare	4,475,540	3,593,428
Pension	531,596	(262,182)
Education	333,379	535,356
Bonds	(191,338)	(483,876)
Other	67,945	41,263
Termination benefits - Voluntary retirement plan	161,796	-
	<b>5,378,918</b>	<b>3,423,989</b>
Welfare benefits and salaries payable	423,360	353,285
Other post-employment benefits	73,300	74,841
<b>Total</b>	<b>5,875,578</b>	<b>3,852,115</b>
Current	1,974,496	1,392,266
Non-current	3,901,082	2,459,849
	<b>5,875,578</b>	<b>3,852,115</b>

**22.1 Post-employment benefits liability (asset)**

The following table shows the movement in liabilities and assets, net of post-employment benefits and termination benefits at December 31, 2016 and 2015:

	Pension and pension bonds (1)		Healthcare, Education and others		Total	
	2016	2015	2016	2015	2016	2015
<b>Employee benefits liabilities</b>						
<b>Opening balance</b>	<b>10,435,546</b>	<b>11,559,018</b>	<b>4,170,047</b>	<b>5,515,809</b>	<b>14,605,593</b>	<b>17,074,827</b>
Current service cost	-	-	53,771	53,095	53,771	53,095
Past service cost	-	-	164,271	-	164,271	-
Interest expense	876,076	839,716	337,844	395,977	1,213,920	1,235,693
Actuarial losses (gains)	1,915,767	(1,252,017)	616,834	(1,490,315)	2,532,601	(2,742,332)
Paid benefits	(763,956)	(711,171)	(301,634)	(304,519)	(1,065,590)	(1,015,690)
<b>Closing balance</b>	<b>12,463,433</b>	<b>10,435,546</b>	<b>5,041,133</b>	<b>4,170,047</b>	<b>17,504,566</b>	<b>14,605,593</b>
<b>Plan assets</b>						
<b>Opening balance</b>	<b>11,181,604</b>	<b>11,657,629</b>	-	-	<b>11,181,604</b>	<b>11,657,629</b>
Return on assets	950,704	849,556	-	-	950,704	849,556
Change in the effect of the asset ceiling	379,884	(329,825)	-	-	379,884	(329,825)
Paid benefits	(771,528)	(711,432)	2,406	-	(769,122)	(711,432)
Actuarial gains (losses)	382,511	(284,324)	67	-	382,578	(284,324)
<b>Closing balance</b>	<b>12,123,175</b>	<b>11,181,604</b>	<b>2,473</b>	-	<b>12,125,648</b>	<b>11,181,604</b>
<b>Net post-employment benefits liability (asset)</b>	<b>340,258</b>	<b>(746,058)</b>	<b>5,038,660</b>	<b>4,170,047</b>	<b>5,378,918</b>	<b>3,423,989</b>

(1) There is no service cost for pension and pension plans because the beneficiaries were all retired by July 31, 2010.

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The following table shows the movement in results and other comprehensive income as of December 31, 2016 and 2015:

	2016	2015
<b>Recognized in profit or loss</b>		
Current service cost	53,771	53,095
Past service cost	164,271	-
Interest expense, net	263,216	386,137
	<b>481,258</b>	<b>439,232</b>
<b>Recognized in other comprehensive income</b>		
Healthcare	(792,093)	1,359,631
Pension and pension bonds	(1,533,256)	967,693
Education and severance	175,259	130,684
Termination benefits	67	-
Change in the effect of the asset ceiling	379,884	(329,824)
	<b>(1,770,139)</b>	<b>2,128,184</b>
Deferred tax	616,697	(723,582)
<b>Other comprehensive income, net of taxes</b>	<b>(1,153,442)</b>	<b>1,404,602</b>

## 22.2 Plan assets

Plan assets are represented in the resources provided to Pension Trusts, for payment of the pension liabilities relating to the obligations for monthly pension payments and bonds; that pertaining to health and education is under the responsibility of Ecopetrol. The destination of trust resources and its yields cannot be changed or returned to the Company until all pension obligations have been fulfilled.

The composition by investment type is comprised as follows at December 31, 2016 and 2015:

	2016	2015
Bonds issued by the Colombian Government	4,410,326	4,099,067
Bonds of private entities	2,880,958	3,405,440
Other bonds of public entities	693,061	790,601
Bonds of foreign entities	622,817	300,181
Variable yield	305,052	278,716
Other local currency	2,910,083	2,257,655
Other foreign currency	300,878	429,828
Fair value of plan assets	<b>12,123,175</b>	<b>11,561,488</b>
Less asset ceiling	-	(379,884)
	<b>12,123,175</b>	<b>11,181,604</b>

The yield on plan assets as of December 31, 2016 was 11.60% (4.96% - 2015). The credit quality of issuers and counterparties in transactions involving plan assets is described in Note 31.3 – Credit risk.

The following is the fair value hierarchy of the plan assets as of December 31, 2016 and 2015:

	2016	2015
Level 1	5,604,643	3,876,386
Level 2	6,518,532	7,685,102
	<b>12,123,175</b>	<b>11,561,488</b>

The fair value of the plan assets is calculated using prices quoted in the relevant assets' market. The Company obtains these prices through reliable financial data suppliers recognized in Colombia or abroad depending on the investment.

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For the securities issued in local currency the fair value of the plan assets is calculated using information published by Infovalmer, a supplier of prices authorized by the Superintendency of Finance. According to its methodology prices may be calculated based on market information at the valuation date or estimated based on historic inputs in accordance with the criteria established for the calculation of each of the prices.

The fair value is calculated based on the most representative market of the transactions carried out through electronic platforms approved and supervised by the regulator.

The estimated price is calculated for investments that do not reflect sufficient information to estimate an average market price replicating quoted prices for similar assets or prices obtained through stock broker quotes. 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.

### 22.3 Actuarial assumptions

The following are the actuarial assumptions used in determining the present value of defined employee benefit obligations at December 31, 2016 and 2015:

2016	Pension	Bonds	Healthcare	Education	Other benefits (1)
Discount rate	7.25%	7.00%	7.25%	6.50%	6.67%
Salary growth rate	N/A	N/A	N/A	N/A	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	3.00%	4.00%	N/A
Long-term rate	N/A	N/A	4.00%	4.00%	N/A

2015	Pension	Bonds	Healthcare	Education	Other benefits (1)
Discount rate	8.50%	8.50%	8.50%	7.75%	8.00%
Salary growth rate	4.25%	N/A	N/A	N/A	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	3.50%	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 rates.

The cost trend is the projected increase for the initial year which includes the expected inflation rate.

The mortality table used for all calculations was 'Valid Annuitants' for men and women based on the experience gained for the period 2005-2008 of the Colombian Social Security Institute – ISS.

#### 22.4 Maturity of benefit obligation

The cash flow required for post-employment benefits liability is comprised as follows:

Period	Pension and pension bonds	Other benefits	Total
2017	794,566	330,539	1,125,105
2018	820,364	328,351	1,148,715
2019	842,858	330,878	1,173,736
2020	864,392	333,292	1,197,684
2021	886,464	336,423	1,222,887
2022-2025	4,877,784	1,672,066	6,549,850

#### 22.5 Sensitivity analysis

The sensitivity analysis below has been determined based on reasonably possible changes of the respective assumptions occurring at the end of the reporting period, while keeping all other assumptions as constant, at December 31, 2016:

	Pension	Pension bonds	Healthcare	Education	Other benefits
Discount rate					
-50 basis points	12,278,122	894,404	4,785,817	345,279	235,987
+50 basis points	10,996,917	815,680	4,197,636	329,870	224,749
Inflation rate					
-50 basis points	10,946,122	814,065	-	-	161,456
+50 basis points	12,330,307	895,826	-	-	167,152
Salary growth rate					
-50 basis points	-	-	-	-	62,511
+50 basis points	-	-	-	-	69,633
Cost trend					
-50 basis points	-	-	4,198,775	330,360	-
+50 basis points	-	-	4,782,280	344,700	-

The Company conducted a sensitivity analysis related to the interest rate variation on plan assets. See section 30 – Risk management.

#### 22.6 Voluntary retirement plan

In August 2016 the Company offered a voluntary retirement plan to 200 employees who met certain criteria. As of December 31, 2016 137 employees were part of plan, with a corresponding cost of 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.

### 23. Accrued liabilities and provisions

The following shows a breakdown of the changes in the different categories of accrued liabilities and provisions for the years ended December 31, 2016 and 2015:

	<u>Asset retirement obligation</u>	<u>Litigations</u>	<u>Comuneros provision</u>	<u>Environmental contingencies and others</u>	<u>Total</u>
<b>Balance at 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 (recoveries)	18,285	44,120	(702,486)	(74,312)	(714,393)
Uses	(68,460)	(4,585)	-	(31,218)	(104,263)
Financial cost	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 at 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>Total</b>	<b>5,064,660</b>	<b>209,932</b>	<b>-</b>	<b>643,278</b>	<b>5,917,870</b>

	<u>Asset retirement obligation</u>	<u>Litigations</u>	<u>Comuneros provision</u>	<u>Environmental contingencies and others</u>	<u>Total</u>
<b>Balance at December 31, 2014</b>	<b>4,281,107</b>	<b>299,551</b>	<b>551,497</b>	<b>705,916</b>	<b>5,838,071</b>
Additions (recoveries)	(60,813)	(188,962)	150,989	188,701	89,915
Uses	(84,333)	(10,791)	-	(74,876)	(170,000)
Financial cost	238,876	-	-	2,417	241,293
Foreign currency translation	89,793	-	-	5,905	95,698
Transfers (1)	(12,261)	-	-	(5,369)	(17,630)
<b>Balance at 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>
Current	195,858	85,364	-	372,275	653,497
Non-current	4,256,511	14,434	702,486	450,419	5,423,850
<b>Total</b>	<b>4,452,369</b>	<b>99,798</b>	<b>702,486</b>	<b>822,694</b>	<b>6,077,347</b>

(1) Mainly includes transfers to liabilities associated with assets held for sale.

#### 23.1 Asset retirement obligation

Asset retirement obligation corresponds to the Company's future obligation to restore environmental conditions in a manner similar to those existing prior to the start of projects or activities as described in section 3.5. As long-term obligations this liability is estimated by projecting the expected future payments and discounting at present value with a rate referenced to the Company's financial obligations, taking into account the temporality and risks of this obligation. The weighted average discount rate at December 31, 2016 was 7.80% (2015 - 7.28%).

### 23.2 Litigations

The following is a summary of the main legal proceedings recognized in the statement of financial position, whose loss expectations are highly probable and could imply an outflow of resources at December 31, 2016 and 2015:

Claims	2016	2015
Provision for payment of premium to update the Legal Stability Contract with the Ministry of Finance and Public Credit, generated by the increased investment in the expansion project.	59,528	54,181
Settlement before the Procuraduría General de la Nación with the firms Acciona Infraestructura S.A. y Mantenimiento y Montajes S.A., on August 18, 2016.	44,986	-
Litigation with Schrader Camargo, supplier for Reficar	17,003	17,003
Damage to third parties caused by hydrocarbon easement in a property near to <i>Refinería de Cartagena</i> .	11,019	11,019
Lawsuit by the Sincco consortium for damage related to contractual conditions for the modernization project at the product filling station at the Barrancabermeja industrial complex.	5,347	5,347
Damage to third parties caused by a spill of oil owned by Ecopetrol during a car accident in the Raizal rural district in Cundinamarca.	3,500	3,500
Labor proceeding in 2007 for recalculation of salaries and benefits based on the collective agreement for 232 contractors of Ecopetrol. In the last quarter of 2015 the claimant filed a request for settlement for a new amount of COP\$9,338. In 2016 the ruling issued was favorable to Ecopetrol.	10	9,338

### 23.3 Comuneros - Santiago de las Atalayas provisions

On November 8, 2016, the Ministry of Mines and Energy concluded that the amounts being held were not royalties and therefore not due to the Comuneros. The amounts belonged to Ecopetrol and therefore Ecopetrol recovered the provision it had been recognizing in its financial statements relating to this dispute.

In accordance with the foregoing, the resources held by Ecopetrol are their property without any claim or discussion to date regarding ownership title thereof. On November 8, 2016, the amount of the controversy added up to COP\$688,664 originated mostly from the valuation and financial yields of the fund where the resources were deposited. The reversal of this provision was recognized in the net financial results of the period ending December 31, 2016.

### 23.4 Environmental contingencies and others

These are mainly contingencies for environmental incidents and environmental compensation obligations for the use and impact on natural resources within the framework of environmental authorizations and 1% mandatory investment for the use of water taken directly from natural sources pursuant to that provided for in Law 99 of 1993, article 43 and Decree 1900 of 2006 in relation with Ecopetrol projects in the region. On December 22, 2016, the Ministry of the Environment and Sustainable Development issued Decree 2099, whereby it amended the Regulatory Single Decree of the environment and sustainable development sector, Decree 1076 of 2015 related to their mandatory investment for the use of water taken directly from natural sources; the Company is currently analyzing the impact derived from its implementation.



### 23.5 Legal proceedings not recognized

The following is a summary of the main contingent liabilities that have not been recognized in the statement of financial position since according to evaluations performed by Company's internal and external advisors their occurrence is not probable at December 31, 2016 and 2015:

<u>Claims</u>	<u>2016</u>	<u>2015</u>
Income tax for taxable year 2010 of Hocol - Rejections related to:		
a) Special production on productive fixed assets related to unsuccessful exploratory wells.		
b) Deduction of disbursements related to geology, geophysics and seismic, which must be capitalized and amortized.	197,824	197,824
Income tax for taxable year 2011 of Hocol - Rejections related to:		
a) Special production on real productive fixed assets related to unsuccessful exploratory wells.		
b) Deduction of disbursements related to geology, geophysics and seismic, which must be capitalized and amortized.	147,091	147,091
On March 14, 2016, a lawsuit was filed for default in settling the contract between Konidol and Ecopetrol, which gave rise to excess costs in the maintenance contract.	62,131	-
Indemnity to third parties for damage caused by hydrocarbon spills during a tanker truck accident on the Villeta - Guaduas road.	43,333	43,333
Recalculation of legal and extralegal social benefits on cash paid for the benefit of saving incentives.	16,562	16,562
Claim to Ecopetrol for legal actions filed against Cepsa as the operator of the Association contract for excess costs in current contracts.	10,608	-
Default by Ecopetrol in fulfilling contractual terms of the civil works project with the contractor Edgar Gómez Lucena y Asociados Ltda.	10,000	10,000
Transfers of the electric energy sector for electric power self-generation, pursuant to Law 142 of 1994. In 2016 there was a second instance ruling that was favorable to Ecopetrol.	-	219,944

### 23.6 Detail of contingent assets

Included below, there is a detail of the major assets contingencies of which occurrence is possible at December 31, 2016 and 2015:

<u>Claims</u>	<u>2016</u>	<u>2015</u>
Default in fulfilling the pipe purchase order subscribe to with Daewoo International Corp.	21,232	21,232
Public lighting tax in the municipality of Barrancabermeja for the years 2003 to 2005.	17,490	-
Nullity of administrative act issued by the DIAN, which ordered a special contribution for public works contracts.	13,214	13,214
Nullity of resolution 113 of 1971 of the Presidency of Colombia, whereby the subsurface property titles were transferred to private parties known with the names of Santiago de las Atalayas and Pueblo Viejo de Cusiana. In 2016, the lawsuit ended in favor of Ecopetrol, making it clear that the sequestered cash is the property of Ecopetrol.	-	175,000
Nullity of administrative act that ordered a special contribution for public works contracts. In 2016, there was a first instance ruling that is partially favorable to the claims of Ecopetrol.	2	14,956

#### Refinería de Cartagena

On March 8, 2016 Reficar presented a request for Arbitration before the International Chamber of Commerce (ICC) against Chicago Bridge & Iron Company NV, CB&I (UK) Limited and CBI Colombiana S.A. (collectively, "CB&I") related to the contract for the construction, procurement and engineering entered into by Reficar and CB&I for the expansion of *Refinería de Cartagena* in Cartagena, Colombia. Reficar is the claimant in the arbitration process of the ICC and requests at least US\$2 billion from CB&I. On May 25, 2016 CB&I filed a counterclaim of approximately US\$213 million. On June 27, 2016, Reficar answered this request denying any responsibility. The International Chamber of Commerce process is currently in its preliminary stage and a hearing is scheduled for October 2018.

## 24. Equity

The main components of equity are comprised as follows:

### 24.1 Subscribed and paid-in capital

Ecopetrol's authorized capital amounts to \$36,540,000, and is comprised of 60,000,000,000 ordinary shares, 41,116,694,690 of such shares have been subscribed represented by 11.51% (4,731,905,873 shares) of natural and non-government entities and 88.49% (36,384,788,817 shares) held by Government entities. The value of the reserve shares amounts to \$11,499,933 comprised by 18,883,305,310 shares. At December 31, 2016 and 2015, subscribed and paid-in capital amounts to \$25,040,067. There are no potentially dilutive instruments.

On March 26, 2015, the General Stockholders' Meeting approved the capitalization of occasional reserves of Ecopetrol S.A. for COP\$14,760,893 through the mechanism of increasing the face value. This capitalization of reserves did not modify materially the number of ordinary shares registered.

### 24.2 Additional paid-in capital

It mainly corresponds to: (i) surplus with respect to its nominal value derived from the sale of shares upon capitalization in 2007, for \$4,457,997, (ii) \$31,377 the value generated by the process of placing the 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) to the surplus over nominal value arising from the sale of shares awarded in the second round, which took place in September 2011, in the amount of \$2,118,468, and (iv) Additional paid-in capital receivable for \$(143).

### 24.3 Equity reserves

The balance of equity reserves is comprised as follows at December 31, 2016 and 2015:

	<u>2016</u>	<u>2015</u>
Legal reserve	1,269,680	5,139,587
Fiscal and statutory reserves	289,164	405,660
Occasional reserves	-	1,323
<b>Total</b>	<b><u>1,558,844</u></b>	<b><u>5,546,570</u></b>

The following shows the balance and a breakdown of the changes in equity reserves at December 31, 2016 and 2015:

	<u>2016</u>	<u>2015</u>
<b>Opening balance</b>	<b>5,546,570</b>	<b>17,963,370</b>
Appropriation of reserves, net	(117,819)	2,344,095
Legal reserve used to offset previous year loss (Note 24.4)	(3,869,907)	-
Capitalization of occasional reserves	-	(14,760,895)
<b>Closing balance</b>	<b><u>1,558,844</u></b>	<b><u>5,546,570</u></b>

#### Legal reserve

The Colombian Code of Commerce establishes the appropriation obligation of 10% of net income to the legal reserves until the legal reserves are equal to 50% of the subscribed capital. The legal reserve can be used to offset losses or for distribution in the event of a Company's liquidation.

Occasional reserves

This corresponds to the appropriation of earnings ordered by the Stockholders' meeting to carry out new explorations and future investments, as well as unrealized profits between group companies. On March 26, 2015, the Stockholders' Meeting approved, after the appropriation of the occasional reserves of the 2014 period, the capitalization of occasional reserves for \$14,760,895 through the mechanism of face value increase.

Tax and mandatory reserves

The Colombian tax regime contemplates the appropriation of the period's profits equivalent to 70% when the value of the depreciation deduction for tax purposes exceeds the accounting depreciation. This reserve may be released to the extent that the depreciations subsequently accounted exceed those annually claimed for tax purposes or the assets that generated the higher value deducted are sold.

In addition, Decree 2336 of 1995 set out the obligation to establish a reserve for valuation of investments. The profits generated at the closing of the accounting period as a consequence of the application of special valuation systems at market prices and that have not been made on behalf of the Company, will be taken to a reserve.

**24.4 Retained earnings and payment of dividends**

The following shows the balance and a breakdown of the changes in retained earnings at December 31, 2016 and 2015:

	<b>2016</b>	<b>2015</b>
Opening balance	(6,814,432)	8,192,040
Profit (loss) attributable to owners of Ecopetrol's shareholders	2,447,881	(7,193,859)
Appropriation of reserves	117,819	(2,344,095)
Legal reserve used to offset previous year loss (1)	3,869,907	
Dividends declared (1)	-	(5,468,521)
Other movements	(23,637)	3
Closing balance	<b>(402,462)</b>	<b>(6,814,432)</b>

(1) The Company distributes dividends based on its separate financial statements prepared under Colombian IFRS.

The Ordinary General Meeting of Shareholders held on March 31, 2016, approved the proposal for profit distribution, which established that there would be no distribution for the year 2015, given the net loss occurred in that year; in addition, the shareholders voted to use the legal reserve to offset this loss, as permitted by the Article 456 of the Colombian Code of Commerce. The amount of losses offset with the legal reserve once releases and tax and mandatory appropriations amounted to \$ 3,869,907. Dividends paid in 2016 attributable to non-controlling shareholders of subsidiaries amounted to COP\$1,022,121.

On the results of 2014 the General Stockholders Meeting approved the distribution of an ordinary dividend per share of COP\$133. In June, 2015 the Company paid the minority stockholders COP\$629,344 and COP\$4,149,000 to majority stockholders. Dividends declared to the majority shareholder in 2015 payable at December 31, 2015 amounted to COP\$690,177 and were fully paid during the first quarter of 2016. Dividends paid in 2015 attributable to non-controlling shareholders of subsidiaries amounted to COP\$715,053.

**24.5 Other comprehensive income attributable to owners of the Company**

The following is a breakdown of other comprehensive income, net of tax at December 31, 2016 and 2015:

	<b>2016</b>	<b>2015</b>
Actuarial gain on defined benefit plans	994,953	2,148,395
Gain (loss) on equity instruments measured at fair value (1)	7,828	(49,881)
Cash flow hedges for future exports	244,131	(217,291)
Hedge of a net investment in a foreign operation	(155,359)	-
Cash flow hedge with derivative instruments	(19,042)	(43,590)
Others	11,817	58,643
Foreign currency translation	8,138,382	8,949,728
	<b><u>9,222,710</u></b>	<b><u>10,846,004</u></b>

(1) During 2016 the Company reclassified to the statement of profit or losses COP \$68,497 (2015 - COP \$19,405) arising from the realization of the valuations at market value of the accumulated amount in equity of assets available for sale - Empresa de Energía de Bogotá and Interconexión Eléctrica S.A. (Note 11).

**24.6 Earnings (loss) per share (basic and diluted)**

	<b>2016</b>	<b>2015</b>
Profit (loss) attributable to Ecopetrol's shareholders	2,447,881	(7,193,859)
Weighted average number of outstanding shares	41,116,694,690	41,116,694,690
<b>Net basic earnings (loss) per share (basic and diluted -Colombian pesos)</b>	<b><u>59.5</u></b>	<b><u>(175.0)</u></b>

There is no potential dilution of shares.

**25. Sales revenue**

The following is a breakdown of sales revenue for the years ended December 31, 2016, 2015 and 2014:

	2016	2015	2014
<b>National sales</b>			
Mid-distillates	8,553,503	10,215,224	11,983,455
Gasoline	6,092,739	6,128,208	6,394,422
Services	4,043,284	4,435,274	3,778,073
Natural gas	1,988,336	1,845,345	1,346,625
Plastic and rubber	724,708	724,392	667,563
L.P.G. and propane	405,869	335,494	426,450
Crude	553,666	491,279	1,213,718
Asphalts	340,400	461,188	459,072
Other products	994,645	988,346	1,001,321
	<b>23,697,150</b>	<b>25,624,750</b>	<b>27,270,699</b>
Recognition of price differential (1)	1,048,022	441,871	485,409
	<b>24,745,172</b>	<b>26,066,621</b>	<b>27,756,108</b>
<b>Foreign sales</b>			
Crude	17,278,579	21,181,265	30,835,510
Fuel oil	2,158,539	2,166,469	3,921,703
Trading of crude	-	1,309,196	1,486,060
Diesel	1,594,945	81,982	179,738
Plastic and rubber	1,171,342	1,096,730	975,282
Gasoline and turbo fuel	1,046,758	93,125	127,090
Cash flow hedge for future exports – Reclassification to profit or loss (Note 31.2.1)	33,074	7,646	-
Other products	457,152	344,237	690,397
	<b>23,740,389</b>	<b>26,280,650</b>	<b>38,215,780</b>
<b>Total sales revenue</b>	<b>48,485,561</b>	<b>52,347,271</b>	<b>65,971,888</b>

- (1) Corresponds to the application of Decree 1880 of September 2014 and Resolution 180522 of 2010, which defined the procedure for price differentials (value generated by the difference between the parity price and the regulated price, which can be positive or negative). See section 4.16 – Sales revenue recognition, for more details.

**Sales by geographic areas**

Operating sales revenue by geographic areas is comprised as follows for the years ended December 31, 2016, 2015 and 2014:

	2016	%	2015	%	2014	%
Colombia	24,745,172	51.0%	26,066,621	49.8%	27,756,108	42.1%
United States of America	11,956,967	24.7%	11,921,720	22.8%	14,977,109	22.7%
Asia	2,717,414	5.6%	6,123,593	11.7%	13,416,506	20.3%
Europe	2,945,951	6.1%	3,981,926	7.6%	5,915,190	9.0%
Central America and Caribbean	3,551,894	7.3%	3,366,978	6.4%	3,049,688	4.6%
South America and others	2,568,163	5.3%	886,433	1.7%	857,287	1.3%
<b>Total</b>	<b>48,485,561</b>	<b>100%</b>	<b>52,347,271</b>	<b>100%</b>	<b>65,971,888</b>	<b>100%</b>

**Concentration of customers**

During 2016 Organización Terpel accounted for 14.4% of total sales in the period (2015 - 14.4% and 2014 - 13.7%). No other customer has more than 10% of total consolidated sales. There was no exposure that affects the financial position of Ecopetrol if the Company lost the client. The commercial relationship with this customer is the sale of refined products and transportation service. Sales to this customer are recognized by the Refining and Petrochemical and transportation and logistics Segments. Organización Terpel, is leader thanks to its network of petrol stations and industrial sales strategy and in the aviation segment.

**26. Cost of sales (before impairment of non-current assets)**

The following is the detail of cost of sales per function for the years ended December 31, 2016, 2015 and 2014:

	<b>2016</b>	<b>2015</b>	<b>2014</b>
<b>Variable costs</b>			
Imported products (1)	12,049,477	12,935,878	13,264,700
Depreciation, depletion and amortization	5,333,245	5,166,455	5,114,053
Hydrocarbon purchases - ANH (2)	3,178,199	3,741,010	6,630,309
Purchases of crude in association and concession	1,517,829	1,928,938	3,293,594
Hydrocarbons transportation services	783,307	1,380,733	1,548,115
Processing materials	608,535	366,454	349,953
Electric power	618,675	424,920	408,248
Gas royalties in cash	478,332	481,029	399,752
Purchases of other products and gas	519,884	703,163	1,021,327
Services contracted in associations	305,326	563,032	612,013
Others (3)	(432,694)	(322,547)	98,904
	<b>24,960,115</b>	<b>27,369,065</b>	<b>32,740,968</b>
<b>Fixed costs</b>			
Depreciation and amortization	2,050,739	1,433,263	1,144,437
Maintenance	1,998,128	2,334,130	2,646,832
Labor cost	1,571,511	1,542,701	1,369,654
Services contracted in associations	1,260,470	1,415,422	1,674,322
Services contracted	1,083,176	1,301,094	1,578,918
Taxes and contributions	391,032	461,624	607,494
General costs	383,842	461,994	441,718
Materials and operating supplies	333,258	435,238	500,934
Hydrocarbons transportation services	157,463	147,733	74,976
Non-capitalized project costs	61,689	92,252	194,875
	<b>9,291,308</b>	<b>9,625,451</b>	<b>10,234,160</b>
	<b>34,251,423</b>	<b>36,994,516</b>	<b>42,975,128</b>

(1) Purchases of diesel and diluent agents to facilitate the transportation of heavy crude oil.

(2) Corresponds mainly to purchases of crude royalties that Ecopetrol makes from the National Hydrocarbons Agency (*Agencia Nacional de Hidrocarburos* or ANH by its acronym in Spanish) derived from national production by both the Company in direct operation and third parties.

(3) Corresponds to the allocation of inventories because the concepts of cost of sales are presented at 100%.

**27. Administration, operation and project expenses**

The following is the detail of administration, operation and project expenses, according to their function for the years ended December 31, 2016, 2015 and 2014:

	2016	2015	2014
<b>Administration expenses</b>			
Taxes (1)	663,889	730,841	102,028
Labor expenses	657,051	491,748	463,836
General expenses and other	556,563	393,971	410,288
Depreciation and amortization	45,765	84,425	54,883
	<b>1,923,268</b>	<b>1,700,985</b>	<b>1,031,035</b>
<b>Operation and project expenses</b>			
Exploration expenses	728,590	1,584,249	2,576,294
Commissions, fees, freights and services	568,513	878,259	1,244,045
Corporate projects	301,854	456,159	269,495
Taxes	286,331	348,871	449,824
Labor expenses	278,383	309,021	266,362
Depreciation and amortization	177,252	86,215	103,834
Maintenance	147,197	181,630	241,313
Fee for regulatory entities	87,325	77,909	108,263
Various	176,242	111,955	260,895
	<b>2,751,687</b>	<b>4,034,268</b>	<b>5,520,325</b>

(1) It mainly includes the recognition of wealth tax. See Note 10 taxes.

**28. Impairment of non-current assets**

The detail of non-current assets impairment charges for the years ended December 31, 2016, 2015 and 2014 is as follows:

	2016	2015	2014
Property, plant and equipment and Intangibles (Note 17)	561,738	4,144,754	1,495,113
Natural and environmental resources (Note 17)	239,151	2,865,077	694,720
Investments in associates and joint ventures (Note 14.2)	127,858	588,144	114,734
Goodwill (Note 19)	-	266,900	-
	<b>928,747</b>	<b>7,864,875</b>	<b>2,304,567</b>



**29. Other operating income and (expenses), net**

The following is the detail of other operating income and (expenses) for the years ended December 31, 2016, 2015 and 2014:

	2016	2015	2014
Deferred income BOMT's (1)	211,768	193,197	140,372
Recovery of provisions for litigation	112,999	205,879	203,688
Compensation received	17,790	29,848	24,648
Profit (loss) on sale of materials and property, plant and equipment	(82,200)	6,744	(111,378)
Current assets impairment expense (2)	(98,739)	(2,858)	(24,784)
Gas pipeline availability under BOMT's contracts (1)	(125,077)	(124,957)	(102,916)
Other income (expenses), net	237,571	70,685	178,564
	<b>274,112</b>	<b>378,538</b>	<b>308,194</b>

(1) BOMT: Build, Operate, Maintain and Transfer contracts arising from the sale of Ecogas.

(2) Includes mainly an allowance for doubtful accounts and provisions for inventories.

**30. Financial result, net**

The following is the detail of financial results net for the years ended December 31, 2016, 2015 and 2014:

	2016	2015	2014
<b>Financial income</b>			
Resources from Santiago de las Atalayas (1)	688,664	-	-
Yield and interest	386,001	293,507	286,527
Valuation of financial assets	136,715	164,614	57,807
Gain on sale of available-for-sale assets	47,129	72,339	-
Gain on valuation of derivatives	42,865	-	2,282
Dividends	10,369	91,464	53,202
	<b>1,311,743</b>	<b>621,924</b>	<b>399,818</b>
<b>Financial expenses</b>			
Interest (2)	(2,765,024)	(1,768,618)	(754,276)
Financial cost of other liabilities (3)	(580,491)	(627,827)	(651,055)
Other financial expenses	(67,786)	(45,614)	(36,410)
Expense from financial assets	(48,997)	(167,869)	(57,640)
Loss on valuation of derivatives	(1,242)	(108,486)	(140,913)
	<b>(3,463,540)</b>	<b>(2,718,414)</b>	<b>(1,640,294)</b>
<b>Foreign exchange gain (loss), net (4)</b>	<b>976,430</b>	<b>(5,566,614)</b>	<b>(2,270,193)</b>
<b>Financial result, net</b>	<b>(1,175,367)</b>	<b>(7,663,104)</b>	<b>(3,510,669)</b>

(1) Corresponds to the reversal of a provision relating to a litigation Santiago de las Atalayas which mostly from the valuation and financial yields generated in the time of permanence of the cash that was subject to the caution (see Note 23.3 for more information).

(2) Interest was capitalized during the period to natural resources and property, plant and equipment for COP\$341,209 (2015 – COP\$744,426 and 2014 – COP\$640,698)

(3) Includes financial cost of asset retirement obligation and post-employment benefits liabilities.

(4) Foreign exchange gain was COP\$17,359,601 in 2016 (2015 - COP\$21,813,720 and 2014 – COP\$27,380,334) and foreign exchange loss was COP\$16,383,171 in 2016 (2015 – COP\$7,360,782 and 2014 – COP\$9,630,975).

### 31. **Risk management**

#### 31.1 **Commodity price risk**

Ecopetrol's business depends substantially on international prices for crude oil and refined products. The prices for these products are volatile and drastic changes could adversely affect the Company 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 Company'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 market over the counter (OTC) to cover itself from the risk of price fluctuations of crude oil and refined products associated to physical transactions. The Company has established appropriate processes to handle risk that include constant monitoring of physical and financial market 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 during the years 2016 and 2015 has not been material and were executed as hedging instruments to mitigate risk at different price indices to the benchmark of the Company's international trade strategy on exports of crude and imports of products.

As of December 31, 2016 and 2015 price hedges were fully settled with an impact on the result of COP\$3,181 and COP\$4,141, respectively.

#### 31.2 **Exchange rate risk**

The group mainly operates in Colombia and makes sales in the local and international markets. For this reason, it is exposed to the exchange rate risk that arises from various foreign currency exposures due to commercial transactions and assets and liabilities held in foreign currency. The impact of fluctuations in exchange rates, especially the Pesos/US\$rate, on operations has been material.

The US\$/pesos exchange rate has fluctuated over the last few years. The peso depreciated by an average of 11.2% and 37.3% in 2016 and 2015, respectively; on the other hand, the closing exchange rates were COP\$3,000.71, COP\$3,149.47 and COP\$2,392.46 as of December 31, 2016, 2015 and 2014, respectively.

When the Colombian peso appreciates in comparison with the U.S. dollar export sales revenue decrease when translated into COP. However, imported goods, the oil services and interest on external debt denominated in U.S. dollars, become less expensive. Conversely, when the Colombian peso depreciates in comparison with the U.S. dollar sales revenues from exports, when translated into COP, increase, and imports and external debt service become more expensive.

The following table sets out the carrying values for financial assets and liabilities denominated in foreign currencies at December 31, 2016 and 2015:

<b>US\$ Million</b>	<b>2016</b>	<b>2015</b>
Cash and cash equivalents	1,916	970
Other financial assets	1,367	381
Trade receivables and payables, net	(282)	(546)
Loans and borrowings	(15,172)	(14,634)
<b>Net liability position</b>	<b>(12,171)</b>	<b>(13,829)</b>

Of the total net liability position US\$2,878 million relates to financial assets and liabilities for companies that have the Colombian peso as their functional currency whose value has affected results for the financial year. Likewise, US\$(15,049) million of the net position relates to monetary assets and liabilities for group companies that have the dollar as their functional currency and non-derivate hedging instruments from Ecopetrol whose value is recognized in other comprehensive income.

The Company'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.

### 31.2.1 Cash flow hedge for future exports

Ecopetrol is exposed to foreign exchange risk given that a high percentage of its crude export sales revenues are denominated in U.S. dollars. In recent years, the Company has acquired long-term debt for investment activities in the same currency that projects receiving 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 to Ecopetrol's functional currency (Colombian pesos) are naturally hedged with the foreign exchange valuation risks of the long-term debt in U.S. dollars, aligned with the company's risk management strategy.

With the objective of presenting in the financial statements the effect of the mentioned 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 US\$5,440 million of Ecopetrol's debt as hedge instrument of its future export sales for the period 2015- 2023, in accordance with IAS 39 – Financial instruments: recognition and measurement.

Hedge accounting records the impact of foreign exchange gains/losses on the hedging instrument on statement of profit or loss effectively at the time of realization of the hedged risk. For this to happen, every month when the foreign currency debt is translated to Colombian pesos at the closing exchange rate, the effects on foreign exchange differences are recognized as part of the other comprehensive income. Once the hedged operation occurs and sales revenue is recognized, the cumulative exchange differences held within in other comprehensive income is reclassified to profit or loss statement, impacting operating income and EBITDA.

The following shows the movement of this non-derivative hedging instrument at December 31, 2016 and 2015:

(US\$ Million)	2016	2015
<b>Hedging instrument at the beginning of the period</b>	<b>5,376</b>	<b>5,376</b>
Reassignment of hedging instruments	870	277
Realized exports	(870)	(277)
Capital payments	(64)	-
<b>Hedging instrument at the end of the period</b>	<b>5,312</b>	<b>5,376</b>

The following is the movement in the other comprehensive income as of December 31:

	2016	2015
<b>Opening balance</b>	<b>217,291</b>	-
Exchange difference on hedging instruments	(724,395)	352,482
Reclassification to profit or loss	(33,074)	(7,646)
Deferred income tax	296,047	(127,545)
<b>Closing balance</b>	<b>(244,131)</b>	<b>217,291</b>

The expected reclassification of exchange differences accumulated in other comprehensive income to profit or loss, setting the exchange rate at COP\$3000.71 is as follows:

Year	Peso equivalents	Income tax	Net
2017	102,454	(41,838)	60,616
2018	117,447	(47,960)	69,487
2019	102,307	(41,778)	60,529
2020	33,981	(13,876)	20,105
2021	16,847	(6,880)	9,967
2022	16,847	(6,880)	9,967
2023	22,750	(9,290)	13,460
	<b>412,633</b>	<b>(168,502)</b>	<b>244,131</b>

### 31.2.2 Hedge of a net investment in a foreign operation

The Board of Directors approved the application of hedge accounting of net investment from June 8, 2016. The measure seeks to reduce the volatility of non-operating income due to the exchange difference. The hedge of a net investment applies to a portion of the investments the Company has in foreign currency, in this case in subsidiaries with the US dollars as their functional currency, using as hedging instrument a portion of the Company's debt denominated in US dollars.

Ecopetrol designated as hedged items net investments in Ocesa, Ecopetrol America Inc., Hocol Petroleum Ltd. (HPL) and Reficar; and as a hedging instrument a portion of its debt denominated in US dollars in a total amount equivalent to US \$5,200 million.

From the implementation to the date of this report this hedge has been effective.

Gain on exchange difference of these debts net of taxes recognized in the other comprehensive income at December 31, 2016, was COP\$155,359.

### 31.2.3 Hedges with derivatives to minimize currency risk

The Company carries out forwards hedging operations using the Non-Delivery modality whose purpose is mitigating the volatility of the exchange rate in the cash flow required for operations of its subsidiary Ocesa, whose functional currency is US dollars. The forward hedging instruments used enable setting the sale price in US dollars, seeking to counteract the effects from devaluation or revaluation at the time in which Ocesa monetizes the resources necessary to fulfill its monthly or specific obligations relative to operational cost and tax payments, which are payable in Colombian pesos.

As of December 31, 2016 there are forwards contracts with a net short position of US \$323 million (2015 - US \$387). The impact on the income statement resulting from the liquidation of these hedges amounting to COP\$42,865 of profit (2015- COP\$86,914 of loss) and the amount recognized on the other comprehensive income was COP\$33,869 of profit (2015 – COP\$60,083 of loss).

### 31.2.4 Sensitivity analysis for exchange rate risk

The following table shows the impact that a variation of 1% and 5% in the exchange rate of the Colombian peso vs the US dollar would have on the assets and liabilities held in such currency at December 31, 2016:

Scenario/ Variation in the exchange rate	Effect on income before taxes (+/-)	Effect on other comprehensive income (+/-)
1%	86,363	451,577
5%	431,813	2,257,884

The sensitivity analysis includes only monetary assets and monetary liabilities held in foreign currency at the closing date.

### 31.3 Credit risk

Credit risk is the risk that the Company may suffer losses as a consequence of the breach of contracts for purchase and sale of crude oil, gas, refined and petrochemical products and transportation services, in addition to the financial institutions in which it keeps investments or the counterparties with which it has contracted derivative financial instruments.

#### Credit risk for customers

In performance of the sale process of crude oil, gas, refined and petrochemical products and transportation services the Company may be exposed to credit risk in the event that customers fail to comply with their payment obligations. Risk management has designed mechanisms and procedures that have permitted the Company to minimize the probability of materialization thus safeguarding the Company's cash flow.

The Company performs a continuous analysis of the financial strength of its counterparties which implies their classification according to their risk level and financial supports in the event of a cessation of payments. In addition, a constant monitoring is made of the national and international market conditions in order to establish early alerts of major changes that may have an impact on the timely payment of obligations from customers of the Company.

For the bad debts, an individual analysis is performed that allow to analyze the situation of each customer and thus define the applicable allowance to be established, such as age of receivables. The group carries out the administrative and legal actions necessary to recover past due accounts receivable as well as the recognition of interest of customers who do not comply with payment policies.

The business group does not have significant concentrations of credit risk. The following is the analysis of aging of customer portfolio in arrears but not impaired, at December 31, 2016 and 2015:

	2016	2015
Less than 3-month overdue	179,008	71,791
Between 3- and 6- month overdue	14,275	4,862
More than 6-month overdue	103,574	116,849
<b>Total</b>	<b>296,857</b>	<b>193,502</b>

**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 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 peso portfolio, it must invest cash excess 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 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 1 year), or 1% in the long term. The Company complied with this policy as of December 31, 2016 and 2015.

The tables below reflect the credit quality of issuers and counterparties in transactions involving financial instruments at December 31, 2016 and 2015:

Credit quality	Cash and cash equivalents		Other financial assets		Plan assets	
	2016	2015	2016	2015	2016	2015
AAA	3,198,394	581,303	1,858,665	1,130,216	9,077,893	7,597,462
F1+	2,188,471	3,696,327	1,636,039	217,493	416,439	43,351
A1	1,466,015	-	3,060,660	-	-	-
F1	545,872	1,247,398	-	48,919	-	-
F2	409,717	421,084	-	-	-	-
BRC 1+	312,290	120,217	-	-	309,282	221,257
Prime-2	78,989	-	-	-	-	-
A1+	73,470	294,931	-	-	-	-
F3	37,172	-	-	-	-	-
Prime-3	32,748	31,862	-	-	-	-
B	144	-	-	-	-	-
AA+	-	-	50,192	-	470,944	661,604
AA	-	-	5,289	-	79,750	68,481
AA-	-	-	3,730	-	34,197	55,077
A	-	-	-	-	4,175	4,682
BBB+	-	-	-	-	193,835	196,815
BBB	-	-	-	125,936	150,808	388,586
BBB-	-	-	-	-	23,237	1,569,850
BB+	-	-	-	-	-	28,999
BB	-	-	-	-	-	22,572
CCC	-	-	-	-	489	1,035
A-	-	-	-	-	9,111	-
A+	-	-	-	-	8,841	-
A3	-	-	-	-	61,325	-
AA3	-	-	-	-	14,385	-
BA2	-	-	-	-	3,006	-
BA3	-	-	-	-	12,802	-
BAA1	-	-	-	-	5,274	-
BAA2	-	-	-	-	141,940	-
BAA3	-	-	-	-	131,993	-
BB-	-	-	-	-	11,001	-
BRC1	-	-	-	-	7,710	-
BRC2+	-	-	-	-	5,763	-
CC	-	-	-	-	734	-
SP1+	-	-	-	-	7,013	-
VRR1+	-	-	-	-	55,821	-
Unrated	67,185	157,328	72,320	62,815	885,407	701,717
<b>Total</b>	<b>8,410,467</b>	<b>6,550,450</b>	<b>6,686,895</b>	<b>1,585,379</b>	<b>12,123,175</b>	<b>11,561,488</b>

### 31.4 Interest rate risk

Interest rate risk arises from Ecopetrol's exposure to changes in interest rates because the group has fixed floating-rate instruments in Ecopetrol's investment portfolio and issuances of floating rate debt linked to LIBOR, DTF and IPC rates. Thus, interest rate volatility may affect the fair value and cash flows related to the Company's investments and the financial expense of floating rate loans and financing.

As of December 31, 2016 and 2015 31% of indebtedness has a floating rate. As a result, if the market interest rate rises financing costs 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 its effective 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.

The following table provides information about the sensitivity of Company's results and other comprehensive income for the next 12 months to variations in interest rate of 100 basis points:

Variation in interest rate	Financial liabilities (Financial expenses)	Financial assets (Financial income)	Plan assets (Other comprehensive income)
+ 100 basis points	321,000	40,670	376,255
- 100 basis points	(245,568)	(40,670)	(383,158)

Sensitivity analysis of discount rates on pension plans is shown in the Note 22 – Provisions for employee benefits.

### 31.5 Liquidity risk

The ability to access the capital necessary to finance the Company's investment plans on acceptable terms, can be limited due to deterioration in market conditions. A new financial crisis could worsen the risk perception in the emerging markets.

Risks related to Colombia's political and regional environment could also make it more difficult to access the international capital markets. These conditions, along with significant write-offs in the financial services sector and the re-pricing of credit risk, can make it difficult to obtain funding for capital needs on favorable terms. As a result, we may be forced to revise the timing and scope of these projects as necessary to adapt to existing market and economic conditions, or access the financial markets on terms less favorable; therefore, negatively affecting the Company's results of operations and financial condition.

Liquidity risk is managed in accordance with the Company's policies aimed at ensuring that there are sufficient net funds to meet the Company'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.

The following is a summary of the maturity of financial liabilities at December 31, 2016. 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 \$ 3,000.71 Colombian pesos per 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 (principal and interests)	4,268,060	29,965,353	25,736,624	20,589,796	80,559,833
Trade and other accounts payable	6,854,363	23,893	-	-	6,878,256
<b>Total</b>	<b>11,122,423</b>	<b>29,989,246</b>	<b>25,736,624</b>	<b>20,589,796</b>	<b>87,438,089</b>

### 31.6 Capital management

The main objective of Ecopetrol's Capital Management is to ensure a financial structure that will optimize the Company's cost of capital, maximize the returns to its shareholders and allows access to financial markets at a competitive cost to cover its financing needs.

The leverage index at the relevant periods is comprised as follow at December 31, 2016 and 2015:

	<b>2016</b>	<b>2015</b>
Loans and borrowings (Note 20)	52,222,027	53,223,338
Cash and cash equivalents (Note 6)	(8,410,467)	(6,550,450)
Other financial assets not restricted (Note 9)	(6,686,895)	(885,547)
<b>Net financial debt</b>	<b>37,124,665</b>	<b>45,787,341</b>
<b>Equity (Note 24)</b>	<b>43,560,501</b>	<b>43,100,963</b>
<b>Leverage (1)</b>	<b>46.01%</b>	<b>51.51%</b>

(1) Net financial debt / (Net financial debt + Equity)



**32. Related parties**

Balances with associated companies and joint ventures as of December 31, 2016 and 2015 are as follows:

	Accounts receivable	Other assets	Accounts payable	Loans
<b>Joint ventures</b>				
Equion Energía Limited	97,601	7,135	89,666	30,644
Ecodiesel Colombia S.A.	129	-	20,765	-
Offshore International Group (1)	170,121	-	-	-
<b>Associates</b>				
Serviport S.A.	-	-	3,989	-
<b>Balance at December 31, 2016</b>	<b>267,851</b>	<b>7,135</b>	<b>114,420</b>	<b>30,644</b>
	Accounts receivable	Other assets	Accounts payable	Loans
<b>Joint ventures</b>				
Equion Energía Limited	64,583	28,668	62,861	45,913
Ecodiesel Colombia S.A.	-	-	22,243	-
<b>Associates</b>				
Serviport S.A.	141	-	2,359	-
<b>Balance at December 31, 2015</b>	<b>64,724</b>	<b>28,668</b>	<b>87,463</b>	<b>45,913</b>

(1) The accounts receivable correspond to a loan granted to Offshore International Group Inc. for US \$57 million in April 2016, at an interest rate of 4.99% payable semi-annually from 2017 and maturing in 2021.

The amounts outstanding are not guaranteed and will be settled in cash. No expense has been recognized in the current period or in prior periods with respect to uncollectible or doubtful accounts related to amounts owed by related parties.

The main transactions with related entities for the years ended December 31, 2016, 2015 and 2014 are detailed as follows:

	2016		2015		2014	
	Sales and services	Purchases and others	Sales and services	Purchases and others	Sales and services	Purchases and others
<b>Joint ventures</b>						
Equion Energía Limited	491,698	418,618	515,968	190,158	908,357	79,264
Ecodiesel Colombia S.A.	5,744	265,584	7,245	267,647	3,840	220,834
Offshore International Group	6,285	-	-	-	-	-
<b>Associates</b>						
Serviport S.A.	-	24,572	-	-	-	-
<b>Total</b>	<b>503,727</b>	<b>708,774</b>	<b>523,213</b>	<b>457,805</b>	<b>912,197</b>	<b>300,098</b>

The dividends received by these companies are listed in Note 14 - Investments in companies.

### 32.1 Key executives management

Based on a resolution adopted at the annual shareholders' meeting in 2012 compensation to directors is the equivalent of four to six minimum monthly wage salaries, which totals approximately COP \$3,870,000 pesos for 2015 and COP \$4,140,000 pesos for 2016. Fees for attendance at virtual meetings are set at 50% of the face-to-face meeting fee. The Board of Directors is not subject to any variable remuneration. The amount canceled in 2016 for fees to Board members amounted to COP\$1,253 (2015 - COP\$1,238).

The total compensation paid to Directors, executive officers and senior management during the year ended December 31, 2016 amounted to COP\$13,901 (2015 - COP\$6,690). The Directors are not eligible to receive pension and retirement benefits. The total amount set aside as of December 31, 2016 to provide pension and retirement benefits to our eligible executive officers amounted to COP\$4,674 (2015 - COP\$10,341).

As of December 31, 2016, the following key management executives owned less than 1% of the outstanding shares of Ecopetrol, as follows:

Key management executive	% Shareholding
Joaquín Moreno Uribe	<1% of outstanding shares
Mauricio Cárdenas Santamaría	<1% of outstanding shares
Héctor Manosalva Rojas	<1% of outstanding shares
Rafael Espinosa Rozo	<1% of outstanding shares
Patricia Stella Zuluaga	<1% of outstanding shares
Juan Carlos Echeverry	<1% of outstanding shares

### 32.2 Post-employment benefit plans

The administration and management of resources for payment of Ecopetrol's pension obligations are managed by pension autonomous equities (PAP, by its acronym in Spanish) which serve as guarantee and payment source. These funds were established in compliance with the provisions of decree 2153 of 1999 which authorized as of December 31, 2008 partial commutation of the value corresponding to monthly payments, bonuses and contributions, transferring said obligations and money supporting them to autonomous patrimonies of a pensional nature.

As of December 31, 2016, the entities managing these resources were: Fiduciaria Bancolombia, Fiduciaria de Occidente and Consorcio Ecopetrol PAAC (comprised by Fiduciaria La Previsora, Fiduciaria Bancoldex, Fiduciaria Agraria and Fiduciaria Central). These entities will manage pension resources for a five-year term (2016 - 2021) and as consideration they receive a remuneration with fixed and variable components which is calculated on the gross yield of the portfolios and are charged to manage resources.

### 32.3 Government related parties

Colombian Government holds control of Ecopetrol with a stock ownership of 88.49%. The most significant transactions with governmental entities are comprised as follows:

#### a) Purchase of oil form the National Hydrocarbons Agency - ANH

Because of the business nature the Company has a direct relationship with ANH, an entity which operates under the Ministry of Mines and Energy rules, of which 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 all producers in Colombia at the prices set in accordance with a jointly established formula, which reflects the export sale prices (crude oils and products), adjustment to the 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 June 30, 2018.

At December 2013 the Company commercialized, on behalf of the ANH, the natural gas received by the latter in kind from the producers. Since January 2014 ANH receives the royalties in cash for the production of natural gas.

The purchase value of oil and gas from AHN is detailed in Note 26 - 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 Ministry of Finance.

**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 parity price and the benchmark price, where the parity price is that corresponding to the daily motor gasoline and diesel prices observed during the month. These differentials may be in favor or against the producers. The value of this differential is detailed in Note 25 - Sales revenue and 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 in respect of this entity and Ecopetrol does not have any other kind of association or commercial relationship with it. 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 this control entity 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.

### 33. Joint operations

The Company 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 2016 are as follows:

Contracts in which Ecopetrol is not the operator:

Partners	Contract	Type	% Participation	Geographic area of operations
Occidental Andina LLC	Chipirón		30-47%	
	Cosecha		30%	
	Cravo norte	Production	50%	Colombia
	Rondón		50%	
Chevron Petroleum Company	Guajira	Production	57%	Colombia
Mansarovar Energy Colombia Ltd	Nare	Production	50%	Colombia
Meta Petroleum Corp	Quifa	Production	30%	Colombia
Equion Energía Limited	Piedemonte	Production	50%	Colombia
	Casanare		64%	
Perenco Colombia Limited	Corocora		56%	
	Estero	Production	89%	Colombia
	Garcero		76%	
	Orocúe		63%	
Perenco Colombia Limited	Casanare		13%	
	Estero		7%	
	Garcero	Production	15%	Colombia
	Orocúe		23%	
	Corocora		28%	
Noble Energy	Gunflint	Production	32%	
Murphy Oil	Dalmatian	Production	30%	EEUU
Anadarko	K2	Production	9%	
ONGC Videsh Limited Sucursal Colombia	Ronda Caribe RC-10	Exploration	50%	Offshore North Caribbean
Petrobras, Repsol & Statoil	Tayrona	Exploration	30%	Offshore North Caribbean
Repsol & Statoil	TEA GUA OFF-1	Exploration	50%	Offshore North Caribbean
Anadarko	Fuerte Norte	Exploration	50%	Offshore North Caribbean
	Fuerte Sur		50%	
Equion Energía Limited	Niscota	Exploration	20%	Colombia
	PAMA-M-187			
Petrobras	PAMA-M-188			
	PAMA-M-222	Exploration	30%	Brazil
	PAMA-M-223			
Vanco	BM-S-63			
	BM-S-71	Exploration	30%	Brazil
	BM-S-72			
Shell	Deep Rydberg/Aleatico	Exploration	29%	
Repsol	Leon	Exploration	40%	
Stone Energy	Parmer	Exploration	30%	EEUU
Murphy Oil	Sea Eagle	Exploration	50%	
Anadarko	Warrior	Exploration	20%	

**Termination of Rubiales and Piriri contracts**

Since July 1, 2016 Ecopetrol took over the direct operation of the Rubiales field, which up to that date had been operated by Pacific Rubiales Energy. Upon termination of the contract Ecopetrol received the assets from said operation and the obligations associated with the BOMT contracts for US\$46 million.

**Termination of Tauramena association agreement**

On July 3, 2016, the Tauramena Association Agreement was terminated and for this reason, Ecopetrol began to operate directly the Cusiana field, Casanare. Since its commercialization in 1993 it was operated first by BP and then by Equion. Cusiana represents for Ecopetrol a 98% participation in the Unified Exploitation Plan (PEU) of the field, while Equión and Emerald will maintain both 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 Sucursal Colombia	Ronda Caribe Nueva	Exploration	50%	Colombia
CPVEN Sucursal Colombia	VMM32	Exploration	51%	Colombia
Shell Exploración and Producción	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
Maurel & Prom Colombia	CPO 17	Exploration	50%	Colombia
JX Nippon	FAZ M-320 R11	Exploration	70%	Brazil
Lewis	Clarinero	Exploration y Production (E&P)	50%	Colombia
Gas Ltd.	CPO9 - Akacias	Production	55%	Colombia
Occidental Andina LLC	La Cira Infantas	Production	54%	Colombia
	Teca		87%	Colombia
Ramshorn International Limited	Guariquies I	Production	50%	Colombia
Equion Energía Limited	Cusiana	Production	98%	Colombia
	Planta de gas			
Perenco Oil And Gas			18%	
Cepsa Colombia	San Jacinto y Rio Paez	Production	18%	Colombia
			18%	
Equion Energía Limited				
Emerald Energy	OAM	Production	45%	Colombia
Pacific Rubiales				

**34. Segment information**

The description of the business segments can be seen in note 4.19 – Information by business segment.

**34.1 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 Group companies.

The following presents the consolidated statement of profit or loss for the years ended December 31, 2016, 2015 and 2014:

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	<b>For the year ended December 31, 2016</b>				
	<b>Exploration and production</b>	<b>Refining and petrochemicals</b>	<b>Transportation and logistics</b>	<b>Eliminations</b>	<b>Total</b>
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>
Administration 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</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	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 income 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:					
Company's shareholders	1,322,370	(1,823,020)	2,960,449	(11,918)	2,447,881
Non-controlling interests	-	(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	978,394	-	7,607,001

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	<b>For the year ended December 31, 2015</b>				
	<b>Exploration and production</b>	<b>Refining and petrochemicals</b>	<b>Transportation and logistics</b>	<b>Eliminations</b>	<b>Total</b>
Third-party sales	25,669,213	22,456,866	4,221,192	-	52,347,271
Inter-segment sales	6,063,398	788,810	6,623,358	(13,475,566)	-
<b>Total Revenue</b>	<b>31,732,611</b>	<b>23,245,676</b>	<b>10,844,550</b>	<b>(13,475,566)</b>	<b>52,347,271</b>
Fixed costs	7,208,632	1,902,797	3,304,815	(2,790,793)	9,625,451
Variable costs	18,500,240	18,856,011	439,607	(10,426,793)	27,369,065
<b>Cost of sales</b>	<b>25,708,872</b>	<b>20,758,808</b>	<b>3,744,422</b>	<b>(13,217,586)</b>	<b>36,994,516</b>
<b>Gross income</b>	<b>6,023,739</b>	<b>2,486,868</b>	<b>7,100,128</b>	<b>(257,980)</b>	<b>15,352,755</b>
Administration expenses	731,626	451,250	518,109	-	1,700,985
Operation and projects expenses	2,969,723	1,155,301	157,596	(248,352)	4,034,268
Impairment of non-current assets	4,504,497	3,278,993	81,388	-	7,864,878
Other operating income and expenses, net	(399,954)	122,595	(101,182)	-	(378,541)
<b>Operating income</b>	<b>(1,782,153)</b>	<b>(2,521,271)</b>	<b>6,444,217</b>	<b>(9,628)</b>	<b>2,131,165</b>
Finance results, net					
Financial income	536,121	135,622	86,568	(136,387)	621,924
Financial expenses	(1,774,090)	(451,906)	(492,485)	67	(2,718,414)
Foreign exchange gain (loss), net	(4,798,741)	(949,176)	181,303	-	(5,566,614)
	<b>(6,036,710)</b>	<b>(1,265,460)</b>	<b>(224,614)</b>	<b>(136,320)</b>	<b>(7,663,104)</b>
Share of profit of companies	(70,407)	23,187	533	-	(46,687)
<b>Income before tax</b>	<b>(7,889,270)</b>	<b>(3,763,544)</b>	<b>6,220,136</b>	<b>(145,948)</b>	<b>(5,578,626)</b>
Income tax	2,037,650	(257,256)	(2,490,747)	-	(710,353)
<b>Net income (loss) for the period</b>	<b>(5,851,620)</b>	<b>(4,020,800)</b>	<b>3,729,389</b>	<b>(145,948)</b>	<b>(6,288,979)</b>
Income attributable to:					
Owners of the Company	(5,851,620)	(4,016,050)	2,819,759	(145,948)	(7,193,859)
Non-controlling interests	-	(4,750)	909,630	-	904,880
	<b>(5,851,620)</b>	<b>(4,020,800)</b>	<b>3,729,389</b>	<b>(145,948)</b>	<b>(6,288,979)</b>
Supplementary information					
Depreciation, depletion and amortization	5,318,587	570,033	881,738	-	6,770,358



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	<b>For the year ended December 31, 2014</b>				
	<b>Exploration and production</b>	<b>Refining and petrochemicals</b>	<b>Transportation and logistics</b>	<b>Eliminations</b>	<b>Total</b>
Third-party sales	35,903,045	26,612,204	3,456,639	-	65,971,888
Inter-segment sales	9,252,146	560,096	4,887,295	(14,699,537)	-
<b>Total Revenue</b>	<b>45,155,191</b>	<b>27,172,300</b>	<b>8,343,934</b>	<b>(14,699,537)</b>	<b>65,971,888</b>
Fixed costs	6,788,549	1,888,558	3,538,797	(1,981,744)	10,234,160
Variable costs	21,139,234	23,648,670	402,255	(12,449,191)	32,740,968
<b>Cost of sales</b>	<b>27,927,783</b>	<b>25,537,228</b>	<b>3,941,052</b>	<b>(14,430,935)</b>	<b>42,975,128</b>
<b>Gross income</b>	<b>17,227,408</b>	<b>1,635,072</b>	<b>4,402,882</b>	<b>(268,602)</b>	<b>22,996,760</b>
Administration expenses	335,432	354,221	341,523	(141)	1,031,035
Operation and projects expenses	4,288,108	1,039,695	380,940	(188,418)	5,520,325
Impairment of non-current assets	965,607	1,340,086	(1,121)	-	2,304,572
Other operating income and expenses, net	(285,821)	12,490	(36,643)	1,775	(308,199)
<b>Operating income</b>	<b>11,924,082</b>	<b>(1,111,420)</b>	<b>3,718,183</b>	<b>(81,818)</b>	<b>14,449,027</b>
Finance results, net					
Financial income	251,902	113,237	127,262	(92,583)	399,818
Financial expenses	(837,510)	(306,174)	(496,615)	5	(1,640,294)
Foreign exchange gain (loss), net	(2,243,938)	(309,449)	283,194	-	(2,270,193)
	<b>(2,829,546)</b>	<b>(502,386)</b>	<b>(86,159)</b>	<b>(92,578)</b>	<b>(3,510,669)</b>
Share of profit of companies	154,816	11,254	-	-	166,070
<b>Income before tax</b>	<b>9,249,352</b>	<b>(1,602,552)</b>	<b>3,632,024</b>	<b>(174,396)</b>	<b>11,104,428</b>
Income tax	(4,159,511)	(29,251)	(1,246,093)	-	(5,434,855)
<b>Net income for the period</b>	<b>5,089,841</b>	<b>(1,631,803)</b>	<b>2,385,931</b>	<b>(174,396)</b>	<b>5,669,573</b>
Income attributable to:					
Owners of the Company	5,089,841	(1,627,705)	1,758,777	(174,396)	5,046,517
Non-controlling interests	-	(4,098)	627,154	-	623,056
	<b>5,089,841</b>	<b>(1,631,803)</b>	<b>2,385,931</b>	<b>(174,396)</b>	<b>5,669,573</b>
Supplementary information					
Depreciation, depletion and amortization	5,172,743	548,539	695,925	-	6,417,207

### 34.2 Information by segments of sales by product and capital expenditures

#### 34.2.1 Sales by product

The sales by product of each of the segments are detailed below for the years ended December 31, 2016, 2015 and 2014:

	For the year ended December 31, 2016				Total
	Exploration and production	Refining and petrochemicals	Transportation and logistics	Eliminations	
<b>Local sales</b>					
Med-distillates	-	8,553,503	-	-	8,553,503
Gasoline and turbo fuel	-	6,465,939	-	(373,200)	6,092,739
Services	73,247	41,736	10,572,170	(6,643,869)	4,043,284
Natural gas	2,383,323	11,763	-	(406,750)	1,988,336
Plastic and rubber	-	724,708	-	-	724,708
L.P.G. and propane	90,783	319,644	-	(4,558)	405,869
Crude oil	5,284,554	-	-	(4,730,888)	553,666
Asphalts	31,277	309,123	-	-	340,400
Aromatics	-	186,228	-	-	186,228
Oil fuel	1,382	146,866	-	-	148,248
Other products	424,952	669,568	75,793	(510,144)	660,169
	<b>8,289,518</b>	<b>17,429,078</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>8,289,518</b>	<b>18,477,100</b>	<b>10,647,963</b>	<b>(12,669,409)</b>	<b>24,745,172</b>
<b>Foreign sales</b>					
Crude	19,516,197	-	-	(2,237,618)	17,278,579
Oil fuel	-	2,158,539	-	-	2,158,539
Med-distillates	-	1,594,945	-	-	1,594,945
Plastic and rubber	-	1,171,342	-	-	1,171,342
Gasoline and turbo fuel	-	1,046,758	-	-	1,046,758
Natural gas	350,685	-	-	(291,875)	58,810
L.P.G. and propane	6,342	2,225	-	-	8,567
Cash flow hedging – Reclassification to profit or loss	33,074	-	-	-	33,074
Other products	25,395	363,250	814	316	389,775
	<b>19,931,693</b>	<b>6,337,059</b>	<b>814</b>	<b>(2,529,177)</b>	<b>23,740,389</b>
<b>Total sales revenue</b>	<b>28,221,211</b>	<b>24,814,159</b>	<b>10,648,777</b>	<b>(15,198,586)</b>	<b>48,485,561</b>

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	Exploration and production	Refining and petrochemicals	Transportation and logistics	Eliminations	Total
<b>Local sales</b>					
Med-distillates	25,782	10,206,599	-	(17,157)	10,215,224
Gasoline	-	6,464,661	-	(336,453)	6,128,208
Services	118,812	198,369	10,822,078	(6,703,985)	4,435,274
Natural gas	2,198,284	-	-	(352,939)	1,845,345
Crude oil	5,847,368	-	-	(5,356,089)	491,279
Diesel and asphalts	49,583	411,605	-	-	461,188
Plastic and rubber	-	724,392	-	-	724,392
L.P.G. and propane	154,201	190,346	-	(9,053)	335,494
Other products	262,906	1,070,725	22,472	(367,757)	988,346
	<b>8,656,936</b>	<b>19,266,697</b>	<b>10,844,550</b>	<b>(13,143,433)</b>	<b>25,624,750</b>
Recognition of price differential	-	441,871	-	-	441,871
	<b>8,656,936</b>	<b>19,708,568</b>	<b>10,844,550</b>	<b>(13,143,433)</b>	<b>26,066,621</b>
<b>Foreign sales</b>					
Crude	21,495,762	-	-	(314,497)	21,181,265
Fuel oil	-	2,166,469	-	-	2,166,469
Trading of crude	1,309,196	-	-	-	1,309,196
Natural gas	233,500	-	-	(50,550)	182,950
Gasoline and turbo fuel	27,756	65,369	-	-	93,125
Diesel	-	81,982	-	-	81,982
Plastic and rubber	-	1,096,730	-	-	1,096,730
Cash flow hedging – Reclassification to profit or loss	7,646	-	-	-	7,646
Other products and services	1,815	126,558	-	32,914	161,287
	<b>23,075,675</b>	<b>3,537,108</b>	<b>-</b>	<b>(332,133)</b>	<b>26,280,650</b>
<b>Total revenue</b>	<b>31,732,611</b>	<b>23,245,676</b>	<b>10,844,550</b>	<b>(13,475,566)</b>	<b>52,347,271</b>

	Exploration and production	Refining and petrochemicals	Transportation and logistics	Eliminations	Total
<b>Local sales</b>					
Med-distillates	1,241	11,982,214	-	-	11,983,455
Gasoline	-	6,979,197	-	(584,775)	6,394,422
Services	245,798	152,267	8,324,753	(4,944,745)	3,778,073
Natural gas	1,580,941	-	-	(234,316)	1,346,625
Crude oil	9,487,864	-	-	(8,274,146)	1,213,718
Diesel and asphalts	46,336	412,736	-	-	459,072
Plastic and rubber	-	667,563	-	-	667,563
L.P.G. and propane	181,806	248,578	-	(3,934)	426,450
Other products	102,696	812,510	19,181	66,934	1,001,321
	<b>11,646,682</b>	<b>21,255,065</b>	<b>8,343,934</b>	<b>(13,974,982)</b>	<b>27,270,699</b>
Recognition of price differential	-	485,409	-	-	485,409
	<b>11,646,682</b>	<b>21,740,474</b>	<b>8,343,934</b>	<b>(13,974,982)</b>	<b>27,756,108</b>
<b>Foreign sales</b>					
Crude	31,524,915	-	-	(689,405)	30,835,510
Fuel oil	-	3,921,703	-	-	3,921,703
Trading of crude	1,486,060	-	-	-	1,486,060
Natural gas	439,076	-	-	(15,615)	423,461
Gasoline and turbo fuel	-	127,090	-	-	127,090
Diesel	-	179,738	-	-	179,738
Plastic and rubber	-	975,282	-	-	975,282
Other products and services	58,458	228,013	-	(19,535)	266,936
	<b>33,508,509</b>	<b>5,431,826</b>	<b>-</b>	<b>(724,555)</b>	<b>38,215,780</b>
<b>Total revenue</b>	<b>45,155,191</b>	<b>27,172,300</b>	<b>8,343,934</b>	<b>(14,699,537)</b>	<b>65,971,888</b>

**34.2.2 Capital expenditures by segment**

The following are the amounts of investments made by each segment for the years ended December 31, 2016, 2015 and 2014:

<b>2016</b>	<b>Exploration and production</b>	<b>Refining and petrochemicals</b>	<b>Transportation 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>

<b>2015</b>	<b>Exploration and production</b>	<b>Refining and petrochemicals</b>	<b>Transportation and logistics</b>	<b>Total</b>
Property, plant and equipment	2,460,975	3,590,279	2,497,679	8,548,933
Natural and environmental resources ( Note 2.8)	6,856,761	-	-	6,856,761
Intangibles	69,126	18,494	24,635	112,255
	<b>9,386,862</b>	<b>3,608,773</b>	<b>2,522,314</b>	<b>15,517,949</b>

<b>2014</b>	<b>Exploration and production</b>	<b>Refining and petrochemicals</b>	<b>Transportation and logistics</b>	<b>Total</b>
Property, plant and equipment	3,556,536	3,730,289	1,636,743	8,923,568
Natural and environmental resources (Note 2.8)	6,601,680	-	-	6,601,680
Intangibles	26,610	10,636	74,772	112,018
	<b>10,184,826</b>	<b>3,740,925</b>	<b>1,711,515</b>	<b>15,637,266</b>

**35. Contractual obligations**

Ecopetrol business group enter into various commitments and contractual obligations that may require future cash payments. The details of the commitments and contractual obligations can be found in section 4.8 Financial Review - Financial Indebtedness and Other Contractual Obligations.

**36. Subsequent events**

1. On February 15, 2017 the fourth auction was carried out corresponding to the Second Stage of the Alienation and Awarding Program of 28,465,035 shares of Empresa de Energía de Bogotá S.A. E.S.P, the auction was declared deserted.
2. The Ordinary General Shareholders' Meeting, held on March 31, 2017, approved the profit distribution project, which establishes that a common dividend per share of twenty-three pesos (COL \$ 23) will be distributed. The shareholders' dividend was paid in a single installment on April 28, 2017.
3. On April 28, 2017 Ecopetrol transferred the fields Santana and Nancy-Maxine-Burdine to Gran Tierra for a total amount of US\$30.41 million. On May 26, 2017 the company IHSA paid US\$21.74 million to acquire the fields Rio de Oro and Puerto Barco, Rio Zulia and Valdivia Almagro, which will be transferred on May 30 and 31, 2017. All of these fields were awarded through an auction offered in November 2016.
4. As part of the investigations carried out by various control entities on the Cartagena refinery modernization and expansion project, the Prosecutor's Office (Fiscalía General de la Nación) is conducting a confidential investigation. In connection therewith, on April 27, 2017, through a press release informed its intention to pursue charges including document forgery, illegal interest in the execution of agreement, misappropriation of public funds and unjust enrichment.

The Prosecutor's Office has not yet made public the factual basis for such charges, and accordingly we are not in a position to predict the outcome of the Prosecutor's Office investigation or the disposition of any charges that the Prosecutor's Office may bring. Given the early stage of the investigation, it is not possible to assess the probability of any other consequences that might impact the financial statements, such as additional provisions, fines, legal costs, disallowance of tax deductions that may impact the recognition of tax reserves or the carrying amount of deferred tax assets or any other impact that is not known at the present time.

**37. 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), 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 Company. 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 2016, 2015 and 2014, and includes information related to the Company’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 Company opted not to do so. Ecopetrol estimated its reserves without considering non-traditional resources.

**(a) Capitalized costs relating to oil and gas exploration and production activities**

	December 31,		
	2016	2015	2014
Natural and environmental properties	47,097,475	45,789,713	40,356,524
Wells, equipment and facilities – property, plant and equipment	29,931,039	21,822,897	17,839,350
Construction in progress	6,855,832	9,145,198	8,110,401
Accumulated depreciation, depletion and amortization	(49,714,944)	(39,743,147)	(32,003,657)
<b>Net capitalized costs</b>	<b>34,169,402</b>	<b>37,014,661</b>	<b>34,302,618</b>

It includes information of the exploration and production segment subsidiaries.

In accordance with IAS 37, natural and environmental properties include asset retirement obligations amounting COP\$766,909, COP\$580,575 and COP\$1,061,392 during 2016, 2015 and 2014, respectively.

**(b) 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.

	Year ended December 31		
	2016	2015	2014
Acquisition of Proved properties	-	-	16,747
Acquisition of unproved properties (1)	-	357,772	263,057
Exploration costs	852,097	1,012,264	2,036,526
Development costs	2,190,426	8,018,131	8,189,239
<b>Total costs incurred</b>	<b>3,042,523</b>	<b>9,388,167</b>	<b>10,505,569</b>

(1) It relates to drilling for the Leon 2 exploratory project, operated by Repsol as well as acquisition of the Lease sales 235 and 246 (unproven lands). For 2014, it corresponds to drilling for the Ridberg/Aleatico and Leon 1 exploratory projects, operated by Shell and Repsol, respectively, as well as acquisition of the Lease Sale 231 (unproved lands).

**(c) Results of operations for oil and gas exploration and production activities**

The Company's results of operations from oil and gas exploration and production activities for the years ended December 31, 2016, 2015 and 2014 are as follows:

	<b>2016</b>	<b>2015</b>	<b>2014</b>
Net revenues			
Sales	21,322,662	26,039,708	36,678,579
Transfers	7,734,195	5,692,902	8,476,612
Total	<u>29,056,857</u>	<u>31,732,610</u>	<u>45,155,191</u>
Production cost (1)	5,785,950	6,006,563	6,457,013
Depreciation, depletion and amortization (2)	6,123,914	9,887,331	6,129,538
Other production costs (3)	12,370,540	14,457,836	16,406,789
Exploration expenses (4)	730,393	1,586,940	2,590,778
Other expenses (5)	1,488,143	2,711,274	2,478,563
Total	<u>26,498,940</u>	<u>34,649,944</u>	<u>34,062,681</u>
Income before income tax	2,557,918	(2,917,333)	11,092,510
Income tax expenses	<u>(1,367,357)</u>	<u>(371,376)</u>	<u>(5,428,674)</u>
Results of operations for producing activities	<u><b>1,190,561</b></u>	<u><b>(3,288,709)</b></u>	<u><b>5,663,836</b></u>

- (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, it includes accretion expense related to the asset retirement obligations that were recognized during 2016, 2015 and 2014 amounting approximately COP\$305,653, COP\$206,570 and COP\$184,648, respectively.
- (2) In accordance with IAS 37 the expense related to asset retirement obligations that were recognized during 2016, 2015 and 2014 in depreciation, depletion and amortization, amounted approximately to COP\$188,370, COP\$294,849 and COP\$160,106, respectively.
- (3) Corresponds to transportation costs and naphtha that are not part of the Company'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 2016, 2015 and 2014, the Company transferred approximately 17.7%, 17.9% and 18.8%, respectively, of its crude oil and gas production; (percentages based on the value sales in Colombian pesos) to intercompany business units. Based on volume those transfers were 46.1%, 37.4% and 38.8%, respectively (including Reficar).

The intercompany transfers were performed at market prices.

**(d) Reserve information**

Ecopetrol follows international standards for estimating, classifying and reporting reserves framed under SEC definitions. The process is led by the Reserves Department which submits the report to the Board of Directors for approval.

The reserves were audited at a level of 99% by 2 specialized auditing companies: DeGolyer and MacNaughton and Ryder Scott Company. 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 2016, 2015 and 2014, and corresponds to the official reserves statements prepared by the Company:

	2016			2015			2014		
	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>1,239</b>	<b>3,479</b>	<b>1,849</b>	<b>1,465</b>	<b>3,529</b>	<b>2,084</b>	<b>1,434</b>	<b>3,068</b>	<b>1,972</b>
Revisions of previous estimates (1)	(50)	(23)	(54)	(64)	225	(25)	154	666	270
Improved recovery	11	1	11	16	3	17	33	-	34
Extensions and discoveries	22	25	27	24	-	24	41	59	51
Production	(189)	(264)	(235)	(202)	(278)	(251)	(197)	(264)	(243)
<b>Closing balance</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>	<b>1,465</b>	<b>3,529</b>	<b>2,084</b>
<b>Proved developed reserves:</b>									
Opening balance	913	3,176	1,470	1,042	3,284	1,618	933	2,663	1,400
Closing balance	779	3,131	1,329	913	3,176	1,470	1,042	3,284	1,618
<b>Proved undeveloped reserves:</b>									
Opening balance	326	303	379	423	245	466	501	405	572
Closing balance	254	87	269	326	303	379	423	245	466

(1) It 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.

The section *Overview Business – Exploration and Production – Reserves* contains additional information of the process of estimating reserves and main explanations about the changes in Proved Reserves.

**(e) 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.

	2016	2015	2014
Future cash inflows	140,458,230	176,865,586	310,138,127
Future costs			
Production	(60,705,779)	(76,363,169)	(107,629,865)
Development	(12,005,835)	(16,498,118)	(23,504,455)
Income tax expenses	(15,400,000)	(30,052,830)	(60,366,272)
Future net cash flow	52,346,616	53,951,469	118,637,535
10% annual discount for estimated timing of cash flows	(18,221,004)	(19,117,422)	(43,604,395)
Standardized measure of discounted future net cash flows	<b>34,125,612</b>	<b>34,834,047</b>	<b>75,033,140</b>



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The following are the principal sources of change in the standardized measure of discounted net cash flows in 2016, 2015 and 2014:

	<u>2016</u>	<u>2015</u>	<u>2014</u>
Net change in sales and transfer prices and in production (lifting) cost related to future production	3,603,876	(50,472,025)	12,924,167
Changes in estimated future development costs	(4,767,340)	592,529	(10,987,031)
Sales and transfer of oil and gas produced during the period	(23,270,907)	(25,726,047)	(38,698,178)
Net change due to extensions and discoveries	154,352	(93,190)	(902,356)
Net change due to purchase and (sales) of minerals in place	(83,450)	-	-
Net change due to revisions in quantity estimates	(2,570,103)	(985,217)	18,866,518
Previously estimated development costs incurred during the period	5,042,697	10,769,369	8,702,964
Accretion of discount	5,423,781	11,321,221	11,018,459
Timing and other	6,394,404	(4,381,037)	2,103,078
Net change in income taxes	9,364,255	18,775,304	(1,254,706)
Aggregate change in the Standardized measure of discounted future net cash flows for the year	<u><b>(708,435)</b></u>	<u><b>(40,199,093)</b></u>	<u><b>1,772,915</b></u>

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**Exhibit 1 - Consolidated companies, associates and joint ventures**

**Consolidated subsidiaries**

Company	Functional currency	Ownership interest Ecopetrol	Activity	Shared interest	Country/ Domicile	Geographic area of operations	Net equity	Income (loss) for the period
Ecopetrol Global Energy S.L.U	U.S. Dollar	100%	Investment vehicle	Ecopetrol America Inc., Ecopetrol Oleo & Gas do Brazil Ltda., Ecopetrol del Perú S. A., ECP Oil and Gas Germany GmbH GmbH, Refinería de Cartagena S. A., Bioenergy S. A.	Spain	Spain	2,727,352	(380,156)
Ecopetrol Oleo é Gas do Brazil Ltda.	Real	100%	Hydrocarbon exploration and explotación	Sociedad Portuaria de Oleofinas y Derivados, Propileno del Caribe S. A	Brazil	Brazil	27,617	(50,849)
Ecopetrol del Perú S. A.	U.S. Dollar	100%	Hydrocarbon exploration and explotación	-	Peru	Peru	51,523	(2,847)
Ecopetrol América Inc.	U.S. Dollar	100%	Hydrocarbon exploration and explotación	Ecopetrol Perú S.A., Ecopetrol Oleo é Gas do Brazil Ltda., Propileno del Caribe S. A, Sociedad Portuaria de Oleofinas y Derivados	United States of America	United States of America	2,645,772	(298,055)
Black Gold Re Ltd.	U.S. Dollar	100%	Reinsurer of Ecopetrol and its subsidiaries	-	Bermuda	Bermuda	581,901	36,808
ECP Oil and Gas Germany GmbH	U.S. Dollar	100%	Hydrocarbon exploration and explotación	-	Germany	Angola	2,476	(27,530)
Hocol Petroleum Limited	U.S. Dollar	100%	Investment vehicle.	Hocol S. A.	Bermuda	Bermuda	2,267,217	(15,627)
Hocol S.A	U.S. Dollar	100%	Hydrocarbon exploration and explotación	ODC, Oleoducto Bicentenario	Cayman Islands	Colombia	1,563,126	659

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Company	Functional currency	Ownership interest Ecopetrol	Activity	Shared interest	Country/ Domicile	Geographic area of operations	Net equity	Income (loss) for the period
Andean Chemicals Ltd.	U.S. Dollar	100%	Investment vehicle	Bioenergy S. A., Refinería de Cartagena, Propileno del Caribe S. A. y Comai S.A.	Bermuda	Bermuda	4,857,372	(1,564,731)
Refinería de Cartagena S. A.	U.S. Dollar	100%	Hydrocarbons refining, marketing and distribution	-	Colombia	Colombia	6,969,793	(2,205,876)
Propileno del Caribe Propilco S. A.	U.S. Dollar	100%	Production and marketing of polypropylene resin	Comai S. A., Refinería de Cartagena., Bioenergy S. A., Sociedad Portuaria Oleofinas y Derivados	Colombia	Colombia	1,195,760	191,060
COMAI - Compounding and Masterbatching Industry	Colombian peso	100%	Manufacturing of polypropylene compounds and master batches for a wide range of uses	Refinería de Cartagena., Bioenergy S. A., Zona franca de Cartagena S.A. , Sociedad Portuaria del Dique	Colombia	Colombia	131,227	103,888
Bioenergy S. A.	Colombian peso	98.46%	Biofuels production	Bioenergy Zona Franca S. A., Amandine Holdings Corp. y Los Arces Group Corp.	Colombia	Colombia	313,824	(475,294)
Bioenergy Zona Franca S. A.	Colombian peso	98.46%	Biofuels production	-	Colombia	Colombia	251,185	(362,102)
Amandine Holdings Corp.	Colombian peso	98.46%	In a winding-up process	-	Panama	Panama	6,657	-
Los Arces Group Corp.	Colombian peso	98.46%	In a winding-up process	-	Panama	Panama	5,100	-
Cenit S.A.S.	Colombian peso	100%	Storage and transportation through hydrocarbon pipelines	Oleoducto Bicentenario, Ocesa, ODC, ODL, Sento S.A.S, Serviport	Colombia	Colombia	10,767,210	2,915,342

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Company	Functional currency	Ownership interest Ecopetrol	Activity	Shared interest	Country/ Domicile	Geographic area of operations	Net equity	Income (loss) for the period
Oleoducto Central S. A. - Ocesa	U.S. Dollar	72.65%	Pipeline transportation of crude oil	-	Colombia	Colombia	2,446,722	1,779,134
ODL S. A.	Colombian peso	65%	Pipeline transportation of crude oil	-	Panama	Colombia	1,044,369	341,362
Oleoducto de Colombia S. A. – ODC	Colombian peso	73%	Pipeline transportation of crude oil	-	Colombia	Colombia	288,734	237,787
Oleoducto Bicentenario de Colombia SAS	Colombian peso	55.97%	Pipeline transportation of crude oil	-	Colombia	Colombia	945,026	440,371
Ecopetrol Capital AG	U.S. Dollar	100%	Financing, liquidation of funding for companies, groups or any business or related activity	-	Switzerland	Switzerland	1,098,981	143,805
Ecopetrol Global Capital SLU	Euro	100%	Investment vehicle	-	Spain	Spain	31	(53)
Ecopetrol Costa Afuera S.A.S.	Colombian peso	100%	Offshore exploration	-	Colombia	Colombia	7,954	(1,834)
Sento S.A.S.	Colombian peso	100%	Investments in hydrocarbon transportation business	ODC	Colombia	Colombia	21,453	10,918

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**Associates and joint ventures**

Company	Functional currency	Ownership interest Ecopetrol	Activity	Country/ Domicile	Geographic area of operations	Net equity	Income (loss) for the period
<b>Associates</b>							
Invercolsa S.A. (*)	Colombian peso	43.35%	Investment in companies of transport and distribution of natural gas and L.P.G. in Colombia	Colombia	Colombia	560,915	111,997
Serviport S.A.	Colombian peso	49%	Services for oil-vessel loading and unloading support; supply of equipment; technical inspections and loading	Colombia	Colombia	18,259	877
Sociedad Portuaria Olefinas y Derivados S.A. (*)	Colombian peso	50%	Construction, use, maintenance, adaptation and administration of ports and private or public docks facilities	Colombia	Colombia	2,669	469
<b>Joint ventures</b>							
Equion Energía Limited	U.S. Dollar	51%	Hydrocarbon exploration, exploitation and production	United Kingdom	Colombia	1,530,858	279,515
Ecodiesel Colombia S.A.	Colombian peso	50%	Production, commercialization and distribution of biofuels and oleo chemicals	Colombia	Colombia	79,050	24,176
Offshore International Group	U.S. Dollar	50%	Hydrocarbon exploration, exploitation and production	United States of America	Peru	1,192,980	(248,037)

(\*) Information available as of November 30, 2016.

**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/ María Fernanda Suárez  
Name: María Fernanda Suárez  
Title: Chief Financial Officer

By: /s/ Juan Carlos Echeverry  
Name: Juan Carlos Echeverry  
Title: Chief Executive Officer

Dated: May 30, 2017

## 10. Exhibits

<b>Exhibit No.</b>	<b>Description</b>
1.1	Amended and Restated Bylaws of Ecopetrol S.A., dated March 26, 2015, as recorded under Public Deed No. 1049 of May 19, 2015 (incorporated by reference to Exhibit 3.1 on Form 6-K of the Company, furnished to the U.S. Securities and Exchange Commission on November 27, 2015 (File No. 001-34175)) (English Translation).
4.1	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).
4.2	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).
4.3	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).
4.4	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).
4.5	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).
4.6	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).
4.7	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).
4.8	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)).
4.9	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).
4.10	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)).
4.11	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).
4.12	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).
4.13	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).

<b>Exhibit No.</b>	<b>Description</b>
4.14	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).
8.1	List of subsidiaries of Ecopetrol S.A.
12.1	Section 302 Certification of the Chief Executive Officer.
12.2	Section 302 Certification of the Chief Financial Officer.
13.1	Section 906 Officer Certification.
99.1	Third-Party Reserve Report of Ryder Scott Company, L.P.
99.2	Third-Party Reserve Report of DeGolyer and MacNaughton.

#### **11. Cross-reference to Form 20-F**

		<b>Sections</b>
Item 1.	Identity of Directors, Senior Management and Advisers	N/A
Item 2.	Offer Statistics and Expected Timetable	N/A
Item 3.	Key Information	
	A. Selected Financial Data	1.3
	B. Capitalization and Indebtedness	N/A
	C. Reasons for the Offer and Use of Proceeds	N/A
	D. Risk Factors	5.1
Item 4.	Information on the Company	Note 1 to the consolidated financial statements
	A. History and Development of the Company	2.1; 3.1; Note 1 to the consolidated financial statements
	B. Business Overview	2; 3.3 – 3.9; 4.5.1
	C. Organizational Structure	3.2
	D. Property, Plants and Equipment	3.4 – 3.6; 4.6.2; Notes 15, 16 and 18 to the consolidated financial statements
	E. Oil and Gas Disclosures	3.3 – 3.6; Notes 15 and 16 and Supplemental information on Oil and Gas producing activities (unaudited by EY) to the consolidated financial statements
Item 4A.	Unresolved Staff Comments	None
Item 5.	Operating and Financial Review and Prospects	
	A. Operating Results	3.8; 4; 5.1; 5.2
	B. Liquidity and Capital Resources	2.1; 4.6; 4.8; Consolidated statements of cash flow and Notes 9, 20, 30 and 31.6 to the consolidated financial statements
	C. Research and development, Patents and Licenses, etc.	3.7; Note 18 to the consolidated financial statements
	D. Trend Information	4.10
	E. Off-Balance Sheet Arrangements	4.9
	F. Tabular Disclosure of Contractual Obligations	4.8
	G. Safe Harbor	1.2
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	B. Compensation	7.6; Notes 4, 22 and 32 to the consolidated financial statements
	C. Board Practices	7.3
	D. Employees	3.12
	E. Share Ownership	7.7



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Item 7.	Major Shareholders and Related Party Transactions	
	A. Major Shareholders	6.3; 6.8; 7.7
	B. Related Party Transactions	3.10; Note 32 to the consolidated financial statements
	C. Interests of Experts and Counsel	N/A
Item 8.	Financial Information	
	A. Consolidated Statements and Other Financial Information	4; 5.3; 6.2; 8
	B. Significant Changes	7.8; Note 36 to the consolidated financial statements
Item 9.	The Offer and Listing	
	A. Offer and Listing Details	6.3
	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
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	A. Share Capital	N/A
	B. Memorandum and Articles of Association	7.1
	C. Material Contracts	3.4.4; 4.8; Exhibits 4.1 – 4.12
	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 31 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
	C. Other Securities	N/A
	D. American Depositary Shares	6.4
Item 13.	Defaults, Dividend Arrearages and Delinquencies	None
Item 14.	Material Modifications to the Rights of Security Holders and Use of Proceeds	None
Item 15.	Controls and Procedures	5.2; 7.8
Item 16A.	Audit Committee Financial Expert	7.3.2
Item 16B.	Code of Ethics	7.2; 7.4
Item 16C.	Principal Accountant Fees and Services	7.8
Item 16D.	Exemptions from the Listing Standards for Audit Committees	N/A
Item 16E.	Purchases of Equity Securities by the Issuer and Affiliated Purchases	N/A
Item 16F.	Changes in Registrant’s Certifying Accountant	7.8
Item 16G.	Corporate Governance	7.4
Item 16H.	Mine Safety Disclosure	N/A
Item 17.	Financial Statements	N/A
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ADDENDUM N° 6  
FRAMEWORK CRUDE SERVICES AGREEMENT

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**ADDENDUM NO. 6**  
**FRAMEWORK CRUDE SERVICES AGREEMENT**

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Between

**CENIT TRANSPORTE Y LOGÍSTICA DE HIDROCARBUROS S.A.S.**

and

**ECOPETROL S.A.**

**BOGOTÁ D.C., APRIL 25, 2016**

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**ADDENDUM NO. 6 TO THE  
FRAMEWORK CRUDE SERVICES AGREEMENT**

This Addendum (“Addendum No. 6”) to the Framework Crude Services Agreement (the “Agreement”) is entered into on this day, April twenty-fifth (25th), 2016 (hereinafter the “Signing Date”), by the following parties (hereinafter the “Parties”, and each of them a “Party” or the “Party”):

1. **CENIT TRANSPORTE Y LOGÍSTICA DE HIDROCARBUROS S.A.S.**, a Colombian simplified stock corporation [*sociedad por acciones simplificadas*] organized pursuant to a private document dated June fifteenth (15th), 2012, registered with the commercial registry on June fifteenth (15th), 2012, with commercial registration No. 02224959 (hereinafter “CENIT”), represented for the signing of this Addendum by **THOMAS RUEDA EHRHARDT**, acting in his capacity as legal representative of CENIT; and
2. **ECOPETROL S.A.**, a Colombian mixed privately/publicly owned corporation [*sociedad de economía mixta*], associated with the Ministry of Mining and Energy, authorized by Law 1118 of 2006, acting in accordance with its bylaws and having principal domicile at Bogotá, D.C., with NIT 899.999.068-1, represented for the signing of this instrument by **JUAN CARLOS ECHEVERRY GARZÓN**, identified as shown beneath his signature, who is acting in his capacity as Chief Executive Officer, authorized to enter into this addendum in accordance with the provisions of the ECOPETROL S.A. Bylaws (hereinafter “ECOPETROL”), and

The Parties have approved the aspects set forth below, subject to the following

**RECITALS**

1. On April 1<sup>st</sup>, 2013, CENIT and ECOPETROL entered into the Framework Agreement for complete provision of the Services (as defined in the Agreement), pursuant to which CENIT provides to ECOPETROL Crude Transport Services by Pipeline along the Galán – Ayacucho Corridor.
2. The reduction in ECOPETROL’s production of light and medium crude, as well as the trend among domestic producers (third parties) to export all their production, has rendered difficult the process of purchasing appropriate crude (raw material) for the Barrancabermeja Refinery in the domestic market. In that regard, it has been noted that the medium and light crude content in the refinery’s diet has declined, which has affected its operations by forcing it to reduce its load in order to operate with a diet of increasingly heavy crude. In studying the transport systems to which the Barrancabermeja Refinery is connected, it was determined that it is possible to mitigate this problem by increasing the availability of light and medium crudes transported along the Caño Limón – Coveñas Oil Pipeline (eastern corridor), since mixes of heavy crude are being transported along the western corridor.

3. To be able to supply appropriate crude (light/medium) to the Barrancabermeja Refinery, ECOPETROL asked CENIT to amend the Framework Services Agreement, to guarantee that the 14" Galán – Ayacucho line can also transport an average minimum of thirty thousand barrels per calendar day (30,000 bpcd) in the direction Ayacucho – Galán under the Quality Specifications set forth in Annex TC-1 of the Agreement for Vaconia Blend or Caño Limón Crude (hereinafter the "Reversal Plan").
4. To address ECOPETROL's needs, the entry into operation of the Reversal Plan implies that CENIT must undertake a series of investments and operational adjustments, to which end the Parties agree that this Addendum No. 6 will establish the terms and conditions by which ECOPETROL will adequately compensate CENIT for the aforementioned investments and adjustments.

Pursuant to the above recitals, CENIT and ECOPETROL

**AGREE:**

**ONE.-** As compensation for the necessary investments and operational adjustments required for the entry into operation of the Reversal Plan, the Parties agree the payment of the following monetary considerations, in accordance with the terms set forth below:

**"Monetary considerations, Reversal Plan:**

*Notwithstanding monthly payment of the Fee for provision of Services on the 14" Galán – Ayacucho Oil Pipeline to which CENIT is entitled, as set forth in Section 5.02 of the Agreement, the investments and operational adjustments shall be recovered through monthly payment by ECOPETROL, where applicable, of the following monetary considerations, over a period of seven (7) Calendar Years counting from the Effective Date of this Addendum No. 6 (hereinafter the "Term for the Monetary considerations of the Reversal Plan"):*

- (i) *A fixed monetary consideration equivalent to FORTY-NINE THOUSAND, TWO HUNDRED SEVENTY-FIVE US dollars (USD\$ 49,275), as compensation for the investments made to place the Reversal Plan into operation, resulting from the product of multiplying thirty thousand Barrels per Calendar Day (30,000 BPCD) by ZERO POINT ZERO FIVE FOUR US DOLLARS (USD\$ 0.054) for three hundred sixty-five (365) Days, divided by twelve (12) Calendar Months during the Term of the Monetary Considerations of the Reversal Plan (hereinafter the "Monetary Consideration for Investment"); plus*
- (ii) *A fixed monetary consideration for ECOPETROL's use of the 14" two-way Galán – Ayacucho line in the direction Ayacucho – Galán on one Day of the Month of Operations invoiced, which will apply regardless of the volume effectively transported by ECOPETROL (hereinafter the "Fixed Monetary Consideration for Use of Reversal"). The monthly value of the Fixed Monetary Consideration for Use of Reversal shall result from the product of multiplying thirty thousand Barrels per Calendar Day (30,000 BPCD) by ZERO POINT EIGHT ZERO SEVEN US DOLLARS (USD\$ 0.8070) for each Day ECOPETROL effectively uses the 14" two-way Galán – Ayacucho pipeline in the direction Ayacucho – Galán during a Month of Operations; plus*

(iii) A variable monetary consideration applicable as of Barrel number thirty thousand one (30,001) effectively carried on the 14" two-way Galán – Ayacucho pipeline in direction Ayacucho – Galán on one Day of the Month of Operations invoiced (hereinafter the "Variable Monetary Consideration for Use of Reversal"). The monthly amount of the Variable Monetary Consideration for Use of Reversal shall result from the product of multiplying ZERO POINT EIGHT ZERO SEVEN US DOLLARS (USD\$ 0.8070) by each additional Barrel over thirty thousand Barrels per Calendar Day (30,000 BPCD) effectively carried on one Day of the Month of Operations.

The Fixed Monetary Consideration for Use of Reversal and the Variable Monetary Consideration for Use of Reversal shall not apply and therefore may not be invoiced by CENIT for Days when the 14" two-way Galán – Ayacucho pipeline operates in direction Galán – Ayacucho, provided that on that same Day the 14" two-way Galán – Ayacucho pipeline has not operated in direction Ayacucho – Galán."

**TWO.-** As of the Effective Date, the Galán – Ayacucho Corridor identified in Annex TC-7 of the Crude Transport Service by Oil Pipeline – Contracted Capacity of ECOPETROL for each Oil Pipeline, shall be understood as being included in the 18" Galán – Ayacucho and the 14" two-way Galán – Ayacucho pipelines.

**THREE.-** To amend, as of the Effective Date (as this term is defined in Clause 4 of this Addendum No. 6), Annex TC-8 of the Crude Transport Service by Oil Pipeline – Oil Pipelines Entry and Exit, to include the new entry points for the 14" two-way Galán – Ayacucho line in direction Ayacucho – Galán, which shall read as follows:

System (Line)	Initial Station	End Station	Initial Custody Transfer Point	Final Custody Transfer Point
14" Two Way Ayacucho – Galán Line	(Direction Ayacucho – Galán)  Ayacucho	(Direction Ayacucho – Galán)  Galán	<p><b>(Direction Ayacucho – Galán)</b></p> <ul style="list-style-type: none"> <li>• Official Measurement: Dynamic and/or Static from Ayacucho</li> <li>• Transfer point: ACN metering system at Ayacucho and dedicated tanks.</li> <li>• Physical limit of border or pumping facility [bateria]: closest link [brida] to the Ayacucho metering system.</li> </ul> <p>Closest link to the valves of the Ayacucho storage tanks</p>	<p><b>(Direction Ayacucho – Galán)</b></p> <ul style="list-style-type: none"> <li>• Official measurement: Dynamic Pump House 8</li> <li>• Transfer point: at the meters</li> <li>• Physical limit of border or pumping facility: at the link of the downstream connection of the Pump House 8 meters.</li> </ul>
	(Direction Galán – Ayacucho)  Galán	(Direction Galán – Ayacucho)  Ayacucho	<p><b>(Direction Galán – Ayacucho)</b></p> <ul style="list-style-type: none"> <li>• Official Measurement: Static Pump House 8</li> <li>• Transfer point: at the tanks of Pump House 8</li> <li>• Physical limit of border or pumping facility: closest link to the valves of the Pump House 8 storage tanks</li> </ul>	<p><b>(Direction Galán – Ayacucho)</b></p> <ul style="list-style-type: none"> <li>• Dynamic measurement from Ayacucho at meters 1301 and 1302</li> <li>• Transfer point at the Ayacucho dynamic meters</li> <li>• Physical limit of border or pumping facility: closest link to the Ayacucho metering system.</li> </ul>



**FOUR.-** The Parties shall understand by Effective Date of Addendum No. 6 the date that CENIT indicates to ECOPETROL as the Day the Reversal Plan is operationally available, provided that all necessary permits and authorizations have been obtained for its entry into operation.

In any event, the notification must be made a minimum of sixty (60) Days in advance of the first Day of the Month of Operations of the direction Ayacucho – Galán of the 14” two-way Galán Ayacucho pipeline.

CENIT may amend the date of notification mentioned in this clause, notifying ECOPETROL in writing again of the date when the Reversal Plan will be operationally available, prior to the date initially indicated, without thereby implying any responsibility or breach whatsoever by CENIT. Consequently, the Parties shall understand that the Effective Date shall be the date set forth in the aforementioned communication.

**FIVE.-** ECOPETROL may not exercise the rights assumed in Part (ii) of Section 3.05 of the General Conditions of the Agreement upon final release of Firm Capacity in the Galán Ayacucho Corridor during the Term of the Monetary Consideration for the Reversal Plan. In any event, the Term of the Monetary Consideration for the Reversal Plan shall not suspend the term set forth in Section 3.05 (ii) (c) of the Agreement.

**SIX.-** The Parties agree that the Monetary Consideration for Investment, the Fixed Monetary Consideration for Use of Reversal and the Variable Monetary Consideration for Use of Reversal as described in Clause One of this Addendum No. 6 shall not be subject to any adjustment or indexation over time.

**SEVEN.-** Without prejudice to the provisions of Clause One of this Addendum No. 6, the Fixed Monetary Consideration for Use of Reversal and the Variable Monetary Consideration for Use of Reversal may be subject to revision by CENIT in the event that ECOPETROL undertakes final releases of Firm Capacity on any of the following Oil Pipelines or agreements: 8” Ayacucho – Galán, 16” Ayacucho – Coveñas, 24” Ayacucho – Coveñas or Use of Port for Crude at Coveñas.

**EIGHT.-** The Parties understand that the other clauses of the Agreement shall remain current in all aspects not expressly amended in this Addendum No. 6.

In attestation of the above, this Addendum No. 6 is signed by the undersigned, in Bogotá D.C., on April twenty-fifth (25th), 2016.

**By ECOPETROL,**

**By CENIT,**

/s/ Juan Carlos Echeverry Garzón  
Juan Carlos Echeverry Garzón  
Chief Executive Officer

/s/ Thomas Rueda Ehrhardt  
Thomas Rueda Ehrhardt  
Chairman



ADDENDUM N° 7  
FRAMEWORK CRUDE SERVICES AGREEMENT

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ADDENDUM NO. 7  
FRAMEWORK CRUDE SERVICES AGREEMENT

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Between

**CENIT TRANSPORTE Y LOGÍSTICA DE HIDROCARBUROS S.A.S.**

and

**ECOPETROL S.A.**

**BOGOTÁ D.C., DECEMBER 28, 2016**

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**ADDENDUM NO. 7 OF THE  
FRAMEWORK CRUDE SERVICES AGREEMENT**

This Addendum No. 7 (the “Addendum”) to the Framework Crude Services Agreement (the “Agreement”) is entered into on this day, December 28, 2016, by the following legal entities (hereinafter the “Parties”, and each of them a “Party” or the “Party”):

1. **ECOPETROL S.A.**, a Colombian mixed privately/publicly owned corporation [*sociedad de economía mixta*], associated with the Ministry of Mining and Energy, authorized by Law 1118 of 2006, acting in accordance with its bylaws and having principal domicile at Bogotá, D.C., with NIT 899.999.068-1, represented for the signing of this instrument by **VICTOR ALEJANDRO URIBE BURGOS**, identified as shown beneath his signature, who is acting in his capacity as Director of the Logistical Operations Department of the Operational Planning Division, authorized to enter into this addendum in accordance with the Special Power of Attorney granted to him by ECOPETROL S.A. (hereinafter “ECOPETROL”), and
2. **CENIT TRANSPORTE Y LOGÍSTICA DE HIDROCARBUROS S.A.S.**, a Colombian mixed privately/publicly owned corporation authorized by Decree 1320 of 2012, associated with the Ministry of Mining and Energy, having principal domicile at Bogotá D.C. and NIT 900.531.210-3, (hereinafter “CENIT”), represented for the signing of this Addendum by **MICHEL JANNA GANDUR**, identified as shown beneath his signature, who is acting in his capacity as Alternate Legal Representative of CENIT, authorized to enter into this Agreement in accordance with the corporation’s bylaws.

The Parties have approved the aspects set forth below, subject to the following

**RECITALS**

1. On April 1, 2013, CENIT and ECOPETROL entered into the Agreement, which sets forth in its Annex TC-7 that the “Galán – Ayacucho” Corridor had Firm Capacity of 71,500 BPCD [barrels per calendar day] and included the 14” Galán - Ayacucho and the 18” Galán-Ayacucho pipelines.
2. The 14” Galán-Ayacucho and the 18” Galán - Ayacucho pipelines are subject to the same Fees.
3. Pursuant to Addendum No. 6 to the Framework Crude Services Agreement entered into on April 25, 2016, the Parties agreed to the following points, among others: (i) reversal of the 14” Galán-Ayacucho pipeline in the Galán direction, (ii) payment of a “Fixed Monetary Consideration for Use of Reversal” applicable to 30,000 BPCD, (iii) that the Galán - Ayacucho Corridor would consist of the 18” Galán - Ayacucho and the two-way 14” Galán - Ayacucho pipelines, and (iv) that ECOPETROL would not be able to exercise the rights considered in Part (ii), Section 3.05 of the General Conditions of the Agreement upon the final release of Firm Capacity in the Galán Ayacucho Corridor during the Term of the Monetary Consideration for the Reversal Plan.
4. Prior to the reversal of the 14” Galán - Ayacucho line in the direction of Galán, this system had been offering 20,000 BPCD.



5. Pursuant to Resolution 31350 of July 26, 2016, the Ministry of Mining and Energy set the fees in dollars and in pesos.
6. Pursuant to Resolution 31480 of 2016, the Ministry of Mining and Energy set the Transport Fee for the 18" Galán Isla VI and the 18" Isla VI – Ayacucho systems for five (5) systems, including the 14" Ayacucho Galán oil pipeline.
7. Pursuant to this Addendum, the Parties do not seek to amend or substitute the obligations set forth in the Agreement nor in Addenda One, Two, Three, Four, Five or Six, all of which are in full force and effect, except for the changes expressly contained in this Addendum.

In view of the above recitals, the Parties have agreed, pursuant to this Addendum, to the following

#### CLAUSES

**Clause One.** - The Parties agree to amend Section 6.04, which shall hereinafter read as follows:

*“Section 6.04. Currency. Invoices shall be issued in Colombian pesos (COP) and/or in US dollars (USD).”*

**Clause Two-** The Parties agree to amend Section 6.05, which shall hereinafter read as follows:

*“Section 6.05. Payment. ECOPETROL irrevocably undertakes to pay invoices in the following form:*

*Ecopetrol irrevocably undertakes to pay invoices within thirty (30) Days after the date of approval, in Colombian pesos or US dollars, as agreed between the Parties, to the bank account registered at ECOPETROL, in immediately available funds and in accordance with the CENIT Money Laundering Policy. In the event of a dispute, the Parties agree that payment shall in all cases be in Colombian pesos.*

*ECOPETROL may pay in dollars invoices issued in US dollars, provided that current Colombian law permits payment in dollars by Colombian residents.*

*For purposes of payments in pesos for Services for which the Fee is set solely in US dollars and are invoiced in US dollars, the payment amount shall be determined based on the Rate for the corresponding service in dollars and it shall be settled at the Representative Market Rate (RMR) officially certified by the Financial Superintendency for the date of issuance of the corresponding invoice.*

*For purposes of invoicing for Services for which the Fee has been agreed to with one component in Colombian pesos and another in US dollars, the total shall be invoiced in US dollars. For the peso component, the Representative Market Rate (RMR) officially certified by the Financial Superintendency for the date of issuance of the corresponding invoice shall be used. Ecopetrol may make the payment in pesos or in dollars, based on the Representative Market Rate (RMR) officially certified by the Financial Superintendency for the date of issuance of the corresponding invoice.*

**PARAGRAPH.-** Adjustments to invoices deriving from the actual volumes transported shall be settled at the Representative Market Rate (RMR) officially certified by the Financial Superintendency for the date of issuance of the invoice to which the respective adjustment corresponds.”

**Clause Three.-** The Parties agree that as of December 1, 2016 and for purposes of Annex TC-7 of the Framework Crude Services Agreement, Contracted Capacity for the 14” Ayacucho – Galán and the 18” Galán – Ayacucho systems shall be as follows:

System (line)	Contracted Capacity BPD	Use or Pay BPD	Use and Pay BPD	TOTAL (*)
<b>GALAN - AYACUCHO L18”</b>	<b>41,500</b>	<b>31,955</b>	<b>9,545</b>	<b>41,500</b>
<b>AYACUCHO GALAN L14”</b>	<b>30,000</b>	<b>23,100</b>	<b>6,900</b>	<b>30,000</b>

(\*) The provisions set forth in Clause 5, Addendum No. 6, as to the release of capacity on these systems, is retained. When the 14” Galán Ayacucho System is functioning in direction Galán – Ayacucho, it will have a contracted capacity of 20,000 (23% S&P and 77% SoP)

The Capacity offered for the 18” Galán – Ayacucho system may be affected, depending upon the products Ecopetrol requests to be transported, without this implying a breach by CENIT. Said requests shall be reviewed and, if possible, defined under special agreements in each planning process.

In the case of operating restrictions affecting the 14” Ayacucho – Galán and/or the 8” Ayacucho – Galán systems, the Parties agree that all or part of the barrels of the 8” Ayacucho – Galán system may be transported through the 14” Ayacucho – Galán system.

Barrels transported under the conditions specified above on the 14” Ayacucho – Galán system, and that exceed for one or more days of the service month the daily capacity initially proposed by ECOPETROL and accepted by CENIT for a specific month on that system shall be taken into consideration in determining monthly fulfillment of the SoP of the 8” Ayacucho – Galán system. For invoicing purposes, these barrels shall at all times exceed the capacity initially proposed by ECOPETROL and accepted by CENIT on the 14” Ayacucho – Galán system, shall be invoiced on the 14” Ayacucho – Galán system, and shall be discounted from barrels to be invoiced under the SoP of the 8” Ayacucho – Galán system.

**Clause Four.-** The Parties agree to add to Annex TC-1 the following Crude specifications, which may be transported via the 18” Galán – Ayacucho and 16” Ayacucho – Coveñas systems, Coveñas – Cartagena with the following specifications, on the understanding that their transport may affect the capacity of the aforementioned systems:

	Standard	Light Fuel Oil
Viscosity @ 50°C, max. (SSF)	ASTM D-445	50.00
Viscosity @ 50°C, max. (cSt)	ASTM D-445	106.00
Flash point, min. (°C)	ASTM D-93	60.0
Temperature, máx. (°C)		65

The transport delta from Galán to Coveñas is 10° C, with dispatch of homogenous products from the refinery tank

**Clause Five.-** Amend Annex AC-2, Storage Agreement for Destination Crude, Duration, Operation and Maintenance and Lease fee for Tank TK-8168, as follows:

- (i) Clause 2, Chapter I is amended, which shall now read as follows:

**“Clause 2. Duration:** This Agreement shall have a duration of three (3) months as of December first (1st), 2016, hereinafter the “Effective Date.” This term shall be automatically extended for periods of one (1) month unless either Party expresses its intention to extend it, no less than one (1) month from the date of expiration of the initial term or that of the corresponding extension.”

- (ii) Clauses 3 and 4 of Chapter I are eliminated.

- (iii) Clause 5 of Chapter II is amended, which shall now read as follows:

**“Clause 5. Return:** ECOPETROL shall return the Tank in the same conditions as it was delivered thereto on January tenth (10th), 2015 and after expiration of the leasing period and its extensions, in the event it is canceled, to which end it shall have 30 (thirty) Days to leave the remaining amounts and block the corresponding lines that had been connected, which activity shall be its sole responsibility, on which date the tank must be delivered to CENIT. CENIT shall not be custodian of any remainders that might be found in the tank upon termination of the leasing period, and ECOPETROL must remove the crude and assume the costs of cleaning in the event that the Tank is required to be used with another product in the future, or in the event that CENIT requires the tank to be cleaned, which CENIT shall communicate prior to termination of the Framework Services Agreement Execution Period.”

- (iv) Clause 1, Chapter II is modified, which shall henceforth read as follows:

**“Clause 1. Lease fee:** As compensation for lease of the Tank, ECOPETROL undertakes to pay to CENIT a monthly fee of FOUR HUNDRED SEVENTY-TWO MILLION, THREE HUNDRED NINETY-SIX THOUSAND, SEVEN HUNDRED THIRTY-EIGHT COLOMBIAN PESOS (COL\$ 472,396,738). In addition, ECOPETROL undertakes to pay monthly SIXTY-TWO MILLION COLOMBIAN PESOS (COL\$ 62,000,000) for routine maintenance to be performed on the Tank.



*The Lease Fee and routine maintenance fee shall be updated on the first of January of each year, by the Consumer Price Index (CPI) of the immediately preceding calendar year.”*

(v) Clause 2, Chapter II is amended, which shall henceforth read as follows:

*“Clause 2. Invoicing and Payment: Invoices must be paid by ECOPETROL within thirty (30) days after their issuance by CENIT. Invoices shall be issued within the first fifteen (15) days of each month during the lease. Unless the Parties agree otherwise, all payments shall be made by deposit or electronic funds transfer to the account CENIT indicates on each invoice.”*

**Clause Six.-** The parties represent that pursuant to this addendum, they formally record the agreement entered into between them and approved on December first (1st), 2016, to which end the effects of the provisions set forth herein shall apply as of December first (1st), 2016, unless a different date is stipulated in some clause.

In attestation of the above, this Addendum is signed by the undersigned, in Bogotá D.C., on December 28, 2016.

**By ECOPETROL,**

/s/ Víctor Alejandro Uribe Burgos  
\_\_\_\_\_  
Víctor Alejandro Uribe Burgos  
C.C. 92.527.921 of Sincelejo  
Director, Logistical Operations Department

**By CENIT,**

/s/ Michel Janna Gandur  
\_\_\_\_\_  
Michel Janna Gandur  
10.013.570 of Pereira  
Alternate Legal Representative

## 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, 2017.

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.**	Colombia	98.61%
BIOENERGY ZONA FRANCA S.A.S.**	Colombia	98.61%
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%
PROPILCO S.A.*	Colombia	100.00%
SANTIAGO OIL COMPANY**	Cayman Islands	51.00%
ESENTTIA RESINAS DEL PERU SAC**	Peru	100.00%
ECOPETROL COSTA AFUERA COLOMBIA S.A.S**	Colombia	100.00%

\*Direct and indirect participation.

\*\*Solely indirect participation through other subsidiaries or affiliates.

## CERTIFICATION

I, Juan Carlos Echeverry, 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: May 30, 2017

By: /s/ Juan Carlos Echeverry  
Name: Juan Carlos Echeverry  
Title: Chief Executive Officer

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## CERTIFICATION

I, María Fernanda Suárez, 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: May 30, 2017

By: /s/ María Fernanda Suárez  
Name: María Fernanda Suárez  
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, 2016 (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: May 30, 2017

By: /s/ Juan Carlos Echeverry  
Name: Juan Carlos Echeverry  
Title: Chief Executive Officer

Dated: May 30, 2017

By: /s/ María Fernanda Suárez  
Name: María Fernanda Suárez  
Title: Chief Financial Officer

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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 6, 2017

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 an estimate of the proved reserves attributable to certain properties of ECOPETROL, as of December 31, 2016. 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 study, completed on January 20, 2017 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, 2016. Based on information provided by ECOPETROL, the third party estimate conducted by Ryder Scott addresses 56 percent of the total proved developed net liquid hydrocarbon reserves and 48 percent of the total proved undeveloped net liquid hydrocarbon reserves, of ECOPETROL. The Ryder Scott review also addresses 75 percent of the total proved developed net gas reserves and 83 percent of the total proved undeveloped net gas reserves, of ECOPETROL.

The estimated reserve amounts presented in this report, as of December 31, 2016, 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.

SUITE 600, 1015 4TH STREET, S.W.  
 621 17TH STREET, SUITE 1550

CALGARY, ALBERTA T2R 1J4  
 DENVER, COLORADO 80293-1501

TEL (403) 262-2799  
 TEL (303) 623-9147

FAX (403) 262-2790  
 FAX (303) 623-4258

**SEC PARAMETERS**  
 Estimated Net Reserves  
 Certain Interests of  
**ECOPETROL**  
 As of December 31, 2016

	Proved		Total Proved
	Developed	Undeveloped	
<b><u>Net Remaining Reserves</u></b>			
Oil/Condensate - MBarrels	385,741	109,873	495,614
Plant Products - MBarrels	50,137	11,882	62,019
Sales Gas - MMCF	2,177,623	68,508	2,246,131
Fuel Gas - MMCF	167,127	3,855	170,982

Liquid hydrocarbons are expressed in thousand standard 42 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. Further, they include ECOPEOTROL’s participation interest in properties operated by Ecopetrol America Incorporated, Equion Energia 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 proved reserve 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, from known accumulations under defined conditions. 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. At ECOPEOTROL’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. If 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.”

RYDER SCOTT COMPANY PETROLEUM CONSULTANTS

Proved reserve 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 significantly 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 significantly 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 production sharing contracts, the fiscal terms of various production sharing 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.

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**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 singularly or in combination by the reserve evaluator in the process of estimating the quantities of reserves. Reserve 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 reserve quantities are estimated using the deterministic incremental approach, the uncertainty for each discrete incremental quantity of the reserves is addressed by the reserve category assigned by the evaluator. Therefore, it is the categorization of reserve 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 reserve category must meet the SEC definitions as noted above.

Estimates of reserves quantities and their associated reserve categories may be revised in the future as additional geoscience or engineering data become available. Furthermore, estimates of reserves quantities and their associated reserve 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 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	0.3%	3.6%	1.2%	4.1%
Performance	99.6%	0%	94.7%	0%
Analogy	0%	0%	0%	0%
Combination	0%	96.4%	4.1%	95.9%

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These performance methods include, but may not be limited to, decline curve analysis and analogy which utilized extrapolations of historical production and pressure data available through November 2016 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 2016. 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 that 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 or leases, 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.

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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, 2016. 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 area included in the 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.

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Geographic Area	Product	Price Reference	Average Benchmark Prices	Average Realized Prices
North and South America	Oil/Condensate	Brent	\$44.49/Bbl	\$33.30/Bbl
	NGLs	Brent	\$44.49/Bbl	\$24.00/Bbl
	Gas	Contract	Contract	\$3.95/MCF

The liquid prices 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 67 percent of the future gross income is derived from the sale of liquid hydrocarbons and 33 percent from gas sales.

**Costs**

Operating costs used in our evaluation were based on the operating expense reports of ECOPETROL and include only those costs directly applicable to the evaluated assets. The operating costs include a portion of general and administrative costs allocated directly to the leases and wells. 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 assets.

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 significant. The estimates of the net abandonment costs furnished by ECOPETROL were accepted without independent verification.

The proved developed and undeveloped reserves in this report have been incorporated herein in accordance with ECOPETROL's plans to develop these reserves as of December 31, 2016. 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. 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, 2016, such changes were, in accordance with rules adopted by the SEC, omitted from consideration in making this evaluation.

Current costs used by ECOPETROL were held constant throughout the life of the properties.

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***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 over 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.

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.

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***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 ECOPEOTROL.

We have provided ECOPEOTROL 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 ECOPEOTROL 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

/s/ Mario A. Ballesteros, P.E.  
\_\_\_\_\_  
TBPE License No. 107132  
Managing Senior Vice President

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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. Herman G. Acuña was the primary technical person responsible for overseeing the independent estimation of the reserves, future production and income to render the audit conclusions of the report.

Mr. Acuña, an employee of Ryder Scott Company, L.P. (Ryder Scott) since 1997, is a Managing Senior International Vice President and Board Member. He serves as an Engineering Group Coordinator responsible for coordinating and supervising staff and consulting engineers of the company in ongoing reservoir evaluation studies worldwide. Before joining Ryder Scott, Mr. Acuña served in a number of engineering positions with Exxon. For more information regarding Mr. Acuña's geographic and job specific experience, please refer to the Ryder Scott Company website at [www.ryderscott.com](http://www.ryderscott.com).

Mr. Acuña earned a Bachelor (Cum Laude) and a Masters (Magna Cum Laude) of Science degree in Petroleum Engineering from The University of Tulsa in 1987 and 1989 respectively. He is a registered Professional Engineer in the State of Texas, a member of the Association of International Petroleum Negotiators (AIPN) and the Society of Petroleum Engineers (SPE).

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. Acuña fulfills. Mr. Acuña 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. Mr. Acuña has recently taught various company reserves evaluation schools in Argentina, China, Denmark, Spain and the U.S.A. Mr. Acuña has participated in various capacities in reserves conferences such as being a panelist at Trinidad and Tobago's Petroleum Conference, delivering the reserves evaluation seminar during IAPG convention in Mendoza, Argentina and chairing the first Reserves Evaluation Conference in the Middle East in Dubai, U.A.E.

Based on his educational background, professional training and over 20 years of practical experience in petroleum engineering and the estimation and evaluation of petroleum reserves, Mr. Acuña 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, as the following definitions, descriptions and explanations rely wholly or in part on excerpts from the original document (direct passages excerpted from the aforementioned SEC document are denoted in italics herein).

Reserves are those estimated remaining quantities of petroleum which are anticipated to be economically producible, as of a given date, from known accumulations under defined conditions. All reserve estimates involve some degree of uncertainty. 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 Commission. 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 Commission 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 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.

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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.

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**PROVED RESERVES (SEC DEFINITIONS) CONTINUED**

(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 further conditions.*

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**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**

**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)**

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 extracting 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 to be recovered from completion intervals that are open and producing at the time of the estimate.*

*Improved recovery reserves are considered producing only after the improved recovery project is in operation.*

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**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 which 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 which will require additional completion work or future re-completion prior to start of production.*

*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.*

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**DeGolyer and MacNaughton**  
5001 Spring Valley Road  
Suite 800 East  
Dallas, Texas 75244

March 6, 2017

Board of Directors  
Ecopetrol S.A.  
Calle 35 No. 7-21 Piso 1  
Bogota, D.C. Colombia

Ladies and Gentlemen:

Pursuant to your request, we have audited the net proved hydrocarbon reserves, as of December 31, 2016, of certain selected properties in Colombia and Peru that Ecopetrol S.A. has represented are owned by Ecopetrol S.A., its wholly owned subsidiary Hocol Petroleum Limited, and through its ownership interest in Savia Peru S.A. (collectively, "ECOPETROL"). This evaluation was completed on March 6, 2017. ECOPETROL has represented that these properties account for 38 percent on a net equivalent barrel basis of ECOPETROL's net proved reserves as of December 31, 2016. ECOPETROL has also represented that these properties account for 45 percent of ECOPETROL's total proved developed net liquid hydrocarbon (oil, condensate, and natural gas liquids (NGL)) reserves, 25 percent of its total proved developed net gas reserves, 52 percent of its total proved undeveloped net liquid hydrocarbon reserves, and 17 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 to be produced from these properties after December 31, 2016. Net reserves are defined as that portion of the gross reserves attributable to the interests owned by ECOPETROL after deducting all interests owned 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 natural gas liquids (NGL) royalties be paid in cash. Based on this legislation, ECOPETROL has requested that royalties associated with gas and NGL be considered as a cash payment and not deducted from net reserves. ECOPETROL has also advised that for the properties in Peru evaluated herein, all royalties are paid in kind.

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Estimates of oil, condensate, NGL, and gas reserves should be regarded only as estimates that may change as further production history and additional information become available. Not only are such reserves 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.

Data used in this audit were obtained from reviews with ECOPETROL personnel, from ECOPETROL files, from records on file with the appropriate regulatory agencies, and from public sources. In the preparation of this report we have relied, without independent verification, upon such information furnished by ECOPETROL with respect to property interests, 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.

### **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 the analyses of areas offsetting existing wells with test or production data, reserves were classified as proved.

When applicable, the volumetric method was used to estimate the original oil in place (OOIP) and the original gas in place (OGIP). Structure 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 and other engineering methods were used to estimate OOIP or OGIP.

Estimates of ultimate recovery were obtained after applying recovery factors to OOIP or 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. In such cases, an analysis of reservoir performance, including production rate, reservoir pressure, and gas-oil ratio behavior, was used in the estimation of reserves.

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 only to the limits of economic production or to the limit of the production licenses as appropriate.

Oil, condensate, and NGL reserves estimated in this report are expressed in terms of 42 United States gallons per barrel. Condensate reserves are to be recovered by conventional field operations. For reporting purposes, oil and condensate reserves have been estimated separately and are presented herein as a summed quantity. In this report, NGL reserves are defined to be propane, butane, and C<sub>5+</sub> and are to be recovered by low-temperature separation.

Gas quantities estimated herein are expressed as marketable gas, fuel gas, and sales gas at a temperature base of 60 degrees Fahrenheit and a pressure base of 14.7 pounds per square inch absolute. 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 and is estimated as reserves. 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, and shrinkage resulting from field separation and processing.

The proved reserves for the properties included 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.

<b>Method</b>	<b>Gas</b>		<b>Liquid Hydrocarbons</b>	
	<b>Developed (%)</b>	<b>Undeveloped (%)</b>	<b>Developed (%)</b>	<b>Undeveloped (%)</b>
Volumetric	0	0	0	0
Performance	6	8	73	41
Combination	94	92	27	59

### **Definition of Reserves**

Petroleum reserves included in this report are classified as proved. Only proved reserves have been evaluated for this report. Reserves classifications used 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.

**Primary Economic Assumptions**

The following economic assumptions were used for estimating existing and future prices and costs, expressed in United States dollars (U.S.\$):

*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.\$36.19 per barrel for oil and condensate and U.S.\$41.27 per barrel for NGL, based on a 12-month average Brent reference price of U.S.\$44.49 per barrel. ECOPETROL supplied differentials by field to the Brent reference price. ECOPETROL has also represented that the volume-weighted average adjusted product prices attributable to estimated proved reserves for the properties in Peru evaluated herein were U.S.\$39.26 per barrel for oil and condensate and U.S.\$38.60 per barrel for NGL based on the 12-month average Ardjuna and Minas crude reference prices. These prices were held constant throughout the life of the evaluation.

*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.\$3.79 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.\$1.10 per thousand cubic feet. These prices were held constant throughout the life of the evaluation.

*Operating Expenses, Capital Costs, and Abandonment Costs*

Operating expenses and capital costs, based on information provided by ECOPETROL, were used in estimating future costs required to operate the properties. In certain cases, future costs, either higher or lower than existing costs, may have been used because of anticipated changes in operating conditions. These costs were not escalated for inflation. Abandonment costs were provided by ECOPETROL.

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 oil and gas reserves, we are not aware of any such governmental actions which would restrict the recovery of the December 31, 2016, estimated proved oil and gas reserves.

Our estimates of ECOPETROL's net proved reserves attributable to the reviewed properties were based on the definitions of proved reserves of the SEC and are summarized as follows, expressed in millions of barrels (MMbbl), millions of cubic feet (MMcf), and millions of barrels of oil equivalent (MMboe):

**Estimated by DeGolyer and MacNaughton**  
**Net Proved Reserves**  
as of  
**December 31, 2016**

	<b>Oil and Condensate (MMbbl)</b>	<b>NGL (MMbbl)</b>	<b>Marketable Gas (MMcf)</b>	<b>Fuel Gas (MMcf)</b>	<b>Sales Gas (MMcf)</b>	<b>Oil Equivalent (MMboe)</b>
<b>South America</b>						
Proved Developed	330.897	6.110	781,377.216	63,916.260	717,460.956	474.091
Proved Undeveloped	131.424	0.802	14,968.685	3,783.984	11,184.701	134.853
<b>South America Total Proved</b>	<b>462.321</b>	<b>6.913</b>	<b>796,345.901</b>	<b>67,700.244</b>	<b>728,645.657</b>	<b>608.944</b>

## Notes:

1. Totals may vary due to rounding.
2. Marketable gas is converted to oil equivalent using an energy equivalent factor of 5,700 cubic feet of gas per 1 barrel of oil equivalent.

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.

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 ECOJETROL. Our fees were not contingent on the results of our evaluation. This letter report has been prepared at the request of ECOJETROL. 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.

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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 company did prepare the letter report addressed to ECOPETROL dated March 6, 2017, and that I, as Senior Vice President, was responsible for the preparation of this letter report.
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 International Society of Petroleum Engineers and that I have in excess of 34 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

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