PETROCHINA CO LTD
Form 20-F
April 29, 2019

UNITED STATES

SECURITIES AND EXCHANGE COMMISSION

Washington, D.C. 20549

Form 20-F

(Mark One)

REGISTRATION STATEMENT PURSUANT TO SECTION 12(b) OR 12(g) OF THE SECURITIES EXCHANGE ACT OF 1934

or

ANNUAL REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934
For the fiscal year ended December 31, 2018.

or

TRANSITION REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934

or

SHELL COMPANY REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934

Date of event requiring this shell company report __________

For the transition period from __________ to __________

Commission File Number 1-15006

(Exact name of Registrant as specified in its charter)

PetroChina Company Limited

(Translation of Registrant s name into English)

The People s Republic of China

(Jurisdiction of incorporation or organization)

9 Dongzhimen North Street

Dongcheng District, Beijing 100007

The People s Republic of China,

(Address of principal executive offices)

Wu Enlai

Telephone number: 8610 59982622

Facsimile number: 8610 62099557

Email address: zxy@petrochina.com.cn

Address: 9 Dongzhimen North Street, Dongcheng District, Beijing 100007, The People s Republic of China

(Name, telephone, e-mail and/or facsimile number and address of registrant s contact person)

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

Title of Each Class	**Trading Symbol**	**Name of Each Exchange on Which Registered**
American Depositary Shares, each representing 100	**PTR**	
H Shares, par value RMB1.00 per share		New York Stock Exchange, Inc
*H Shares, par value RMB1.00 per share		.New York Stock Exchange, Inc.**

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

None

(Title of Class)

Securities for which there is a reporting obligation pursuant to Section 15(d) of the Act.

None

(Title of Class)

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:

A Shares, par value RMB1.00 per share***	161,922,077,818(1)
H Shares, par value RMB1.00 per share	21,098,900,000****

(1) Includes 148,010,665,536 A Shares held by CNPC and 13,911,412,282 A Shares held by the public shareholders.

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 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

Note Checking the box above will not relieve any registrant required to file reports pursuant to Section 13 or 15(d) of the Securities Exchange Act of 1934 from their obligations under those Sections.

Indicate by check mark whether the registrant (1) has filed all reports required to be filed by Section 13 or 15(d) or the Securities Exchange Act of 1934 during the preceding 12 months (or for such shorter period that the registrant was required to file such reports), and (2) has been subject to such filing requirements for the past 90 days. Yes No

Indicate by check mark whether the registrant has submitted electronically every Interactive Data File required to be submitted pursuant to Rule 405 of Regulation S-T (§232.405 of this chapter) during the preceding 12 months (or for such shorter period that the registrant was required to submit such files). Yes No

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

Large Accelerated Filer Accelerated Filer Non-Accelerated Filer Emerging Growth company

If an emerging growth company that prepares its financial statements in accordance with U.S. GAAP, indicate by check mark if the registrant has elected not to use the extended transition period for complying with any new or revised financial accounting standards 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

(APPLICABLE ONLY TO ISSUERS INVOLVED IN BANKRUPTCY PROCEEDINGS DURING THE PRECEDING FIVE YEARS)

Indicate by check mark whether the registrant has filed all documents and reports required to be filed by Sections 12, 13 or 15(d) of the Securities Exchange Act of 1934 subsequent to the distribution of securities under a plan confirmed by a court. Yes No

* PetroChina s H Shares are listed and traded on The Stock Exchange of Hong Kong Limited.

** Not for trading, but only in connection with the registration of American Depository Shares.

*** PetroChina s A Shares became listed on the Shanghai Stock Exchange on November 5, 2007.

**** Includes 778,325,000 H Shares represented by American Depositary Shares.

Table of Contents

Table of Contents

Table of Contents

CERTAIN TERMS AND CONVENTIONS

Conventions Which Apply to this Annual Report

Unless the context otherwise requires, references in this annual report to:

CNPC or CNPC group are to our parent, China National Petroleum Corporation and its affiliates and subsidiaries, excluding PetroChina, its subsidiaries and its interests in long-term investments, and where the context refers to any time prior to the establishment of CNPC, those entities and businesses which were contributed to CNPC upon its establishment.

PetroChina , we , our , our company , the Company and us are to: PetroChina Company Limited, a joi company incorporated in the People s Republic of China with limited liability and its subsidiaries and branch companies.

PRC or China are to the People s Republic of China, but does not apply to its Hong Kong, Macau and Taiwan for purposes of this annual report.

We publish our consolidated financial statements in Renminbi or RMB. In this annual report, IFRS refers to International Financial Reporting Standards as issued by the International Accounting Standards Board.

Conversion Table

1 barrel-of-oil equivalent	= 1 barrel of crude oil	= 6,000 cubic feet of natural gas
1 cubic meter	= 35.315 cubic feet	
1 ton of crude oil	= 1 metric ton of crude oil	= 7.389 barrels of crude oil (assuming an API gravity of 34 degrees)

Certain Oil and Gas Terms

Unless the context indicates otherwise, the following terms have the meanings shown below:

acreage	The total area, expressed in acres, over which an entity has interests in exploration or production. Net acreage is the entity s interest, expressed in acres, in the relevant exploration or production area.
condensate	Light hydrocarbon substances produced with natural gas that condense into liquid at normal temperatures and pressures associated with surface production equipment.

crude oil	Crude oil, including condensate and natural gas liquids.
developed reserves	Under the reserves rules of the Securities and Exchange Commission, or SEC, developed 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.

1

Table of Contents

development cost	For a given period, costs incurred to obtain access to proved reserves and to provide facilities for extracting, treating, gathering and storing the oil and gas.
finding cost	For a given period, costs incurred in identifying areas that may warrant examination and in examining specific areas that are considered to have prospects of containing oil and gas reserves, including costs of drilling exploratory wells and exploratory-type test wells. Finding cost is also known as exploration cost.
lifting cost	For a given period, costs incurred to operate and maintain wells and related equipment and facilities, including applicable operating costs of support equipment and facilities and other costs of operating and maintaining those wells and related equipment and facilities. Lifting cost is also known as production cost.
natural gas liquids	Hydrocarbons that can be extracted in liquid form during natural gas production. Ethane and pentanes are the predominant components, with other heavier hydrocarbons also present in limited quantities.
offshore	Areas under water with a depth of five meters or greater.
onshore	Areas of land and areas under water with a depth of less than five meters.
primary distillation capacity	At a given point in time, the maximum volume of crude oil a refinery is able to process in its basic distilling units.
proved reserves	Under the SEC reserves rules, proved 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

Table of Contents

	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.
reserve-to-production ratio	For any given well, field or country, the ratio of proved reserves to annual production of crude oil or, with respect to natural gas, to wellhead production excluding flared gas.
sales gas	Marketable production of gas on an as sold basis, excluding flared gas, injected gas and gas consumed in operations.
undeveloped reserves	Under the SEC reserves rules, undeveloped 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.

3

Table of Contents

	(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, or by other evidence using reliable technology establishing reasonable certainty.
water cut	For a given oil region, the percentage that water constitutes of all fluids extracted from all wells in that region.

References to:

- BOE is to barrels-of-oil equivalent,
- Mcf is to thousand cubic feet, and
- Bcf is to billion cubic feet.

4

Table of Contents

FORWARD-LOOKING STATEMENTS

This annual report contains forward-looking statements within the meaning of Section 27A of the Securities Act of 1933, as amended, and Section 21E of the Securities and Exchange Act of 1934, as amended. These forward-looking statements are, by their nature, subject to significant risks and uncertainties. These forward-looking statements include, without limitation, statements relating to:

- the amounts and nature of future exploration, development and other capital expenditures;
- future prices and demand for crude oil, natural gas, refined products and chemical products;
- development projects;
- exploration prospects;
- reserves potential;
- production of oil and gas and refined and chemical products;
- development and drilling potential;
- expansion and other development trends of the oil and gas industry;
- the planned development of our natural gas operations;
- the planned expansion of our refined product marketing network;
- the planned expansion of our natural gas infrastructure;
- the anticipated benefit from the acquisition of certain overseas assets from CNPC, our parent company;
- the plan to continue to pursue attractive business opportunities outside China;

our future overall business development and economic performance;

our anticipated financial and operating information regarding, and the future development and economic performance of, our business;

our anticipated market risk exposure arising from future changes in interest rates, foreign exchange rates and commodity prices; and

other prospects of our business and operations.

The words anticipate , believe , could , estimate , expect , intend , may , plan , seek , will and would expressions, as they related to us, are intended to identify a number of these forward-looking statements.

By their nature, forward-looking statements involve risks and uncertainties because they relate to events and depend on circumstances that will occur in the future and are beyond our control. The forward-looking statements reflect our current views with respect to future events and are not a guarantee of future performance. Actual results may differ materially from information contained in the forward-looking statements as a result of a number of factors, including, without limitation, the risk factors set forth in this annual report and the following:

fluctuations in crude oil and natural gas prices;

failure to achieve continued exploration success;

failures or delays in achieving production from development projects;

continued availability of capital and financing;

acquisitions and other business opportunities that we may pursue;

Table of Contents

- general economic, market and business conditions, including volatility in interest rates, changes in foreign exchange rates and volatility in commodity markets;
- liability for remedial actions under environmental regulations;
- the actions of competitors;
- wars and acts of terrorism or sabotage;
- changes in policies, laws or regulations of the PRC, including changes in applicable tax rates;
- the other changes in global economic and political conditions affecting the production, supply and demand and pricing of crude oil, refined products, petrochemical products and natural gas; and
- the other risk factors discussed in this annual report, and other factors beyond our control.

You should not place undue reliance on any forward-looking statements.

Table of Contents

PART I

Item 1 *IDENTITY OF DIRECTORS, SENIOR MANAGEMENT AND ADVISORS*

Not applicable. However, see Item 6 Directors, Senior Management and Employees Directors, Senior Management and Supervisors and Item 16C Principal Accountant Fees and Services .

Item 2 *OFFER STATISTICS AND EXPECTED TIMETABLE*

Not applicable.

Item 3 *KEY INFORMATION*

Table of Contents

Selected Financial Data

Historical Financial Information

You should read the selected historical financial data set forth below in conjunction with our consolidated financial statements and the notes and Item 5 Operating and Financial Review and Prospects included elsewhere in this annual report. The selected consolidated statement of comprehensive income (except for ADS data) and cash flow data for the years ended December 31, 2016, 2017 and 2018 and the selected consolidated statement of financial position data as of December 31, 2017 and 2018 set forth below are derived from our audited consolidated financial statements included elsewhere in this annual report. The selected consolidated statement of comprehensive income data (except for ADS data) and cash flow data for the years ended December 31, 2014 and 2015 and the selected consolidated statement of financial position data as of December 31, 2014, 2015 and 2016 set forth below are derived from our audited financial statements not included in this annual report. Our consolidated financial statements were prepared in accordance with IFRS as issued by the International Accounting Standards Board. The financial information included in this section may not necessarily reflect our results of operations, financial position and cash flows in the future.

	As of or for the Year Ended December 31,				
	2014	**2015**	**2016**	**2017**	**2018**
	RMB	**RMB**	**RMB**	**RMB**	**RMB**
	(In millions, except for per share, per ADS data and percentages)				
Consolidated Statement of Comprehensive Income Data					
Revenue	2,282,962	1,725,428	1,616,903	2,015,890	2,353,588
Total operating expenses	(2,113,129)	(1,646,176)	(1,556,268)	(1,948,168)	(2,232,591)
Profit from operations	169,833	79,252	60,635	67,722	120,997
Profit before income tax expense	156,759	57,815	45,140	53,089	115,206
Income tax expense	(37,731)	(15,726)	(15,768)	(16,296)	(42,790)
Profit for the year	119,028	42,089	29,372	36,793	72,416
Attributable to:					
Owners of the Company	107,172	35,517	7,857	22,798	52,591
Non-controlling interests	11,856	6,572	21,515	13,995	19,825
Basic and diluted earnings per share attributable to owners of the Company(1)	0.59	0.19	0.04	0.12	0.29
Basic and diluted net earnings per ADS(2)	58.56	19. 41	4.29	12.46	28.73
Consolidated Statement of Financial Position Data					
Total current assets	391,308	349,344	381,665	425,162	433,128
Total non-current assets	2,014,165	2,044,500	2,014,986	1,979,450	1,999,138
Total assets	2,405,473	2,393,844	2,396,651	2,404,612	2,432,266
Total current liabilities	579,829	471,407	499,263	576,667	586,386
Total non-current liabilities	507,863	578,403	524,653	446,626	435,222
Total liabilities	1,087,692	1,049,810	1,023,916	1,023,293	1,021,608
Equity attributable to owners of the Company	1,175,894	1,179,716	1,189,024	1,193,520	1,214,286
Non-controlling interests	141,887	164,318	183,711	187,799	196,372
Total equity	1,317,781	1,344,034	1,372,735	1,381,319	1,410,658

Other Financial Data					
Dividend declared and proposed per share	0.26	0.09	0.06	0.13	0.18
Dividend declared and proposed per ADS	26.35	8.73	5.93	13.00	17.88
Capital expenditures	291,729	202,238	172,386	216,227	255,974
Return on net assets (%)[(3)]	9.1	3.0	0.7	1.9	4.3
Consolidated Statement of Cash Flow Data					
Net cash flows from operating activities	356,477	261,312	265,179	366,655	351,565
Net cash flows used for investing activities	(290,838)	(215,879)	(175,887)	(243,546)	(267,732)
Net cash flows used for financing activities	(44,312)	(45,439)	(67,007)	(94,725)	(123,515)

Table of Contents

(1) As of December 31, 2014, 2015, 2016, 2017 and 2018, respectively, basic and diluted earnings per share were calculated by dividing the profit attributable to owners of the Company by 183,021 million, the total number of shares outstanding in each of these financial years.

(2) Each ADS represents 100 H Shares. The basic and diluted earnings per ADS were calculated with the same method as that used for the calculation of the basic and diluted earnings per share.

(3) Return on net assets is calculated as Profit for the year attributable to owners of the Company divided by Equity attributable to owners of the Company .

Table of Contents

Risk Factors

Our business is primarily subject to various changing competitive, economic and social conditions. Such changing conditions entail certain risks, which are described below.

Risks Related to Macro Economic Conditions

Our operations may be adversely affected by international and domestic economic conditions. As the oil and gas industry is sensitive to macro-economic trends, oil and gas prices tend to fluctuate along with changes in macro-economic conditions. We may experience pricing pressure on our refined products in recessionary periods, which would have an adverse effect on our profitability**.** Changes in macro-economic conditions can affect the demand for certain of our products. These factors may also lead to intensified competition for market share, with consequential potential adverse effects on sales volumes. Inflation may lead to increase in our operating costs. Notwithstanding the measures taken by the PRC government to control inflation, China may experience an increase in inflation in the future and our operating costs may become higher than anticipated. The financial and economic situation may also have a negative impact on third parties with whom we do, or may do, business. Any of these factors may adversely affect our financial condition, results of operations and liquidity.

Risks Related to Competition

The oil, gas and petrochemicals industries are highly competitive. There is strong competition, both within the oil and gas industry and with other industries, in supplying the fuel needs of commercial, industrial and residential markets. In recent years, with the intensive reform of China s petroleum, refining and chemical, natural gas, LNG, pipelines and refined oils sales industries, we have been facing increasingly intense competition from privately-owned companies, foreign-invested enterprises and other state-owned enterprises that recently entered the refinery, chemical, sales, and oil and gas service sectors. In addition, the rapid development of unconventional oil and gas resources, new energy sources and new products also poses competition with the conventional energy and petrochemical industries. Competition puts pressure on product prices, affects oil products marketing and requires continuous management focus on identifying new trends, reducing unit costs and improving efficiency. The implementation of our growth strategy requires continued technological advances and innovation, including advances in exploration, production, refining, petrochemicals manufacturing technology and advances in technology related to energy usage. Our performance could be impeded if competitors developed or acquired intellectual property rights to technology that we required or if our innovation lagged the industry.

The Eastern and Southern regions of China have a higher demand for refined products and chemical products than the Western and Northern regions. Although we have strived to increase our refinery capacity in the Southern regions of China over recent years, most of our refineries and chemical plants are located in the Northeastern and Northwestern regions of China. We incur relatively higher transportation costs for delivery of our refined products and chemical products to certain areas of the Eastern and Southern regions from our refineries and chemical plants in Western and Northern China. We face strong competition from other traditional domestic oil companies, local independent refineries and other competitors. As a result, we expect that we will continue to encounter difficulty in increasing our sales of refined products and chemical products in these regions.

Risks Related to Outbound Investments and Trading

We are subject to various political, legal and regulatory environments in foreign developing countries where we operate, some of which are known to be unstable and differ in certain significant respects from those prevailing in developed countries. The main factors affecting our outbound investments include unstable political situations, unstable tax policies and unstable regulatory regimes. CNPC, our controlling shareholder, and its affiliates and subsidiaries may choose to undertake, without our involvement, overseas investments, operations and trading in the oil and gas industry, including certain exploration and production of oil and gas, refining, transportation, trading, engineering construction and technical services, operations of pipelines and liquefied natural gas, or LNG projects, or other business activities in certain countries or with certain entities that are subject to U.S. sanctions, including Iran, Cuba, Myanmar, Russia and Venezuela.

In 2018, the United States withdrew from the Joint Comprehensive Plan of Action (JCPOA) and reimposed certain sanctions against Iran, which were conditionally lifted in 2015 following entry into the JCPOA. These reimposed sanctions have implications for non-U.S. companies, including requiring foreign companies to cease participation in projects in certain sectors of Iran (including the energy sector), and, except for eight countries and regions (including China) which were granted a Significant Reduction Exception (SRE), prohibiting or restricting oil imports from Iran. Pursuant to section 13(r) to the U.S. Securities Exchange Act of 1934, reporting issuers are required to disclose whether they or any of their affiliates have knowingly engaged in certain activities, transactions, or dealings related to Iran during the reporting period, including activities not prohibited by U.S. or other law. During the reporting period, our controlling shareholder, CNPC, held indirect interests in certain oil and gas development projects in Iran, namely, (i) the MIS oil fields in which CNPC obtained a 75% interest in 2005, (ii) the North Azadegan oilfield, in which CNPC obtained a 100% interest in 2009 and (iii) the South Pars gas field project, in which CNPC obtained a 100% interest in 2009. After temporarily ceasing participation in the South Pars gas field project in 2012, CNPC in July 2017 regained a 30% investment and operating interest in the project under a new Iran Petroleum Contract (the IPC), in which Total S.A. (Total) held a 50.01% interest. In November 2018, Total withdrew from the project, and CNPC took over its interest pursuant to the IPC. Operation with respect to the South Pars project is currently suspended. In 2018, the MIS oilfield and the North Azadgan oilfield were in production, and CNPC extracted oil in order to recover its investment as per the project agreements. After the U.S. reimposed the sanctions, CNPC has been providing minimum support and services to the two oilfields pursuant to the SRE issued to China. In 2018, CNPC transported back to China approximately 2.3 million tons of crude oil that it extracted from the two oilfields, of which approximately 1.1 million tons were resold to our company s refineries. In 2018, crude oil that we processed from the foregoing source accounted for 0.7% of the total oil processed by our refineries and contributed 0.1% of our total revenue.

Since July 2014, the United States has adopted economic sanctions against certain Russian persons and entities, including various entities operating in the financial, energy and defense sectors, such as Rosneft, Gazprom, Transneft, OAO Novatek and Yamal LNG. These sanctions prohibit U.S. persons from transacting in, providing financing for or otherwise dealing in debt issuance by certain of these entities, or restrict exports and transfer of technologies to certain of these entities. CNPC had certain pre-existing trading and investment relationships with some of these sanctioned Russian entities. For example, CNPC entered into a long-term agreement with each of Rosneft and Transneft to import crude oil from Russia in 2009, a long-term agreement with Rosneft to import crude oil from Russia in June 2013 and a long-term agreement with Gazprom to import natural gas from Russia in May 2014. CNPC has resold, and will for the foreseeable future resell, all or a substantial portion of the imported crude oil from Rosneft and Transneft under the crude oil agreements to us. CNPC also indirectly holds 20% equity interest in OAO Yamal LNG, which is a subsidiary of OAO Novatek, another sanctioned Russian entity. In May 2014, we entered into a long-term LNG import agreement with a subsidiary of OAO Yamal LNG to import LNG from Russia.

In August 2017, the United States imposed economic sanctions against the Government of Venezuela and certain state-owned entities, including Petroleos de Venezuela, S.A. (PdVSA). These sanctions prohibit U.S. persons from transacting in, providing financing for or otherwise dealing in new debt issued by these entities on or after August 25, 2017, with certain exceptions for short-term debt. Neither CNPC nor PetroChina purchased such new debt securities issued by the Government of Venezuela or by PdVSA, nor did they provide any assistance to third parties in this regard. CNPC has longstanding trading and investment activities in Venezuela. In 2018, based on certain pre-existing contract obligations, we purchased

products from PdVSA for resale which contributed 0.06% of our total revenue in 2018. In 2008, CNPC Exploration and Development Company Limited (CNPC E&D), a joint venture held as to 50% by us and 50% by a wholly-owned subsidiary of CNPC, acquired 40% stake in the Sinovensa block located in Carabobo, Monagas State, Venezuela. The other 60% stake of the block is held by PdVSA, which also serves as the operator of the block. The block produces and sells heavy oil. For the year ended December 31, 2018, the share of profit generated from the block accounted for approximately 1.5% of our total profit. CNPC E&D currently does not plan to discontinue the business or dispose of the interest in this block.

We closely monitor the possible impacts of U.S. sanctions against the countries and entities which have trading or investment relationships with CNPC or us. We do not believe that our activities, nor those of CNPC, with these entities are in violation of applicable economic sanctions administered by the United States. However, we cannot assure you that current or future regulations or developments related to economic sanctions will not have a material adverse impact on our business or reputation. Certain U.S. based investors may not wish to invest and have proposed or adopted divestment or similar initiatives regarding investments in companies that do business with countries and entities that are subject to U.S. sanctions. These investors may not wish for CNPC or us to make investments or conduct activities in the countries or with the entities that are the subject of U.S. sanctions and may divest their investment in us because of our relationship with CNPC and its investments and activities in those countries or with those entities that are the subject of U.S. sanctions. As a result, the trading prices of our ADSs may be adversely affected.

In July 2012, the U.S. Treasury Department s Office of Foreign Assets Control, OFAC, added Bank of Kunlun Co., Ltd., or Kunlun Bank, an affiliate of our company due to common control by CNPC, to its List of Foreign Financial Institutions Subject to Part 561 pursuant to the Comprehensive Iran Sanctions, Accountability, and Divestment Act of 2010. OFAC reported that Kunlun Bank provided financial services to at least six Iranian banks that were on OFAC s sanctions list during 2012. These financial services included holding accounts, making transfers and paying letters of credit on behalf of the designated banks. In 2018, Kunlun Bank has discontinued the business activities which are subject to U.S. sanctions. Our company has no involvement in or control over such activities of Kunlun Bank or CNPC and CNPC subsidiaries and affiliates, and we have never received any revenue or profit derived from these activities.

Risks Related to Government Regulation

Our operations, like those of other PRC oil and gas companies, are subject to extensive regulations and control by the PRC government. These regulations and control affect many material aspects of our operations, such as exploration and production licensing, industry-specific and product-specific taxes and fees and environmental and safety standards. As a result, we may face significant constraints on our ability to implement our business strategies, to develop or expand our business operations or to maximize our profitability. Our business may also be affected by future changes in certain policies of the PRC government with respect to the oil and gas industry.

Currently, the PRC government must approve the construction and major renovation of significant refining and petrochemical facilities as well as the construction of significant crude oil, natural gas and refined product pipelines and storage facilities. We presently have several significant projects pending approval from the relevant government authorities and will need approvals from the relevant government authorities in connection with several other significant projects. We do not have control over the timing and outcome of the final project approvals.

Because PRC laws, regulations and legal requirements dealing with economic matters continue to evolve, and because of the limited volume of published judicial interpretations and the non-binding nature of prior court decisions, the interpretation and enforcement of these laws, regulations and legal requirements involve some uncertainty. Because the PRC Company Law is different in certain important aspects from company laws in the United States, Hong Kong and other common law jurisdictions, and because the PRC securities

Table of Contents

laws and regulations are still at a stage of development, you may not enjoy the shareholders protections that you may be entitled to in other jurisdictions.

Risks Related to Controlling Shareholder

As of December 31, 2018, CNPC beneficially owned approximately 81.03% of our share capital. This ownership percentage enables CNPC to elect our entire board of directors without the concurrence of any of our other shareholders. Accordingly, CNPC is in a position to:

- control our policies and management affairs;
- subject to applicable PRC laws and regulations and provisions of our articles of association, affect the timing and amount of dividend payments and adopt amendments to certain of the provisions of our articles of association; and
- otherwise determine the outcome of most corporate actions and, subject to the regulatory requirements of the jurisdictions in which our shares are listed, cause our company to effect corporate transactions without the approval of minority shareholders.

CNPC s interests may sometimes conflict with those of some or all of our minority shareholders. We cannot assure you that CNPC, as our controlling shareholder, will always vote its shares in a way that benefits our minority shareholders.

In addition to its relationship with us as our controlling shareholder, CNPC by itself or through its affiliates also provides us with certain services and products necessary for our business activities, such as construction and technical services, production services, materials supply services, social services and financial services. The interests of CNPC and its affiliates as providers of these services and products to us may conflict with our interests.

Risks Related to Pricing and Exchange Rate

Our operations are affected by the volatility of prices for crude oil, refined products and natural gas. We set our crude oil median prices monthly based on the international trading prices for crude oil.

In recent years, international prices for crude oil have fluctuated substantially in response to changes in global and regional economy, politics and supply and demand for crude oil. We do not have, and will not have, control over factors affecting international prices for crude oil. Fluctuations in crude oil prices have a significant impact in our results of operations. A decline in crude oil prices may reduce revenues from, and may result in a loss in, our exploration and production segment. Further, if crude oil prices remain at a low level for a prolonged period, our company has to determine and estimate whether our oil and gas assets may suffer impairment and, if so, the amount of the impairment. An increase in crude oil prices may, however, increase the production costs of refined products, reduce demand for our products and affect our operating profits.

Since 2008, the PRC government has gradually improved its refined oil pricing mechanism. When there is a change in the average crude oil price in the international market during a given time period, the PRC government can adjust refined oil prices. When international crude oil price experiences sustained increases or becomes significantly volatile, the PRC government may increase its control over the refined oil prices. As a result, the regulation on refined product prices by the PRC government may reduce our profit and cause our refining assets to suffer impairment.

We negotiate the actual settlement price with natural gas users within the price range permitted by the PRC government. When the domestic price is lower than the international natural gas price, the cost of our imported natural gas will be higher than the sales price of our natural gas, which may reduce our revenues and profit, or result in losses, cause our natural gas assets to suffer impairment.

We receive most of our revenues in Renminbi. A portion of our Renminbi revenues must be converted into other currencies to meet our foreign currency obligations. The existing foreign exchange limitations under the PRC laws and regulations could affect our ability to obtain foreign exchange through debt financing, or to obtain foreign exchange for capital expenditures. The value of Renminbi against U.S. dollar and other currencies may fluctuate and is affected by, among other things, changes in China s political and economic conditions. The PRC government has implemented a floating exchange rate system to allow the value of the Renminbi to fluctuate within a regulated band based on market supply and demand and by reference to a basket of foreign currencies. Because most of our imports of crude oil, equipment and other materials and our outbound investments are settled in foreign currencies, the exchange rates between RMB and U.S. dollars and any other relevant foreign currencies may have an effect on our crude oil purchase costs and our investment costs.

Risks Related to Environmental Protection and Safety Production

Compliance with changes in laws, regulations and obligations relating to environmental protection and safety production could result in substantial expenditures and reduced profitability from increases in operating costs. In recent years, the PRC government has implemented environmental protection and safety production laws and regulations and has gradually improved refined oil standards which have stricter requirements for our business, and led to an increase in our operating costs. In the future, the PRC government will implement more stringent environmental protection and safety production regulations and impose higher standards on refined oil products. Compliance with these new regulations and standards will increase our costs and expenses.

Our oil and gas exploration and production activities shall comply with relevant PRC environment protection laws and regulations governing abandonment and disposal processes for oil and gas exploration and production activities. We have established standard abandonment procedures pursuant to these laws and regulations. We have included under our asset retirement obligations the costs for these abandonment activities and this asset retirement obligation is based on our best estimate of future abandonment expenditures. In addition, PRC national or local governments may enact stricter environmental protection regulations and our abandonment costs may increase as a result.

Exploring for, producing and transporting crude oil and natural gas and producing and transporting refined products and chemical products involve many hazards. These hazards may result in fires, explosions, spills, blow-outs and other unexpected or dangerous conditions causing personal injuries or death, property damage, environmental damage and interruption of operations.

Some of our oil and natural gas fields are surrounded by residential areas or located in areas where natural disasters, such as earthquakes, floods and sandstorms, tend to occur more frequently than in other areas. As with many other companies around the world that conduct similar businesses, we have experienced accidents that have caused property damage and personal injuries and death.

Significant operating hazards and natural disasters such as earthquake, tsunami and health epidemics may cause partial interruptions to our operations and property and environmental damage that could have an adverse impact on our financial condition.

Risks Related to Climate Change

In recent years, the oil industry has faced an increasingly severe challenge imposed by global climate change. Numerous international, domestic and regional treaties and agreements that restrict the emission of greenhouse gas have been executed and become effective. China and some other countries in which we operate have adopted, or are considering the adoption of, regulatory frameworks to reduce greenhouse gas emissions. These include adoption of carbon emission quota and trade regimes, carbon taxes, increased efficiency standards, and incentives or mandates for renewable energies. These requirements may lead to a substantial increase in our expenditures, make our products more expensive, lengthen our project time, reduce the demand for hydrocarbons, and shift hydrocarbon demand toward relatively low carbon sources such as natural gas. Current and pending greenhouse gas regulations may also increase our compliance costs, such as those for monitoring or sequestering emissions. As a result, our results of operations and our strategic investment may be adversely affected.

China is a signatory country to the Paris Agreement which has taken effect since November 2016. China is expected to reach the peak level of carbon emissions by 2030. In 2017, the PRC government rolled out the national carbon quota trading system. Our subsidiaries operating in China are expected to be subject to mandatory requirement with respect to carbon emission quota and trading in the next few years, which could increase our costs of operations.

Risks Related to Insurance

Due to the fact that oil industry is susceptible to high and industry-specific risks in nature, the current ordinary commercial insurance cannot cover all the business areas in which we operate. We maintain insurance coverage against some, but not all, potential losses. We may suffer material losses resulting from uninsurable or uninsured risks or insufficient insurance coverage.

Risks Related to Oil and Gas Reserves

The crude oil and natural gas reserves data in this annual report are only estimates. The reliability of reserves estimates depends on a number of factors, assumptions and variables, such as the quality and quantity of our technical and economic data and the prevailing oil and gas prices applicable to our production, some of which are beyond our control and may prove to be incorrect over time. Results of drilling, testing and production after the date of estimates may require substantial upward or downward revisions in our reserves data. Our actual production, revenues and expenditures with respect to our reserves may differ materially from these estimates because of these revisions.

We are actively pursuing business opportunities outside China to improve our international operations. We cannot assure you, however, that we can successfully locate sufficient, if any, alternative sources of crude oil supply due to the complexity of the international political, economic and other conditions. If we fail to obtain sufficient alternative sources of crude oil supply, our results of operations and financial condition may be materially and adversely affected.

Risks Related to Liquidity

We have made best endeavors to ensure an appropriate level of liquidity and financing ability. However, as we are currently making our efforts to find high-quality large-scale reserves, strengthening capacity building in key areas, constructing new, and expanding some existing, refinery and petrochemical facilities and constructing several natural gas and oil pipelines, we may have to make substantial capital expenditures and investments. We cannot assure you that the cash generated by our operations will be sufficient to fund these development plans or that our actual future capital expenditures and investments will not significantly exceed our current planned amounts. If either of these conditions arises, we may have to seek external financing to satisfy our capital needs. Our inability to obtain sufficient funding for our development plans could adversely affect our business, financial condition and results of operations.

Risks Related to Effectiveness of Internal Control over Financial Reporting

The SEC, as required by Section 404 of the Sarbanes-Oxley Act of 2002, has adopted rules requiring every public company in the United States to include a management report on such company s internal control over financial reporting in its annual report, which contains management s assessment of the effectiveness of our internal control over financial reporting. In addition, an independent registered public accounting firm must attest to and report on the effectiveness of our internal control over financial reporting. Although our management concluded that our internal control over our financial reporting for the fiscal year ended December 31, 2018 was effective, and our independent registered public accounting firm has issued an attestation report, which concluded that our internal control over financial reporting was effective in all material aspects as of December 31, 2018, we may discover other deficiencies in the course of our future evaluation of our internal control over our financial reporting and may be unable to remediate such deficiencies in a timely manner. If we fail to maintain the adequacy of our internal control over financial reporting, we may not be able to conclude that we have effective internal control over financial reporting on an ongoing basis, in accordance with the Sarbanes-Oxley Act. Moreover, effective internal control is necessary for us to produce reliable financial reports and is important to prevent fraud. As a result, our failure to maintain effective internal control over financial reporting could result in the loss of investor confidence in the reliability of our financial statements, which in turn could harm our business and negatively impact the trading prices of our ADSs, H Shares or A Shares.

Risks Related to Audit Reports Prepared by an Auditor who is not Inspected by the Public Company Accounting Oversight Board

As a company with shares registered with the U.S. Securities and Exchange Commission, or the SEC, and traded publicly in the United States, our independent registered public accounting firm is required under the laws of the United States to be registered with the Public Company Accounting Oversight Board, or the PCAOB, and undergo regular inspections by the PCAOB to assess its compliance with the laws of the United States and professional standards. The PCAOB, however, is currently unable to inspect a registered public accounting firm s audit work relating to a company s operations in China where the documentation of such audit work is located in China. Accordingly, our independent registered public accounting firm s audit of our operations in China is not subject to the PCAOB inspection.

The PCAOB has conducted inspections of independent registered public accounting firms outside of China and has at times identified deficiencies in the audit procedures and quality control procedures of those accounting firms. Such deficiencies may be addressed in those accounting firms future inspection process to improve their audit quality. Due to the lack of PCAOB inspections of audit work undertaken in China, our investors do not have the benefit of the PCAOB inspection of our independent registered public accounting firm s audit work and audit quality control procedures.

Risks Related to SEC Litigation Against the Big Four PRC-based Accounting Firms

On January 22, 2014, Judge Cameron Elliot, an SEC administrative law judge, issued an initial decision suspending the Chinese member firms of the Big Four accounting firms, including our independent registered public accounting firm, from, among other things, practicing before the SEC for six months. In February 2014, the initial decision was appealed. While under appeal and in February 2015, the Chinese member firms of Big Four accounting firms reached a settlement with the SEC. As part of the settlement, each of the Chinese member firms of Big Four accounting firms agreed to settlement terms that include a censure, undertakings to make a payment to the SEC, procedures and undertakings as to future requests for documents by the SEC and possible additional proceedings and remedies should those undertakings not be adhered to.

If the settlement terms are not adhered to, the Chinese member firms of Big Four accounting firms may be suspended from practicing before the SEC, which could in turn delay the timely filing of our financial statements with the SEC. In addition, it could be difficult for us to timely identify and engage another registered public accounting firm to audit and issue an opinion on our financial statements and our internal control over financial reporting. A delinquency in our filing of the annual report with the SEC may result in the NYSE initiating delisting procedures, which could harm our reputation and have other material adverse effects on our overall growth and prospect.

16

Table of Contents

Risks Related to Employee Misconduct

We may not be able to detect or prevent employee misconduct, including misconduct by senior management, and such misconduct may damage our reputation and could adversely affect the trading price of our ordinary shares and ADSs.

We have gradually reinforced and enhanced our internal control and corporate governance policies and procedures in order to strengthen our ability to detect and prevent employee misconduct. We cannot assure you, however, that we will be able to detect or prevent such misconduct in a timely fashion, or at all. If we fail to prevent employee misconduct, our reputation may be harmed, and the trading price of our ordinary shares and ADSs could be adversely affected.

Risks Related to Cyber Security

Our activities depend heavily on the reliability and security of our information technology (IT) systems. Our IT systems may suffer disruptions due to cyber-attack, computer intrusions and viruses, technical failure and disruptions, power and network outages or natural disasters. We have adopted multi-layer technological measures for prevention and detection of cybersecurity problems, and we also train our employees in order to improve their awareness and ability to detect and respond to cybersecurity situations. If our measures prove to be insufficient, the cybersecurity disruptions could damage or destroy assets, compromise business systems, result in proprietary information being altered, lost, or stolen; result in employee, customer, or third-party information or material intellectual property being compromised, cause physical harm to people or the environment, or otherwise disrupt our business operations. We could incur significant costs to remedy the effects of a major cybersecurity disruption in addition to costs in connection with resulting regulatory actions, litigation or reputational harm. As a result, we and our customers, employees, or third parties could be adversely affected, potentially having a material adverse effect on our business and financial conditions.

Item 4 *INFORMATION ON THE COMPANY*

Introduction

History and Development of Our Company

Our legal name is and its English translation is PetroChina Company Limited.

We are the largest oil and gas producer and seller occupying a leading position in the oil and gas industry in the PRC and one of the largest companies in the world. We are engaged in a broad range of petroleum and natural gas related activities, including the exploration, development, production and marketing of crude oil and natural gas; the refining of crude oil and petroleum products, as well as the production and marketing of basic petrochemical products, derivative chemical products and other chemical products; the marketing of refined oil products and trading; and the transmission of natural gas, crude oil and refined oil products as well as the sale of natural gas.

Currently, substantially all of our crude oil and natural gas reserves and production-related assets are located in China. Our exploration, development and production activities commenced in the early 1950s. Over more than six decades, we have conducted crude oil and natural gas exploration activities in many regions of China.

We commenced limited refining activities in the mid-1950s. Our chemicals operations commenced in the early 1950s. In the early 1960s, we began producing ethylene. Our natural gas transmission and marketing activities commenced in Sichuan in Southwestern China in the 1950s.

Table of Contents

We have increased our efforts to pursue attractive business opportunities outside China as part of our business growth strategy to utilize both domestic and international resources to strengthen our competitiveness. Since 2005, we have acquired interests in various oil and natural gas assets in several countries, which significantly expanded our overseas operations and effectively increased our oil and gas reserves and production volumes. We are currently assessing the feasibility of making further investments in international oil and gas markets. At the same time, we have been maintaining certain proportion of imported crude oil and natural gas in accordance with our needs. In 2018, we imported approximately 622.3 million barrels of crude oil, as compared to 486.1 million barrels and 572.5 million barrels of crude oil in 2016 and 2017, respectively.

We were established as a joint stock company with limited liability under the Company Law of the PRC on November 5, 1999 as part of a restructuring in which CNPC transferred to us most of the assets and liabilities of CNPC relating to its exploration and production, refining and marketing, chemicals and natural gas businesses.

On April 7, 2000, we completed a global offering of H Shares and ADSs. In September 2005, we completed a follow-on offering of over 3 billion H Shares at the price of HK$6.00 per share. In October 2007, we issued 4 billion A Shares at an issue price of RMB16.7 per share. The A Shares were listed on the Shanghai Stock Exchange on November 5, 2007. As of December 31, 2018, CNPC beneficially owned 148,010,665,536 A Shares and 291,518,000 H Shares in us, representing approximately 81.03% of our share capital in aggregate. The H Shares held by CNPC were through Fairy King Investments Limited, an overseas wholly owned subsidiary of CNPC.

For a description of our principal subsidiaries, see Note 19 to our consolidated financial statements.

Our headquarters are located at 9 Dongzhimen North Street, Dongcheng District, Beijing, China, 100007, and our telephone number at this address is (86-10) 5998-2622. Our website address is www.petrochina.com.cn. The information on our website is not part of this annual report. Our annual report on form 20-F and other reports filed electronically with the SEC can be found on the SEC s website www.sec.gov.

Our Corporate Organization Structure

The following chart illustrates our corporate organization structure as of December 31, 2018.

(1) Indicates approximate shareholding.
(2) Indicates approximate shareholding, including the 291,518,000 H Shares indirectly held by CNPC as of December 31, 2018 through Fairy King Investments Limited, a wholly owned overseas subsidiary of CNPC, and not including the 5,871,488,603 A Shares transferred to and held in a trust account as collaterals for the exchangeable bonds issued by CNPC.
(3) Includes PetroChina Planning & Engineering Institute, PetroChina Exploration & Development Research Institute, IT Service Center, PetroChina Petrochemical Research Institute and several other companies.

Table of Contents

Acquisitions and Divestment

On March 21, 2018, we entered into a concession agreement with Abu Dhabi National Oil Company, pursuant to which we were granted 10% equity interest in the Abu Dhabi Umm Shaif & Nasr Oilfield for a fee of US$575 million and 10% equity interest in the Lower Zakum Oilfield for a fee of US$600 million, both for a term of 40 years.

On September 27, 2018, we entered into an equity purchase agreement with Total S.A. to acquire the 22.407% equity interest held by Total S.A. in Dalian West Pacific Petrochemical Co., Ltd. (Dalian West Pacific). On December 6, 2018, we entered into an equity purchase agreement with each of Sinochem Group Co., Ltd. and Sinochem International Oil (Hong Kong) Co. Ltd., to acquire 8.424% and 25.208% equity interests in Dalian West Pacific, respectively. After the completion of the aforementioned equity purchase, together with our existing equity interest, we will hold a total equity interest of 84.475% equity in Dalian West Pacific and Dalian West Pacific will become one of our principal subsidiaries.

For information on capital expenditures, please see Item 5 Operating and Financial Review and Prospects Liquidity and Capital Resources Capital Expenditures and Investments.

Table of Contents

Table of Contents

Exploration and Production

We engage in crude oil and natural gas exploration, development and production. Substantially all of our total estimated proved crude oil and natural gas reserves are located in China, principally in Northeastern, Northern, Southwestern and Northwestern China. Meanwhile, we have enhanced our overseas cooperation and expanded our strategic presence in five major overseas oil and gas cooperation regions by conducting new project development. In 2018, the crude oil and natural gas produced by us at overseas regions accounted for 17.6% and 7.8% of our total production of crude oil and natural gas, respectively.

We currently hold exploration and exploitation licenses for oil and gas (including coal seam gas) covering a total area of approximately 295.5 million acres, including the exploration licenses covering a total area of approximately 264.8 million acres and the exploitation licenses covering a total area of approximately 30.7 million acres.

The following table sets forth the financial and operating data of our exploration and production segment for each of the years ended December 31, 2016, 2017 and 2018:

	Year Ended December 31,		
	2016	**2017**	**2018**
Revenue (RMB in millions)	412,484	505,430	658,712
Profit from operations (RMB in millions)	3,148	15,475	73,519
Proved developed and undeveloped reserves			
Crude oil (million barrels)	7,437.8	7,481.3	7,640.8
Natural gas (Bcf)	78,711.8	76,887.6	76,467.0
Production			
Crude oil (million barrels)	920.7	887.0	890.3
Natural gas for sale (Bcf)	3,274.5	3,423.4	3,607.6

Reserves

As of December 31, 2018, our total estimated proved reserves of crude oil was approximately 7,640.8 million barrels and our total estimated proved reserves of natural gas was approximately 76,467.0 Bcf. As of December 31, 2018, proved developed reserves for crude oil and natural gas accounted for 76.5% and 52.5% of our total proved crude oil and natural gas reserves, respectively. Total proved hydrocarbon reserves, including our overseas crude oil reserves of 811.0 million barrels and overseas natural gas reserves of 1,986.9 Bcf, increased by 0.44% from approximately 20,295.9 million BOE as of December 31, 2017 to approximately 20,385.3 million BOE as of December 31, 2018. Natural gas as a percentage of total proved hydrocarbon reserves decreased from 63.1% as of December 31, 2017 to 62.5% as of December 31, 2018.

Approximately 33% of our estimated proved reserves as of December 31, 2018 was assessed by our internal assessment team and audited by our independent engineering consultant. The other part of our estimated proved reserves as of December 31, 2018 and the estimated proved reserves as of December 31, 2016 and 2017 were based on the assessment performed by our independent engineering consultants according to the reserves assessment methodology generally adopted in the U.S. Our independent engineering consultants for 2016, 2017 and 2018 were DeGolyer and MacNaughton, Ryder Scott Company L.P., GLJ Petroleum Consultants and McDaniel & Associates Consultants Ltd. Our reserves estimates include only crude oil and natural gas which we believe can be reasonably produced within the current terms of our production licenses or within the terms of the licenses which we are reasonably certain can be renewed. See Regulatory Matters Exploration Licenses and Production Licenses for a discussion of our production licenses. Also see Item 3 Key Information Risk Factors Risks Related to Oil and Gas Reserves for a discussion of the uncertainty inherent in the estimation of proved reserves.

Our reserves data in 2016, 2017 and 2018 were prepared in accordance with the SEC s final rules on Modernization of Oil and Gas Reporting .

Internal Controls Over Reserves Estimates

We have appointed a Reserves Assessment Directing Team, or the RAD Team. The leader of the RAD Team is our president.

We have implemented a practicing professional certification regime to supervise our employees engaged in oil and gas reserves evaluation and auditing functions. We have set up a team of reserves auditors covering our headquarter office and regional companies to perform reserves evaluation and audits. Meanwhile, we have established a special reserves management department in our exploration and production segment. Each of the officers and employees of that department has over 20 years experience in oil industry and over 10 years experience in SEC-guided reserves evaluation. All of the members of that department have national-level registered qualifications in reserves expertise. Each regional company has established a reserves management committee and a multi-disciplinary reserves research office. Mr. Duan Xiaowen from the Reserves Administration Division of the exploration and production segment, is the person in charge of our reserves estimation. Mr. Duan holds a bachelor s degree in geology and a master s degree in business administration. He has over 25 years of work experience in oil and gas exploration and development industry and has been engaged in reserves estimate and management for a long time. Since 2008, Mr. Duan has been involved in the supervision of reserves estimation and management in our company. In 2016, Mr. Duan became the division head primarily responsible for overseeing the preparation of the reserves estimates, estimation technology and management. The reserves research offices of the regional companies are responsible for estimating newly discovered reserves and updating the estimates of existing reserves. The results of our oil and gas reserves assessment are subject to a two-level review by both the regional companies and our exploration and production company, with final examination and approval by the RAD Team.

In addition, we commissioned independent assessment firms to independently reassess or audit our annually assessed proved reserves in accordance with relevant SEC rules. We disclose the reserves in accordance with the SEC requirements.

Third-Party Reserves Reports

DeGolyer and MacNaughton, an independent petroleum engineering consulting firm based in the United States, carried out an independent assessment and audit of our reserves in China and certain other countries as of December 31, 2016, 2017 and 2018. Mr. Thomas C. Pence, a senior vice president of DeGolyer and MacNaughton, is primarily responsible for supervising the preparation of our reserves report. Mr. Pence is a Registered Professional Engineer in Texas, a member of the International Society of Petroleum Engineers, and has over 36 years of experience in oil and gas reservoir studies and reserves evaluations.

Ryder Scott Company, L.P. (Ryder Scott), an independent petroleum engineering consulting firm based in the United States, carried out an independent assessment of certain of our selected petroleum assets such as in Chad, West Qurna and Peru as of December 31, 2016, 2017 and 2018. Mr. Timour Baichev, a vice president of Ryder Scott, was responsible for overseeing the estimate of the reserves, future production and income as stated in the reserves report. Mr. Timour Baichev is a licensed professional engineer and has over 35 years of experience in the petroleum reserves estimation and evaluation.

GLJ Petroleum Consultants (GLJ), a petroleum consulting firm based in Canada, carried out an independent assessment of our reserves for certain gas and oil properties in Canada as of December 31, 2016, 2017 and 2018.

Ms. Trisha MacDonald was the project manager for the evaluation. She is a senior engineer and has over 10 years of relevant experience.

22

Table of Contents

McDaniel & Associates Consultants Ltd., a petroleum consulting firm with its headquarters in Canada, carried out an independent assessment of our reserves held through PetroKazakhstan Inc. as of December 31, 2016, 2017 and 2018. Mr. Cam Boulton, a vice president of McDaniel & Associates Consultants Ltd., was responsible for supervising the preparation of our reserves report. Mr. Boulton is a member of the Association of Professional Engineers and Geoscientists of Alberta and a member of Society of Petroleum Engineers. He has over 10 years experience in oil and gas reservoir evaluation.

None of the above consulting firms or their partners, senior officers or employees has any direct or indirect financial interest in our company and the remunerations to the firms are not in any way contingent upon reported reserves estimates.

For detailed information about our net proved reserves estimates, please refer to the summary reports of reserves filed herewith as exhibits to this annual report on Form 20-F.

The following table sets forth our estimated proved reserves (including proved developed reserves and proved undeveloped reserves), proved developed reserves and proved undeveloped reserves of crude oil and natural gas as of December 31, 2016, 2017 and 2018.

	Crude Oil and Condensate (Million barrels)	**Natural Gas[1] (Bcf)**	**Combined (BOE, in millions)**
Proved developed and undeveloped reserves			
Reserves as of December 31, 2015	8,521.1	77,524.7	21,441.9
Revisions of previous estimates	(810.9)	(863.2)	(954.7)
Extensions and discoveries	491.7	4,770.3	1,286.8
Improved recovery	93.0		93.0
Purchased	63.6	554.5	156.0
Production for the year	(920.7)	(3,274.5)	(1,466.6)
Reserves as of December 31, 2016	7,437.8	78,711.8	20,556.4
Revisions of previous estimates	486.2	(1,750.8)	194.6
Extensions and discoveries	346.3	3,350.0	904.6
Improved recovery	98.0		98.0
Purchased			
Production for the year	(887.0)	(3,423.4)	(1,457.7)
Reserves as of December 31, 2017	7,481.3	76,887.6	20,295.9
Revisions of previous estimates	334.7	(1,377.9)	105.2
Extensions and discoveries	427.5	4,564.9	1,188.3
Improved recovery	95.9		95.9
Purchased	191.7		191.7
Production for the year	(890.3)	(3,607.6)	(1,491.7)
Reserves as of December 31, 2018	7,640.8	76,467.0	20,385.3
Proved developed reserves			
As of December 31, 2016	5,176.3	40,663.8	11,953.5
As of December 31, 2017	5,592.9	39,242.6	12,133.2
As of December 31, 2018	5,843.1	40,128.2	12,531.1
Proved undeveloped reserves			

As of December 31, 2016	2,261.5	38,048.0	8,602.9
As of December 31, 2017	1,888.4	37,645.0	8,162.7
As of December 31, 2018	1,797.7	36,338.8	7,854.2
Share of proved developed and undeveloped reserves in associates and joint ventures calculated by the equity method			
As of December 31, 2016	504.0	347.6	561.9
As of December 31, 2017	395.3	372.3	457.3
As of December 31, 2018	321.4	429.4	392.9

(1) Represents natural gas remaining after field separation for condensate removal and reduction for flared gas.

Table of Contents

Our proved undeveloped reserves were 7,854.2 million BOE as of December 31, 2018. The main changes in our proved undeveloped reserves in 2018 included (i) an increase of 1,188.3 million BOE through extensions and discoveries; (ii) an increase of 95.9 million BOE through improved recovery; (iii) a decrease of 223.9 million BOE due to our optimization adjustment in the investment plans with respect to certain existing proved undeveloped reserves considering certain new discoveries; and (iv) the conversion of 1,368.8 million BOE of proved undeveloped reserves into proved developed reserves. In 2018, we spent RMB134,995 million on developing proved undeveloped reserves. The overwhelming majority of our proved undeveloped reserves were situated around the oil fields that are currently producing. The majority of our proved undeveloped reserves are already scheduled for development within five years after initial booking.

Some of our natural gas proved undeveloped reserves are being developed more than five years after their initial disclosure primarily due to the effect of long-term natural gas supply contracts. The sale of natural gas produced from our reserves located in China is subject to our long-term contractual obligations to provide a stable supply of natural gas to customers. We sell all of the natural gas through our pipelines and under long-term supply arrangements with customers.

There are mainly two types of long-term supply arrangements. The first is multi-year supply contracts with terms ranging from 20 to 30 years that can be extended upon mutual agreement. The second type is renewable annual contracts. The majority of the natural gas produced from our gas fields in China is put into our nationwide, long-range pipeline system and sold to customers who have entered into multi-year supply contracts with us in the areas where the long-range pipeline system covers. A small portion of the natural gas produced by our company is put into local or internal pipeline systems and sold to customers in the areas adjacent to our gas fields. These customers typically have formed de-facto long-term relationships with our company over the years and enter into supply contracts with us before the year end to determine the amount of gas to be purchased for the next year, with such contracts being renewed every year. In general, our supply relationships with customers under the annual contracts have existed for more than ten years.

Mainly as a result of our contractual obligations to ensure a long-term, stable supply of natural gas to customers, we must maintain a relatively large amount of proved undeveloped natural gas reserves and develop them over an extended period of time (in some cases, longer than five years).

The following tables set forth our crude oil and natural gas proved reserves and proved developed reserves by region as of December 31, 2016, 2017 and 2018.

	As of December 31,					
	2016		2017		2018	
	Proved Developed and Undeveloped	Proved Developed	Proved Developed and Undeveloped	Proved Developed	Proved Developed and Undeveloped	Proved Developed
	(Million barrels)					
Crude oil reserves						
Daqing	1,504.7	1,226.3	1,513.7	1,283.9	1,487.4	1,272.5
Changqing	1,917.8	1,319.1	2,049.2	1,413.9	2,095.2	1,423.6
Xinjiang	795.1	730.5	927.3	855.9	1,000.0	894.6
Other regions[(1)]	3,220.2	1,900.4	2,991.1	2,039.2	3,058.2	2,252.4

Total	7,437.8	5,176.3	7,481.3	5,592.9	7,640.8	5,843.1

Table of Contents

	As of December 31,					
	2016		2017		2018	
	Proved Developed and Undeveloped	Proved Developed	Proved Developed and Undeveloped	Proved Developed	Proved Developed and Undeveloped	Proved Developed
			(Bcf)			
Natural gas reserves[(2)]						
Changqing	25,697.9	9,920.8	25,509.2	9,107.4	25,425.8	9,406.5
Tarim	24,019.2	14,336.1	22,918.7	14,054.7	22,805.9	13,844.9
Chuanyu	13,905.1	6,982.4	13,838.0	6,756.5	13,882.7	7,857.5
Other regions[(1)]	15,089.6	9,424.5	14,621.7	9,324.0	14,352.6	9,019.3
Total	78,711.8	40,663.8	76,887.6	39,242.6	76,467.0	40,128.2

(1) Represents other oil regions in China and our overseas oil and gas fields.
(2) Represents natural gas remaining after field separation for condensate removal and reduction for flared gas.

Exploration and Development

We are currently conducting exploration and development efforts in 12 provinces, two municipalities under the direct administration of the central government and three autonomous regions in China as well as in certain regions in other countries. We believe that we have more extensive experience in the exploration and development of crude oil and natural gas than any of our principal competitors in China.

The following table sets forth the number of wells we drilled, or in which we participated, and the results thereof, for the periods indicated.

Year	Daqing	Xinjiang	Changqing	Others[(1)]	Total
2016					
Net exploratory wells drilled[(2)]	148	134	955	550	1,787
Crude oil	127	87	625	353	1,192
Natural gas	9	1	125	75	210
Dry[(3)]	12	46	205	122	385
Net development wells drilled[(2)]	3,150	792	5,135	2,194	11,271
Crude oil	3,129	777	4,526	1,824	10,256
Natural gas	15	15	551	354	935
Dry[(3)]	6		58	16	80
2017					
Net exploratory wells drilled[(2)]	217	132	868	608	1,825
Crude oil	184	69	539	346	1,138
Natural gas	13	11	59	108	191
Dry[(3)]	20	52	270	154	496
Net development wells drilled[(2)]	3,205	1,520	6,020	3,731	14,476
Crude oil	3,185	1,504	4,217	2,898	11,804

Natural gas	10	13	1,746	820	2,589
Dry(3)	10	3	57	13	83
2018					
Net exploratory wells drilled(2)	231	130	885	532	1,778
Crude oil	207	100	503	299	1,109
Natural gas	15	11	65	89	180
Dry(3)	9	19	317	144	489
Net development wells drilled(2)	3,421	1,630	6,233	3,893	15,177
Crude oil	3,398	1,619	4,086	2,990	12,093
Natural gas	16	11	2,098	885	3,010
Dry(3)	7		49	18	74

Table of Contents

(1) Represents the Liaohe, Jilin, Huabei, Dagang, Sichuan, Tarim, Tuha, Qinghai, Jidong, Yumen, Zhejiang, southern and other oil regions.
(2) Net wells refer to the wells after deducting interests of others. No third parties own any interests in any of our wells.
(3) Dry wells are wells with insufficient reserves to sustain commercial production.

We had 499 wells in the process of being drilled and 9,792 wells with multiple completions as of December 31, 2018.

Oil-and-Gas Properties

The following table sets forth our interests in developed and undeveloped acreage by oil region and in productive crude oil and natural gas wells as of December 31, 2018.

			Acreage[(1)] (Thousand acres)			
	Productive Wells[(1)]		Developed		Undeveloped	
Oil Region	**Crude Oil**	**Natural Gas**	**Crude Oil**	**Natural Gas**	**Crude Oil**	**Natural Gas**
Daqing	77,144	580	1,144.42	103.41	726.90	133.69
Changqing	64,134	15,890	1,510.19	6,628.20	844.83	3,292.87
Xinjiang	34,214	300	394.23	63.44	260.24	18.27
Other regions[(2)]	75,175	6,182	1,671.95	1,320.08	1,014.48	1,871.44
Total	250,667	22,952	4,720.79	8,115.13	2,846.45	5,316.27

(1) Includes all wells and acreage in which we have an interest. No third parties own any interests in any of our wells or acreage.
(2) Represents the Liaohe, Jilin, Huabei, Dagang, Southwestern, Tarim, Tuha, Qinghai, Jidong, Yumen, Zhejiang, Southern and other oil regions.

Table of Contents

Production

The following table sets forth our historical average net daily crude oil and natural gas production by region and our average sales price for the years ended December 31, 2016, 2017 and 2018.

	For the Year Ended December 31,			% of
	2016	2017	2018	2018 Total
Crude oil production[(1)]				
(thousand barrels per day, except percentages or otherwise indicated)				
Daqing	717.2	668.8	632.6	25.9
Changqing	482.7	479.9	480.9	19.7
Xinjiang	224.7	229.0	232.2	9.5
Other[(2)]	1,090.9	1,052.4	1,093.4	44.9
Total	2,515.5	2,430.1	2,439.1	100.0
Annual production (million barrels)	920.7	887.0	890.3	
Average sales price (US$ per barrel)	37.99	50.64	68.28	
Natural gas production[(1)(3)]				
(million cubic feet per day, except percentages or otherwise indicated)				
Changqing	3,103.5	3,121.7	3,275.3	33.1
Tarim	2,093.1	2,277.3	2,353.4	23.8
Chuanyu	1,696.1	1,844.1	1,979.9	20.0
Other[(4)]	2,054.1	2,136.1	2,275.3	23.1
Total	8,946.8	9,379.2	9,883.9	100.0
Annual production (Bcf)	3,274.5	3,423.4	3,607.6	
Average realized price (US$ per Mcf)[(5)]	4.69	5.18	5.85	

(1) Production volumes for each region include our share of the production from all of our cooperative projects with foreign companies in that region.
(2) Represents production from the Liaohe, Jilin, Huabei, Dagang, Tarim, Tuha, Qinghai, Jidong, Yumen and other oil regions and our share of overseas production as a result of our acquisition of overseas assets.
(3) Represents production of natural gas for sale.
(4) Represents production from the Daqing, Qinghai, Tuha, Xinjiang, Liaohe, Huabei, Dagang, Jilin, Jidong, Yumen and other oil and gas regions and our share of overseas production as a result of our acquisition of overseas assets.
(5) As the sales volume of urban gas was included in the sales volume of natural gas beginning in 2018, the average realized prices for 2016 and 2017 were retrospectively adjusted by applying the same approach. For natural gas citygate price, please refer to Item 5 Operating and Financial Review and Prospects Overview .

In 2018, we supplied a substantial majority of our total crude oil sales to our refineries. In addition, we enter into annual crude oil mutual supply framework agreement with Sinopec for supply of crude oil to each other s refineries. Under the annual agreement for 2019, we agreed in principle to supply 0.74 million tons of crude oil to Sinopec s refineries and Sinopec agreed in principle to supply 1.26 million tons of crude oil to us in 2019.

Table of Contents

The following table sets forth our average sales prices and average lifting costs of crude oil and natural gas of our company on an overall basis and those in China in 2016, 2017 and 2018.

	Crude Oil Average Realized Prices (RMB/ton)	Natural Gas(1) Average Realized Prices (RMB/Kilostere)	Average Lifting Cost (US$/BOE)
2016			
Overall	1,865	1,099	11.67
China	1,831	1,146	13.00
2017			
Overall	2,526	1,235	11.53
China	2,494	1,225	12.71
2018			
Overall	3,338	1,367	12.31
China	3,350	1,338	13.55

(1) As the sales volume of urban gas was included in the sales volume of natural gas beginning in 2018, the average realized prices for 2016 and 2017 were retrospectively adjusted by applying the same approach.

Principal Oil and Gas Regions

Daqing Oil Region

The Daqing oil region, our largest oil and gas producing property, is located in the Songliao basin and covers an area of approximately one million acres. In 2016, 2017 and 2018, our crude oil production volume in the Daqing oil region was 717.2 thousand barrels, 668.8 thousand barrels and 632.6 thousand barrels per day, respectively. As of December 31, 2018, we produced crude oil from 40 fields in the Daqing oil region.

As of December 31, 2018, our proved crude oil reserves in the Daqing oil region were 1,487.4 million barrels, representing 19.5% of our total proved crude oil reserves. As of December 31, 2016 and 2017, the proved crude oil reserves in our Daqing oil region were 1,504.7 million barrels and 1,513.7 million barrels, respectively. In 2018, the crude oil reserve-to-production ratio of the Daqing oil region was 6.3 years.

Daqing s crude oil has low sulfur and high paraffin content. As many refineries in China, particularly those in Northeastern China, are configured to refine Daqing crude oil, we have a stable market for the crude oil we produce in the Daqing oil region.

Changqing Oil and Gas Region

The Changqing oil and gas region covers parts of Shaanxi Province, Gansu Province, Ningxia, Inner Mongolia and Shanxi Province. As of December 31, 2018, our proved crude oil reserves in the Changqing oil region were 2,095.2 million barrels, representing 27.4% of our total proved crude oil reserves. In 2018, our crude oil production in the Changqing oil region averaged 480.9 thousand barrels per day, representing approximately 19.7% of our total daily crude oil production. In 2018, the crude oil reserve-to-production ratio at the Changqing oil region was 11.9 years.

In the early 1990s, we discovered the Changqing oil and gas region, which had total proved natural gas reserves of 25,425.8 Bcf as of December 31, 2018, representing 33.3% of our total proved natural gas reserves. In January 2001, we discovered the Sulige gas field in the Changqing oil and gas region, which had total proved natural gas reserves of 14,403.0 Bcf as of December 31, 2018. Sulige gas field is currently the largest gas field in China. In 2018, the Changqing oil and gas region produced 1,195.5 Bcf of natural gas for sale, representing an increase of 4.9% from 1,139.4 Bcf in 2017.

Table of Contents

Xinjiang Oil Region

The Xinjiang oil region is one of our four largest crude oil producing properties and is located in the Junggar basin in Northwestern China. We commenced our operations in the Xinjiang oil region in 1951. The Xinjiang oil region covers a total area of approximately 900,000 acres.

As of December 31, 2018, our proved crude oil reserves in the Xinjiang oil region were 1,000.0 million barrels, representing 13.1% of our total proved crude oil reserves. In 2018, our oil fields in the Xinjiang oil region produced an average of 232.2 thousand barrels of crude oil per day, representing approximately 9.5% of our total daily crude oil production. In 2018, the crude oil reserve-to-production ratio at the Xinjiang oil region was 11.8 years.

Tarim Oil and Gas Region

The Tarim oil and gas region is located in the Tarim basin in Northwestern China with a total area of approximately 590,000 acres. In 1998, we discovered the Kela 2 natural gas field in the Tarim oil and gas region. As of December 31, 2018, the proved natural gas reserves in the Tarim oil and gas region reached 22,805.9 Bcf, representing 29.8% of our total proved natural gas reserves.

In 2018, we produced 859.0 Bcf of natural gas for sale in the Tarim oil and gas region. We have completed the construction of the pipelines to deliver natural gas in the Tarim oil and gas region to the central and Eastern regions of China where there is strong demand for natural gas transmitted through our West-East Gas Pipelines.

Chuanyu Gas Region

We began natural gas exploration and production in the Chuanyu gas region in the 1950s. The Chuanyu gas region covers a total area of approximately 2.3 million acres. The natural gas reserve-to-production ratio in the Chuanyu gas region was approximately 19.2 years in 2018. As of December 31, 2018, we had 116 natural gas fields under development in the Chuanyu gas region.

As of December 31, 2018, our proved natural gas reserves in the Chuanyu gas region were 13,882.7 Bcf, representing 18.2% of our total proved natural gas reserves and an increase of 0.3% from 13,838.0 Bcf as of December 31, 2017. In 2018, our natural gas production for sale in the Chuanyu gas region reached 722.7 Bcf, representing 20.0% of our total natural gas production for sale.

Table of Contents

Table of Contents

Refining and Chemicals

We now operate 29 enterprises located in nine provinces, four autonomous regions and three municipalities to engage in refining of crude oil and petroleum products, as well as the production and marketing of basic petrochemical products, derivative chemical products and other chemical products.

The following table sets forth the financial and operating data of our refining and chemicals segment for each of the years ended December 31, 2016, 2017 and 2018.

	Year Ended December 31,		
	2016	2017	2018
Revenue (RMB in millions)	582,510	707,804	874,125
Profit from operations (RMB in millions)	39,026	39,961	42,756
Crude oil processed (million barrels)	953.3	1,016.9	1,122.8
Crude oil primary distillation capacity (million barrels/year)	1,257.6	1,347.0	1,380.3
Production of refined oil products (thousand tons)	86,022	92,715	105,342

Refining

Refined Products

We produce a wide range of refined products at our refineries. Some of the refined products are for our internal consumption and used as raw materials in our petrochemical operation. The table below sets forth production volumes for our principal refined products for each of the years ended December 31, 2016, 2017 and 2018.

	Year Ended December 31,		
Principal Product	2016	2017	2018
	(In thousand tons)		
Diesel	46,689	48,241	52,022
Gasoline	33,275	37,363	43,453
Kerosene	6,058	7,111	9,867
Lubricants	1,164	1,636	1,600
Fuel oil	2,222	1,880	1,675
Naphtha	9,919	10,032	11,775

Our Refineries

Most of our refineries are strategically located close to our crude oil production and storage bases along our crude oil and refined product transmission pipelines and railways, which provide our refineries with secure supplies of crude oil and facilitate our distribution of refined products to the domestic markets.

In 2018, we further optimized our production processes, adjusted our products portfolio and concentrated our resources and production capacity on products with high profit margins. We reduced the diesel-gasoline ratio from 1.29 in 2017 to 1.20 in 2018. In each of the years ended December 31, 2016, 2017 and 2018, our exploration and production operations supplied approximately 71.8%, 67.0% and 59.7%, respectively, of the crude oil processed in our refineries.

Table of Contents

The table below sets forth certain operating statistics regarding our refineries as of December 31, 2016, 2017 and 2018.

	As of December 31,		
	2016	2017	2018
Primary distillation capacity[(1)] (thousand barrels per day)			
Lanzhou Petrochemical	212.6	212.6	212.6
Dalian Petrochemical	415.0	415.0	415.0
Fushun Petrochemical	222.7	222.7	222.7
Dushanzi Petrochemical	202.4	202.4	202.4
Guangxi Petrochemical	202.4	202.4	202.4
Jilin Petrochemical	198.4	198.4	198.4
Sichuan Petrochemical	202.4	202.4	202.4
Yunnan Petrochemical[(2)]		263.2	263.2
Other refineries	1,789.6	1,771.4	1,862.5
Total	3,445.5	3,690.5	3,781.6
Refining throughput (thousand barrels per day)			
Lanzhou Petrochemical	166.6	178.3	187.7
Dalian Petrochemical	263.5	217.4	323.0
Fushun Petrochemical	170.5	158.9	175.1
Dushanzi Petrochemical	151.2	149.1	147.2
Guangxi Petrochemical	90.9	143.3	186.6
Jilin Petrochemical	184.3	181.6	164.4
Sichuan Petrochemical	141.0	147.5	131.5
Yunnan Petrochemical[(2)]		81.4	204.4
Other refineries	1,443.9	1,528.6	1,556.4
Total	2,611.9	2,786.1	3,076.3

(1) Represents the primary distillation capacity of crude oil and condensate.
(2) Yunnan Petrochemical commenced operations in August 2017.

In each of the years ended December 31, 2016, 2017 and 2018, the average utilization rate of the primary distillation capacity at our refineries was 80.3%, 80.3% and 83.0%, respectively, and the average yield for our four principal refined products (gasoline, kerosene, diesel and lubricants) at our refineries was 67.6%, 68.6% and 70.4%, respectively. Yield represents the number of tons of a refined product expressed as a percentage of the number of tons of crude oil from which that product is processed. In each of the years ended December 31, 2016, 2017 and 2018, the overall refining yield at our refineries was 93.5%, 93.3% and 93.7%, respectively.

In 2018, Dalian Petrochemical, Yunnan Petrochemical, Fushun Petrochemical, Lanzhou Petrochemical, Dushanzi Petrochemical, Guangxi Petrochemical, Sichuan Petrochemical, and Jilin Petrochemical were our leading refineries in terms of both primary distillation capacity and refining throughput.

To maintain efficient operations of our facilities and lower production costs, we have endeavored to achieve the most cost-efficient proportions of various types of crude oil in our refining process. We purchase a portion of our crude oil requirements from third-party international suppliers located in different countries and regions. In 2018, we purchased crude oil sourced from Rosneft and Transneft, both of which are Russian companies subject to U.S. economic sanctions for use in our refining operations. The revenue generated from our refineries from the crude oil sourced from Rosneft and Transneft accounted for 4.29% of our total revenue in 2018. See Item 3 Key Information Risk Factors Risks Related to Outbound Investments and Trading.

Table of Contents

Chemicals

Most of our chemical plants are close to our refineries and are connected to the refineries by pipelines, providing additional production flexibility and opportunities for cost competitiveness. The raw materials required by our chemicals operations are mainly supplied by our own refineries.

Our Chemical Products

The table below sets forth the production volumes of our principal chemical products for each of the years ended December 31, 2016, 2017 and 2018.

	Year Ended December 31,		
	2016	2017	2018
	(In thousand tons)		
Basic petrochemicals			
Ethylene	5,589	5,764	5,569
Derivative petrochemicals			
Synthetic resin	9,078	9,284	9,049
Synthetic fiber raw materials and polymer	1,410	1,390	1,388
Synthetic rubber	760	809	869
Other chemicals			
Urea	1,900	1,439	828

We are one of the major producers of ethylene in China. We use the bulk of the ethylene we produce as a principal feedstock for the production of many chemical products, such as polyethylene. As of December 31, 2018, our annual ethylene production capacity was 5,910 thousand tons. We produce a number of synthetic resin products, including polyethylene, polypropylene and ABS. As of December 31, 2018, our annual production capacities for polyethylene, polypropylene and ABS were 5,062 thousand tons, 4,120 thousand tons and 705 thousand tons, respectively.

Marketing of Chemicals

Our chemical products are distributed to a number of industries including the automotive, construction, electronics, medical manufacturing, printing, electrical appliances, household products, insulation, packaging, paper, textile, paint, footwear, agriculture and furniture industries.

The following table sets forth the sales volumes of our chemical products by principal product category for each of the years ended December 31, 2016, 2017 and 2018.

	Year Ended December 31,		
Product	2016	2017	2018
	(In thousand tons)		
Derivative petrochemicals			
Synthetic resin	8,998.4	9,166.0	9,489.1
Synthetic fiber	83.6	76.9	75.8
Synthetic rubber	793.7	813.6	899.6

Intermediates	9,262.4	10,324.6	10,480.2
Other chemicals			
Urea	2,181.8	1,171.8	732.3

In each of the years ended December 31, 2016, 2017 and 2018, our capital expenditures for our refining and chemicals segment amounted to approximately RMB12,847 million, RMB17,705 million and RMB15,287 million, respectively. These capital expenditures were incurred primarily in connection with the construction and expansion of our refining and chemical facilities and the upgrading of our product quality. We believe that our refined products are capable of meeting the product specification and environmental protection requirements as set by the PRC government.

Table of Contents

Table of Contents

Marketing

We engage in the marketing of refined products through 36 regional sales companies including two distribution branch companies, one lubricant branch company, one fuel oil company and one convenience store chain company, PetroChina uSmile Company Limited, operated under the trade name uSmile . These operations include the transportation and storage of the refined products, and the wholesale, retail and export of gasoline, diesel, kerosene, lubricant, asphalt and other refined products. In addition, with respect to our international trading sector, we have optimized the import and export resources, focused on synergies, actively expanded into the high-end markets, and maintained growth in trading volume and improved operation results.

The following table sets forth the financial and operating data of our marketing segment for each of the years ended December 31, 2016, 2017 and 2018:

	Year Ended December 31,		
	2016	**2017**	**2018**
Revenue (RMB in millions)	1,301,616	1,660,456	2,003,105
Profit /(Loss) from operations (RMB in millions)	11,048	8,279	(6,450)
External sales volume of refined oil products (thousand tons)	159,107	169,466	177,498

We market a wide range of refined products, including gasoline, diesel, kerosene and lubricants, through an extensive network of sales personnel and independent distributors and a broad wholesale and retail distribution system across China. As of December 31, 2018, our marketing network consisted of:

- Numerous nationwide wholesale distribution outlets. Almost all of these outlets are located in high demand areas across China, particularly in the coastal areas, along major railways and along the Yangtze River; and

- 21,783 service stations, consisting of 20,555 service stations owned and operated by us and 1,228 franchised service stations owned and operated by third parties.

In addition, in order to adapt to changes in market condition and customer demand, we enhanced integrated marketing for refined products, fuel cards, non-oil business, lubricants and gas, and enhanced marketing through internet and carried out various promotion activities. We expanded our internet payment services and enhanced our marketing of non-oil businesses.

The PRC government and other institutional customers, including railway, transportation and fishery operators, are long-term purchasers of the gasoline and diesel that we produce. We sell gasoline and diesel to these customers based on the supply prices for special customers published by the PRC government. See Regulatory Matters Pricing Refined Products for a discussion of refined product pricing.

The following table sets forth our sales volumes of diesel, gasoline, kerosene and lubricants for each of the years ended December 31, 2016, 2017 and 2018.

	Year Ended December 31,

Product	2016	2017	2018
	(In thousand tons)		
Diesel	80,168	87,324	86,904
Gasoline	62,406	65,293	71,125
Kerosene	16,533	16,849	19,469
Lubricants	1,122	1,283	1,158

Table of Contents

Wholesale Marketing

We sell refined products both directly and through independent distributors into various wholesale markets, as well as to utility, commercial, petrochemical, aviation, agricultural, fishery and transportation companies in China. Our gasoline and diesel sales also include the amount we transferred to our retail operations.

Retail Marketing

The weighted average sales volume of gasoline and diesel per business day at our service station network was 10.5 tons, 10.5 tons and 10.3 tons per service station in 2016, 2017 and 2018, respectively.

Capital expenditures for the marketing segment for the years ended December 31, 2016, 2017 and 2018 amounted to RMB7,983 million, RMB10,982 million and RMB17,010 million, respectively, which were used mainly for the construction of sales network facilities including service stations and oil storage tanks.

Table of Contents

Table of Contents

Natural Gas and Pipeline

We are China s largest natural gas transporter and seller in terms of sales volume. We sell natural gas primarily to industrial companies, power plants, fertilizer and chemical companies, commercial users and municipal utilities owned by local governments. In addition, we also transmit crude oil and refined products in the natural gas and pipeline segment.

The following table sets forth the financial and operating data of our natural gas and pipeline segment for each of the years ended December 31, 2016, 2017 and 2018:

	As of December 31 or Year Ended December 31,		
	2016	2017	2018
Revenue (RMB in millions)	247,477	295,786	362,626
Profit from operations (RMB in millions)	17,885	15,688	25,515
Total length of natural gas pipelines (km)	49,420	51,315	51,751
Total length of crude oil pipeline (km)	18,872	19,670	20,048
Total length of refined oil products pipeline (km)	10,560	11,389	11,728
Total volume of natural gas sold(1) (Bcf)	6,811.3	7,026.2	7,654.7

(1) Represents the natural gas sold to third parties. As the sales volume of urban gas was included in the sales volume of natural gas beginning in 2018, the sales volumes for 2016 and 2017 were retrospectively adjusted by applying the same approach.

Our Principal Markets for Natural Gas

We sell our natural gas across China. Our natural gas supply covers all provinces, municipalities under direct administration of the central government and autonomous regions of China, other than Macau and Taiwan. We supply natural gas to Tibet by means of LNG tanker trucks.

The Bohai Rim is one of our principal markets for natural gas. The natural gas supplied to Bohai Rim is primarily sourced from the Changqing oil and gas region and transmitted through the Shaanxi to Beijing natural gas pipeline system.

The Yangtze River Delta and Southwestern region in China are also our principal markets. We supply natural gas to these regions primarily from our domestic production sites and through long-distance pipelines and by LNG tanker trucks.

In addition, provinces such as Xinjiang, Guangdong, Henan and Hubei consume more and more natural gas and have become another significant natural gas market of us.

Driven by environmental and efficiency concerns, the PRC government is increasingly encouraging industrial and residential use of natural gas. The PRC government has adopted a number of laws and regulations to require local governments to increase the use of clean energy, such as natural gas and liquefied petroleum gas, to replace the use of raw coal. Several local governments have adopted policies to facilitate an increase in natural gas consumption in order to reduce the air pollution level. The PRC government has also adopted preferential value-added tax rate for natural gas production. Effective April 1, 2019, the value-added tax rate for natural gas was reduced from 10% to 9%, and the value-added tax rate for crude oil was reduced from 16% to 13%. In 2017, the PRC government issued a new policy to accelerate the large-scale and high-efficient utilization of natural gas in urban gas, industrial fuel, gas-fired power generation and transportation, and to significantly increase the proportion of use of natural gas in primary energy consumption. The overall goal of the policy is that the proportion of natural gas in the primary energy consumption to reach around 10% by 2020 and 15% by 2030, and the underground gas storage to form an effective working gas volume of over 14.8 billion cubic meters by 2020 and over 35 billion cubic meters by 2030.

Table of Contents

We believe that these policies have had a positive effect on the development and consumption of natural gas in our existing or potential markets for natural gas. We believe that these favorable policies will continue to benefit our natural gas business.

Natural Gas Transmission Infrastructure

As of December 31, 2018, we owned and operated approximately 51,751 kilometers of natural gas pipelines in China, representing the vast majority of China s onshore natural gas pipelines. Our existing natural gas pipelines form a national trunk network for natural gas supply and the regional natural gas supply networks in Northwestern, Southwestern, Northern and central China as well as the Yangtze River Delta. Our main natural gas pipelines in operation include the First West-East Gas Pipeline, the Second West-East Gas Pipeline, the Third West-East Gas Pipeline, Zhong County-Wuhan Gas Pipeline, the four Shaanxi-Beijing Gas Pipelines and the Sebei-Lanzhou Gas Pipelines. In 2018, our main natural gas pipelines under construction included the China-Russia East Natural Gas Pipeline and the Fujian-Guangdong branch line of the Third West-East Gas Pipeline.

The China-Russia East Natural Gas Pipeline will extend from Heihe to Shanghai with a total length of 3,691 kilometers and a designed annual throughput capacity of 38.0 billion cubic meters. In 2018, we started the construction of the north section. The north section has a designed length of 837 kilometers. We expect to complete construction of the China-Russia East Natural Gas Pipeline by October 2023.

In 2018, we started the construction of the Fujian-Guangdong branch line of the Third West-East Gas Pipeline, which has a total designed length of 575 kilometers and a designed annual throughput capacity of 5.8 billion cubic meters. We expect to complete construction of the Guangzhou-Chaozhou section by December 2019.

Crude Oil Transportation Infrastructure

We have an extensive network for transportation, storage and distribution of crude oil, which covers many regions of China. As of December 31, 2018, we had crude oil pipelines of 20,048 kilometers. Our main crude oil pipelines in operation include the China-Russia Crude Oil Pipeline, the Western Crude Oil Pipeline, the Northeastern Crude Oil Pipeline and the Lanzhou-Chengdu Crude Oil Pipeline.

Refined Product Transportation Infrastructure

As of December 31, 2018, we had refined product pipelines of 11,728 kilometers. Our main refined product pipelines in operation include the Lanzhou-Zhengzhou-Changsha Refined Oil Pipeline, the Western Refined Oil Pipeline, and the Lanzhou-Chengdu-Chongqing Refined Oil Pipeline. In 2018, we completed the construction of and put into use the Fushun-Jinzhou Refined Oil Pipeline and the Yunnan Refined Oil Pipeline. The Fushun-Jinzhou Refined Oil Pipeline has a length of 431 kilometers with an annual throughput capacity of 7.5 million tons. The Yunnan Refined Oil Pipeline has a length of 951 kilometers with an annual throughput capacity of 8.7 million tons. Our main refined product pipeline under construction is the Jinzhou-Zhengzhou Refined Oil Pipeline, which is expected to be completed by the end of 2019.

During the past three years, we have not experienced any delays in delivering natural gas, crude oil and refined products due to pipeline capacity constraints.

Reform of the Oil and Gas Pipeline Network Operation Mechanism

On March 19, 2019, the PRC government passed the *Opinions on Implementation of the Reform of the Operation Mechanism of Oil and Gas Pipeline Network (the Opinion)*. According to the Opinion, the PRC government will carry out reforms of the oil and gas pipeline operation mechanism. An oil and gas pipeline network operator will be established, which will have diversified investors with state-owned capital holding the majority stake. The Opinion states that the PRC government will form an oil and gas market system with multi-channel suppliers in the upstream, an integrated pipeline network with high efficiency in the middle-stream, and a fully competitive market in the downstream, to improve the efficiency of oil and gas resource allocation. We believe the reforms can promote the reasonable use of pipeline resources and will intensify competition in the domestic oil and gas industry.

Competition

As an oil and gas company operating in a competitive industry, we compete in each of our business segments in both China and international markets for desirable business prospects and for customers. Our principal competitors in China are China Petrochemical Corporation, or Sinopec, and China National Offshore Oil Corporation, or CNOOC.

Exploration and Production Operations

We are the largest onshore oil and gas company in China in terms of proved crude oil and natural gas reserves as well as crude oil and natural gas production and sales. However, we compete with other domestic oil and gas companies for the acquisition of desirable crude oil and natural gas prospects. Similarly, we face some competition in the development of offshore oil and gas resources. In addition, the gradual development of the low-cost shale gas and shale oil in the United States has had a material effect on our business. We believe that our experience in crude oil and natural gas exploration and production and our advanced exploration and development technologies that are suitable for diverse geological conditions in China will enable us to maintain our dominant position in discovering and developing crude oil and natural gas reserves in China.

Refining and Chemicals Operations and Marketing Operations

We compete with Sinopec in our refining and chemicals operations and marketing operations on the basis of price, quality and customer service. Most of our refineries and chemical plants are located in the Northeastern and Northwestern regions of China where we have the dominant market share for refined products and chemical products. We sell the remainder of our refined products and chemical products to the Eastern, Southern, Southwestern and Central-southern regions of China, where our products have a considerable market share. The Eastern and Southern regions of China, where refined products and chemical products are in higher demand, are important markets for our refined products and chemical products. Sinopec has a strong presence in the Eastern and Southern regions of China in competition with us, and most of Sinopec s refineries, chemical plants and distribution networks are located in these regions in close proximity to these markets. Moreover, as the newly constructed facilities of CNOOC commenced operation in the same region, large quantity of chemical products have been marketed into that area, which made the competition even intense. We expect that we will continue to face competition in our refined products and chemical products sales in these regions.

In recent years, China has gradually liberalized the restrictions on market access for the refining and chemical industry. The refining and chemical industry led by us and Sinopec has been rapidly transformed into diversified market participants. Some large state-owned enterprises and private enterprises have entered the refining and chemical industry. Local refineries have rapidly emerged, and international refining and chemical companies have recently opened large refineries in China. The restrictions on foreign investment in retail chains of refined oil have been further liberalized. We expect to continue to face strong market competition.

We also face competition from imported refined products and chemical products in terms of price and quality. In recent years, competition from foreign producers of refined products and chemical products has increased and the retail and wholesale markets in China for refined products and chemical products have been

Table of Contents

gradually opened to foreign competition as a result of the changes in China s tariff policies toward imported refined products and chemical products. In response, we have to reduce our production costs, improve the quality of our products and optimize our product mix.

In addition, we also face competition from alternative energies. For example, electric car, as a clean means of transport with zero pollution and zero emission has won the favor of the government. The central and local governments have imposed restrictions on oil-powered cars, while encouraged electricity-powered cars. The alternative energy-powered cars, especially electric cars, will continue to grow. Despite the issues such as immature technologies, short range and limited infrastructure with respect to electric cars, with the importance attached by the central governments to the development of electric car batteries and electric car technologies and the focus given by the local government to the construction of electric car charging infrastructure, the advantages of electric cars will be fully demonstrated in the future. As a result, the impact of the innovation of electric cars on us will become increasingly obvious and the effect of the refined oil being substituted will be even more prominent.

Natural Gas and Pipeline Operations

We are the largest natural gas supplier in the PRC in terms of sales volume. Currently, we mainly face competition from Sinopec, CNOOC, coal-based natural gas producers and importers of natural gas and LNG in the supply of natural gas to Beijing, Tianjin, Hebei Province, Shanghai, Jiangsu Province, Anhui Province, Henan Province, Hubei Province, Hunan Province and the Northwestern regions of China, our existing principal markets for natural gas. Currently, Sinopec has natural gas fields in Sichuan Province and Chongqing Municipality and sells natural gas to users in places such as Sichuan Province, Chongqing, Hunan Province, Jiangsu Province, Zhejiang Province and Shanghai. We have also expanded into the coastal regions in Eastern and Southern China where we may face competition from CNOOC and Sinopec. The PRC government recently published reforms with an aim to integrate existing pipeline resources and establish a national pipeline network, which is expected to intensify market competition. (See Item 4 Information on the Company Natural Gas and Pipeline). We believe that our advantages in natural gas resources, production, sales and technologies will enable us to continue to be a dominant player in the natural gas markets in China.

See Item 3 Key Information Risk Factors Risks Related to Competition .

Environmental Matters

Like other companies in the industries in which we operate, we are subject to numerous national, regional and local environmental laws and regulations promulgated by the governments in those jurisdictions. These laws and regulations concern our oil and gas exploration and production operations, petroleum and petrochemical products and other activities. In particular, some of these laws and regulations:

- require an environmental evaluation report to be submitted and approved prior to the commencement of exploration, production, refining and chemical projects;
- restrict the type, quantities, and concentration of various substances that can be released into the environment in connection with drilling and production activities;

- limit or prohibit drilling activities within protected areas and certain other areas; and

- impose penalties for pollution resulting from oil, natural gas and petrochemical operations, including criminal and civil liabilities for serious pollution.

These laws and regulations may also restrict air emissions and discharges to surface and subsurface water resulting from the operation of natural gas processing plants, chemical plants, refineries, pipeline systems and other facilities that we own. In addition, our operations are subject to laws and regulations relating to the generation, handling, storage, transportation, disposal and treatment of solid waste materials.

We anticipate that the environmental laws and regulations to which we are subject will become increasingly strict and are therefore likely to have an increasing impact on our operations. It is difficult, however, to predict accurately the effect of future developments in such laws and regulations on our future earnings and operations. Some risk of environmental costs and liabilities is inherent in our operations and products, as it is with other companies engaged in similar businesses. We cannot assure you that material costs and liabilities will not be incurred. However, we do not currently expect any material adverse effect on our financial condition or results of operations as a result of compliance with such laws and regulations. We paid pollutant discharge fees of approximately RMB388 million and RMB333 million in 2016 and 2017, respectively. In 2018, the PRC government began charging environmental protection tax instead of pollutant discharge fees. As we have adopted advanced pollution control technologies, some of our enterprises have obtained reductions of environmental protection tax. In 2018, we paid a total environmental protection tax of approximately RMB140 million.

To meet future environmental obligations, we are engaged in a continuous program to develop effective environmental protection measures. This program includes:

- building environment-friendly projects;
- reducing sulfur content in gasoline and diesel fuel;
- reducing olefins and benzene content in gasoline, and continuously reducing emissions and effluents from our refineries and petrochemical plants; and
- developing and installing monitoring systems at our pollutant discharge openings and developing environmental impact assessments for construction projects.

Our capital expenditures on environmental programs in 2016, 2017 and 2018 were approximately RMB3.10 billion RMB4.17 billion and RMB2.70 billion, respectively.

Because a number of our production facilities are located in populated areas, we have established a series of preventative measures to improve the safety of our employees and surrounding residents and minimize disruptions or other adverse effects on our business. These measures include:

- providing each household in areas surrounding our production facilities with printed materials to explain and illustrate safety and protection knowledge and skills; and
- enhancing the implementation of various effective safety production measures we have adopted previously.

We believe that these preventative measures have helped reduce the possibility of incidents that may result in serious casualties and environmental consequences. In addition, the adoption of these preventative measures has not required significant capital expenditures to date, and therefore, will not have a material adverse effect on our results of operations and financial condition.

See Item 3 Key Information Risk Factors Risks Related to Environmental Protection and Safety and Item 3 Key Information Risk Factors Risks Related to Climate Change .

Properties, Plants and Equipment

We own substantially all of our properties, plants and equipment relating to our business activities. We hold exploration and production licenses covering all of our interests in developed and undeveloped acreage, oil and natural gas wells and relevant facilities.

See the description of our properties, plants and equipment relating to our business activities included elsewhere in this Item 4 Information on the Company and Item 7 Major Shareholders and Related Party Transactions Related Party Transactions .

Table of Contents

Intellectual Property

Our company logo is jointly owned by us and CNPC and has been used since December 26, 2004. Together with CNPC, we have applied for trademark registrations of the logo with the State Trademark Bureau of the PRC. To date, most of our applications for registration of and our other trademarks have been approved and certain others are either in the process of review or public announcement phase. In addition, together with CNPC, we have applied for international trademark registration for our logo in other jurisdictions. We have received 506 International Trademark Registration Certificates for our logo covering more than 50 jurisdictions.

As of December 31, 2018, we owned approximately 15,800 patents in China and other jurisdictions. We were granted 2,848 patents in China in 2018.

Table of Contents

Regulatory Matters

Overview

China s oil and gas industry is subject to extensive regulation by the PRC government with respect to exploration, production, transmission and marketing of crude oil and natural gas as well as production, transportation and marketing of refined products and chemical products. The following central government authorities exercise control over China s oil and gas industry:

- The Ministry of Natural Resources, or the MNR, has the authority to grant, examine and approve mineral resources exploration and production licenses, and to oversee the registration and transfer of exploration and production licenses;
- The Ministry of Commerce, or the MOFCOM,
  - sets and grants import and export volume quotas for crude oil and refined products in accordance with the market supply and demand in China as well as WTO requirements for China;
  - issues import and export licenses for crude oil and refined products to oil and gas companies that have obtained import and export quotas; and
  - issues licenses for sales and storage of crude oil, and wholesale and storage of refined oil products.
- The National Development and Reform Commission, or the NDRC:
  - is responsible for industry administration, industry policy and policy coordination over China s oil and gas industry;
  - publishes guidance prices for natural gas and maximum retail prices for certain refined products, including gasoline and diesel;
  - formulates the plan for aggregate import and export volume of crude oil and refined products in accordance with the market supply and demand in China;
  - approves significant petroleum, natural gas, oil refinery and chemical projects set forth under the Catalogs of Investment Projects Approved by the Central Government; and

approves Sino-foreign equity and cooperative projects of certain types.

Exploration Licenses and Production Licenses

The *Mineral Resources Law* authorizes the MNR to exercise administrative authority over the exploration and production of mineral resources within the PRC. The *Mineral Resources Law* and its supplementary regulations provide the basic legal framework under which exploration licenses and production licenses are granted. The MNR has the authority to issue mineral resources exploration licenses and production licenses. Applicants must be companies approved by the State Council to engage in oil and gas exploration and production activities.

Applicants for exploration licenses must first register with the MNR blocks in which they intend to engage in exploration activities. The holder of an exploration license is obligated to make a progressively increasing annual minimum exploration investment in each corresponding block. Investments range from RMB2,000 per square kilometer for the initial year to RMB5,000 per square kilometer for the second year, and to RMB10,000 per square kilometer for the third and subsequent years. Additionally, the holder has to pay an annual exploration license fee that starts at RMB100 per square kilometer for each of the first three years and increases by an additional RMB100 per square kilometer per year for subsequent years up to a maximum of RMB500 per square kilometer. The maximum term of an oil and natural gas exploration license is seven years, subject to renewal upon expiration of the original term, with each renewal being up to two years. At the exploration stage, an applicant can also apply for a progressive exploration and production license that allows the holder to test and develop reserves not yet fully proven. Upon the detection and confirmation of the quantity of reserves in a certain block, the holder must apply for a production license based on economic evaluation, market conditions and development planning in order to shift into the production phase in a timely fashion. In addition, the holder needs to obtain the right to use that block of land. Generally, the holder of a full production license must obtain a land use rights certificate for industrial land use covering that block of land.

The MNR issues production licenses to applicants on the basis of the reserves reports approved by the relevant authorities. Production license holders are required to pay an annual production right usage fee of RMB1,000 per square kilometer. Administrative rules issued by the State Council provide that the maximum term of a production license is 30 years, 20 years, or 10 years as applicable to large, medium and small mineral blocks, respectively. In accordance with a special approval from the State Council, the MNR has issued production licenses with terms coextensive with the projected productive life of the assessed proven reserves as discussed above. Each of our production licenses is renewable upon our application 30 days prior to expiration. If oil and gas prices increase, the productive life of our crude oil and natural gas reservoirs may be extended beyond the current terms of the relevant production licenses.

Among the major PRC oil and gas companies, the exploration licenses and production licenses held by us, Sinopec and CNOOC account for the majority of mining rights in China. Among those companies, we and Sinopec primarily engage in onshore exploration and production, while CNOOC primarily engages in offshore exploration and production.

Pricing

Crude Oil

According to the *Measures for Administration of Petroleum Products Price issued* by NDRC on January 13, 2016, crude oil prices shall be market oriented. We and Sinopec set the crude oil median prices each month based on the average international market FOB prices for crude oil of different grades in the previous month. In addition, we and Sinopec negotiate a premium or discount to reflect transportation costs, the differences in oil quality and the supply and demand.

Refined Products

The prices of our gasoline and diesel products are subject to government regulation.

On December 18, 2008, the NDRC issued the *Notice on Implementing Price and Tax Reform of Refined Oil*, which improved the pricing mechanism for refined oil products. Under the improved mechanism, the domestic ex-factory prices of refined oil products are determined on the basis of the relevant international crude oil prices, by taking into consideration the average domestic processing cost, tax and a pre-determined profit margin. The prices of diesel and gasoline continue to follow the government guiding prices. The highest retail price set for gasoline and diesel is calculated by using the relevant ex-factory price and a determined profit margin for retailing activities.

On March 26, 2013, the NDRC issued the *Notice on Further Improvement of Refined Oil Pricing Mechanism* and the amended and restated *Measures for Oil Prices Management (on trial)*. Under this new system, (i) the price adjustment period was shortened from 22 working days to 10 and the 4% limit on the price adjustment range was eliminated; (ii) the composition of the basket of crudes to which refined oil products prices are linked was adjusted in light of the composition of the imported crudes and changes in crudes trading on the international market; and (iii) the refined oil products pricing mechanism was further enhanced.

In order to promote the oil product quality upgrading, on September 16, 2013, the NDRC issued the *Circular regarding Relevant Opinions on the Pricing Policy for Oil Product Quality Upgrading*, pursuant to which the price increase standard for the auto-use gasoline and diesel upgraded to China IV Standard shall be set as RMB290 per ton and RMB370 per ton, respectively, and the price increase standard for the auto-use gasoline and diesel upgraded from China IV to China V Standard shall be set at RMB170 per ton and RMB160 per ton, respectively.

On January 12, 2015, the NDRC issued the *Notice on Reducing Domestic Refined Oil Prices*, pursuant to which, since January 13, 2015, the price for No. 98 gasoline is to be determined by the production and operation enterprises themselves.

On January 13, 2016, the NDRC issued the *Notice on Issues Concerning Further Improving the Pricing Mechanism for Refined Oil*, pursuant to which, starting from January 13, 2016, downward adjustment of the refined oil price is subject to a floor of US$40 per barrel. Accordingly, when the international crude oil price drops to US$40 per barrel or below, the refined oil price in China shall not be adjusted downwards and the unadjusted amount shall be allocated to the reserve fund to be used for energy saving, reduction of emission, improving the oil quality and securing a safe supply of refined oil. When the international crude oil price surges to US$130 per barrel or above, appropriate financial and taxation policies shall be adopted to ensure the production and supply of refined oil but the refined oil price shall in principle remain unadjusted or shall only be slightly adjusted upwards. This regulation also liberalized the ex-factory price of liquefied petroleum gas.

On December 15, 2016, the Ministry of Finance (MOF) and NDRC issued *Circulation on Collection of Risk Reserves for Oil Price Control* (the Rules), pursuant to which, effective January 13, 2016, when the price of crude oil in international market drops below the lower limit set by the Chinese government, domestic enterprises which are engaged in production, commissioned processing and import and export of such refined oil products as gasoline and diesel shall make full payment of risk reserves according to sales volumes and the corresponding collection rates. Sales volumes refer to the actual sales volumes of such enterprises between the two adjacent window periods of price adjustment. Collection rates for risk reserves are determined with reference to the unadjusted prices of refined oil products. The NDRC and the MOF jointly determine the collection rates on a quarterly basis and notify the collection agencies in writing.

On December 22, 2016, MOF issued *Notice on Proper Collection of Risk Reserves for Oil Price Adjustment in 2016*, pursuant to which, if the subsidiaries (limited to listed companies) of CNPC, Sinopec and CNOOC have already recognized the risk reserves accrued as operation revenue, such subsidiaries may opt to have such risk reserves to be paid by their parent companies out of the net profit.

Aviation Kerosene

The ex-factory price of aviation kerosene is currently determined by the supply and demand parties subject to a limit of the CIF price in the Singapore market.

Chemical Products

We determine the prices of all of our chemical products based on market conditions.

Natural Gas

On June 28, 2013, the NDRC announced the initiation of a program for the adjustment of natural gas prices from July 10, 2013. The program consists of (i) changing the pricing mechanism of natural gas from ex-factory price to citygate price, and no longer differentiating the prices payable by users in different provinces; (ii) establishing the mechanism linking the citygate price of natural gas to the price of alternative energy with a view to gradually shift to a market-driven pricing mechanism for natural gas; (iii) adopting differential pricing approaches towards the existing usage and the incremental usage so as to establish as soon as practicable a new pricing mechanism for natural gas while reducing the impact that the pricing reform will have on existing gas users.

Table of Contents

On August 10, 2014, based on the natural gas price reform roadmap, the NDRC issued price adjustment programs for non-residential use stock natural gas, pursuant to which, effective September 1, 2014, (i) the natural gas citygate price for non-residential use was increased by RMB400 per thousand cubic meters; (ii) no adjustment will be made to the citygate price for natural gas consumed by residential users; and (iii) further action will be taken to implement the policy in connection with the liberalization of the sales price of imported liquefied natural gas and the ex-factory prices for shale gas, coal-seam gas and coal gas.

On February 26, 2015, the NDRC announced the unification of the prices of domestic natural gas of existing and incremental gas volume starting from April 1, 2015.

On November 18, 2015, the NDRC announced the reduction of the price of natural gas for non-residential use from November 20, 2015, whereby the citygate price ceiling for non-resident users was decreased by RMB700 per thousand cubic meters while the preferential policy and price for natural gas used by fertilizer makers remain unchanged. With a view to improve the market-driven pricing mechanism for natural gas, since November 20, 2016, suppliers and non-residential users can negotiate prices of natural gas up to 20% above the benchmark price for non-residential use.

On October 15, 2016, the NDRC issued *Clarifying the Price Policy for Gas Storage Facilities*, which announced that the prices for natural gas purchase and sale to be conducted by and the prices of gas storage services to be provided by the gas storage facilities shall be formed through the operation of market.

On November 5, 2016, NDRC issued *Notice on Enhancing Price Liberalization for Gas Used as Fertilizer Feedstock*, pursuant to which, effective November 10, 2016, prices for gas used as fertilizer feedstock were fully liberalized and subject to negotiations between the vendors and the purchasers. It encourages the trading of the natural gas used by fertilizer makers in the oil and gas exchange centers in order to achieve open and transparent pricing of gas as fertilizer feedstock.

On November 11, 2016, the NDRC issued *Notice on Relevant Issues concerning the Price Policy for Natural Gas Citygate Price in Fujian Province*, which expressly liberated the citygate natural gas price in Fujian Province and made Fujian the first province that would implement fully liberated citygate natural gas price.

On August 29, 2017, the NDRC issued *Notice on Reduction of the Benchmark Citygate Price of Non-residential Natural Gas*, which reduced the benchmark city gate price of non-residential natural gas by RMB100 per thousand cubic meters effective September 1, 2017.

On May 25, 2018, NDRC issued *Notice on Straightening Out the Citygate Price of Natural Gas for Residential Use* (the Notice), pursuant to which, effective June 10, 2018, prices of natural gas for residential use will no longer be subject to the highest citygate price limit. Instead, the suppliers and users may negotiate prices up to 120% of the reference base rate, which is the same as the base rate for non-residential use. The citygate price of natural gas for residential use may not be increased until the first anniversary of the Notice. According to the Notice, where there is a significant difference between the price of natural gas for residential use and non-residential use, any increase in the citygate price for residential use may not exceed RMB350 per thousand cubic meters in the first year, with any remaining price difference to be rolled over into subsequent years. The policy also rolled out seasonal natural gas prices with a view to encourage market-oriented pricing.

Pipeline Transmission Tariff

Pipeline transmission tariffs for crude oil, refined oil and natural gas are set by the government. Cross province transmission tariffs are set by the NDRC and provincial transmission tariffs are set by the provincial level branches of the NDRC.

For those pipelines constructed prior to 1984, which were funded by the government, the transmission tariff is a uniform flat tariff determined based on the principle of minimum profit margin. For those pipelines constructed with the funds of the enterprises after 1984, the tariffs must be submitted to the NDRC for examination and approval on a case by case basis and based on the capital investment made in the pipeline, the operation period for the pipeline and a reasonable profit margin.

On October 9, 2016, the NDRC issued *Regulation on Administration of the Pipeline Transmission Tariff for Natural Gas (on trial)* and *Rules on Supervision and Review of the Costs Used in Setting the Pipeline Transmission Tariff (on trial)*, which provides that effective January 1, 2017, the pipeline transmission tariff for natural gas shall be reviewed and determined on the principle of permissible costs plus reasonable margins , and the rules intended to regulate the tariff charged by companies engaged in cross-province pipeline transmission operation.

On August 29, 2017, the NDRC issued the *Notice on Approving the Inter-provincial Natural Gas Pipeline Transmission Tariff* , which published the transmission tariff for 13 inter-provincial pipelines companies including PetroChina Beijing Natural Gas Pipeline Co., Ltd. and others.

On March 27, 2019, the NDRC issued the N*otice on Adjusting the Inter-provincial Pipeline Natural Ga*s *Transmission Traffiff*, which adjusted the transmission tariff for 13 inter-provincial pipelines companies including PetroChina Beijing Natural Gas Pipeline Co., Ltd. and others.

Production and Marketing

Crude Oil

Each year, the NDRC publishes the projected target for the production and process of crude oil in China based on the domestic consumption estimates submitted by domestic producers, including but not limited to us, Sinopec and CNOOC, the production of these companies as well as the forecast of international crude oil prices. The actual production volumes are determined by the producers themselves and may vary from estimates. On December 4, 2016, MOFCOM issued the amended *Measures on the Administration of the Refined Products Market*, pursuant to which, effective January 1, 2007, qualified foreign investors are allowed to establish and invest in enterprises that conduct crude oil business.

Refined Products

Previously, only we, Sinopec and joint ventures of the two companies had the right to conduct gasoline and diesel wholesale business. Other companies, including foreign invested companies, were not allowed to engage in wholesale of gasoline and diesel in China s domestic market. In general, only domestic companies, including Sino-foreign joint venture companies, were permitted to engage in retail of gasoline and diesel. Since December 11, 2004, wholly foreign-owned enterprises are permitted to conduct refined oil retail business. Since January 1, 2007, when the *Measures on the Administration of the Refined Products Market* became effective, all entities meeting certain requirements are allowed to submit applications to the MOFCOM to conduct refined oil products wholesale, retail and storage businesses. On July 28, 2018, the PRC government removed the restriction that a Chinese partner must hold a majority share in the construction and operation of a retail oil station chain which has more than 30 outlets and sells refined products of different types and brands supplied through multiple channels.

Natural Gas

The NDRC determines each year the annual national natural gas production target based on the natural gas production targets submitted by domestic natural gas producers. Domestic natural gas producers determine their annual natural gas production targets on the basis of consumption estimates. The actual production volume of each producer is determined by the producer itself, which may deviate from the production target submitted by it. The NDRC also formulates the annual natural gas supply guideline, which requires natural gas producers to distribute a specified amount of natural gas to the designated key municipalities and key enterprises.

Foreign Investments

Cooperation in Exploration and Production with Foreign Companies

Currently, CNPC is one of the few Chinese companies that have the right to cooperate with foreign companies in onshore crude oil and natural gas exploration and production in China. CNOOC has the right to cooperate with foreign companies in offshore crude oil and natural gas exploration and production in China.

Sino-foreign cooperation projects and foreign parties in onshore oil and gas exploration and production in China are generally selected through open bids and bilateral negotiations. Those projects are generally conducted through production sharing contracts. The MOFCOM must approve those contracts.

As authorized by the Regulations of the PRC on Exploration of Onshore Petroleum Resources in Cooperation with Foreign Enterprises, CNPC has the right to enter into joint cooperation arrangements with foreign oil and gas companies for onshore crude oil and natural gas exploration and production. We do not have the capacity to enter into production sharing contracts directly with foreign oil and gas companies under existing PRC law. Accordingly, CNPC will enter into production sharing contracts. After signing a production sharing contract, CNPC will, subject to approval of the MOFCOM, assign to us most of its commercial and operational rights and obligations under the production sharing contract as required by the Non-competition Agreement between CNPC and us.

Transportation and Refining

Since December 1, 2007, PRC regulations have encouraged foreign investment in the construction and operation of oil and gas pipelines and storage facilities. On March 10, 2015, PRC lifted the restrictions on foreign investment in refineries with a production capacity of below 10 million tons per annum. Furthermore, when appropriate, projects must receive necessary approvals from relevant PRC government agencies. See Item 3 Key Information Risk Factors Risks Related to Government Regulation.

Import and Export

Since January 1, 2002, state-owned trading companies have been allowed to import crude oil under an automatic licensing system. Non-state-owned trading companies have been allowed to import crude oil and refined products subject to quotas. The export of crude oil and refined oil products by both state-owned trading companies and non-state-owned trading companies is subject to quota control. The MOFCOM has granted us the right to conduct crude oil and refined product import and export business.

Capital Investment and Financing

Capital investments in exploration and production of crude oil and natural gas made by Chinese oil and gas companies are subject to approval by or filing with relevant government authorities. The following projects are subject to approval by the NDRC or the competent local authorities:

- facilities for taking delivery of and storing liquefied petroleum gas (excluding accessory projects of oil or gas fields or refineries);

new facilities for taking delivery of or storing imported liquefied natural gas (including expansion on a different site other than the original facilities);

oil or gas transmission pipeline networks (excluding gathering and transmission pipeline networks of oil or gas fields);

new refineries, expansion of existing primary processing refineries;

new ethylene, paraxylene (PX), diphenylmethane diisocyanate (MDI) projects; and

new coal-to-olefins projects, new coal to paraxylene (PX) projects, and new coal-to-methanol projects with a capacity of 1 million tons per annum or more.

Table of Contents

Taxes, Fees and Royalties

We are subject to a variety of taxes, fees and royalties. The table below sets forth the major taxes, fees and royalty fees payable by us or by Sino-foreign oil and gas exploration and development cooperative projects. Our subsidiaries which have legal person status should report and pay enterprise income tax to the relevant tax authorities based on the applicable laws and regulations.

Tax Item	Tax Base	Tax Rate
Enterprise income tax	Taxable income	25%, or 15% for qualified taxpayers in certain western regions of China
Value-added tax	Revenue	Prior to July 1, 2017, value added tax rates were 17%, 13%, 11% and 6%, as applicable. In particular, 13% was for liquefied natural gas, natural gas, liquefied petroleum gas, agricultural film and fertilizers and 17% for oil products and other products. Effective July 1, 2017, the rate of 13% was canceled and the applicable rate for natural gas has been changed from 13% to 11%. Effective May 1, 2018, the rate of 17% was changed to 16% and the rate of 11% was changed to 10%. Effective April 1, 2019, the rate of 16% was changed to 13% and the rate of 10% was changed to 9%. Since May 1, 2016, as a result of the reform of value-added tax in lieu of business tax, certain sectors such as real estate, engineering construction, financial and other sectors, which previously were subject to business tax, have been subject to value-added tax instead.
Consumption tax	Aggregate volume sold or self-consumed	RMB1.52 per liter for gasoline, naphtha, solvent naphtha and lubricant and RMB1.2 per liter for diesel, aviation kerosene and fuel oil.

		Collection of taxes on aviation kerosene continues to be suspended.
Resource tax	Sales	6%, exemption or reduction may apply if qualified.
		From April 1, 2018 to March 31, 2021, shale gas production enjoys a 30% reduction.
Crude oil special gain levy	Sales amount above specific threshold	Five-level progressive tax rates from 20% to 40%, taxable if the crude oil price reaches the threshold of US$65 per barrel.
Environmental protection tax	Air pollution equivalent, water pollution equivalent, solid waste pollution equivalent and noise exceeding the standard decibel	Effective January 1, 2018, the PRC government started to impose environmental protection tax. Different emissions apply their corresponding tax rates.
		If a taxpayer s emission of taxable atmospheric pollutants or water pollutants is less than 30% of the national and local pollutant discharge standards, the environmental protection tax shall be levied at 75%. If the taxpayer s emission of taxable atmospheric pollutants or water pollutants is less than 50% of the national and local pollutant discharge

		standards, the environmental protection tax shall be levied at 50%.
Mining right occupancy fees(1)	Area	RMB100 to RMB500 per square kilometer per year for exploration; RMB1,000 per square kilometer per year for production.
Royalty fee(2)	Production volume	Progressive rate of 0-12.5% for crude oil and 0-3% for natural gas

(1) Effective April 13, 2017, the exploration license fee and production license fee were renamed as mining right occupancy fees.

(2) It shall be paid in cash and is only applicable to Sino-foreign oil and gas exploration and development cooperative projects in China. However, effective December 1, 2010, the royalty fee payable by new Sino-foreign oil and gas exploration and development cooperative projects in Western regions was replaced by the resource tax, while those cooperative projects under contracts signed before December 1, 2010 continue to be subject to the royalty fee until the contracts expire. Effective November 1, 2011, the royalty fee payable by new Sino-foreign oil and gas exploration and development cooperative projects in the whole country was replaced by the resource tax, while those cooperative projects under contracts signed before November 1, 2011 continue to be subject to the royalty fee until the contracts expire.

Environmental Regulations

We are subject to various PRC national environmental laws and regulations and also environmental regulations promulgated by the local governments in whose jurisdictions we have operations. The PRC government has adopted extensive environmental laws and regulations that affect the operation of the oil and gas industry. There are national and local standards applicable to emissions control, discharges to surface and subsurface water and disposal, and the generation, handling, storage, transportation, treatment and disposal of solid waste materials.

The environmental regulations require a company, such as us, to register or file an environmental impact report with the relevant environmental authority for approval before it undertakes any construction of a new production facility or any major expansion or renovation of an existing production facility. The new facility or the expanded or renovated facility will not be permitted to operate unless the relevant environmental authority has inspected the environmental equipment installed at the facility and decides it satisfies the environmental protection requirements. Companies that need to discharge pollutants, whether in the form of gas, water or solid wastes, must submit application for pollutant discharge permits. The application must state in detail the types of discharge, discharge outlet, types of pollutants, concentration and amount of discharge. After reviewing the application materials, the relevant environmental administrative department will determine to issue a discharge permit to the company, specifying the types of permitted pollutants, the permitted concentration and amount. If a company s discharges deviated from what were permitted, the relevant administrative department may impose fines on the company or order the company to suspend or close down its operation for resolving the issues. In addition, companies discharging taxable pollutants should declare and pay corresponding environmental protection taxes in accordance with the PRC Environmental Protection Tax Law and its implementing regulations.

Item 4*A* ***UNRESOLVED STAFF COMMENTS***

We do not have any unresolved staff comment.

51

Table of Contents

Item 5 ***OPERATING AND FINANCIAL REVIEW AND PROSPECTS***

General

You should read the following discussion together with our consolidated financial statements and their notes included elsewhere in this annual report. Our consolidated financial statements have been prepared in accordance with IFRS.

Overview

We are engaged in a broad range of petroleum and natural gas related activities, including:

- the exploration, development, production and sale of crude oil and natural gas;
- the refining of crude oil and petroleum products, and the production and marketing of basic petrochemical products, derivative chemical products and other chemical products;
- marketing of refined oil products and trading; and
- the transmission of natural gas, crude oil and refined oil products as well as the sale of natural gas.

We are China s largest producer of crude oil and natural gas and are one of the largest companies in China in terms of revenue. In 2018, we produced approximately 890.3 million barrels of crude oil and approximately 3,607.6 Bcf of natural gas for sale. Our refineries processed approximately 1,122.8 million barrels of crude oil in 2018. In 2018, we had revenue of RMB2,353,588 million and profit attributable to owners of the Company of RMB52,591 million.

Factors Affecting Results of Operations

Our results of operations and the period-to-period comparability of our financial results are affected by a number of external factors, including changes in the prices, production and sales volume of our principal products and the regulatory environment.

Prices of Principal Products

The fluctuations in the prices of crude oil, refined products, chemical products and natural gas have a significant impact on our revenue. See Item 4 Information on the Company Regulatory Matters Pricing for a more detailed discussion of current PRC pricing regulations and Item 3 Risk Factors Risks Related to Pricing and Exchange Rate .

The table below sets forth the average realized prices of our principal products in 2016, 2017 and 2018.

	2016	2017	2018
Crude oil (US$/barrel)	37.99	50.64	68.28
Natural gas (US$/thousand cubic feet)(1)	5.73	6.30	7.13

Gasoline (US$/barrel)	101.41	111.26	124.88
Kerosene (US$/barrel)	54.67	66.60	86.84
Diesel (US$/barrel)	82.84	90.84	110.38

(1) Natural gas citygate price. As the sales volume of urban gas was included in the sales volume of natural gas beginning in 2018, the average realized prices for 2016 and 2017 were retrospectively adjusted by applying the same approach.

Table of Contents

Production and Sales Volume for Oil and Gas Products

Our results of operations are also affected by production and sales volumes. Our crude oil and natural gas production volumes depend primarily on the level of the proved developed reserves in the fields in which we have an interest, as well as other factors such as general economic environment and market supply and demand conditions.

Regulatory Environment

Our operating activities are subject to extensive regulations and control by the PRC government, including the issuance of exploration and production licenses, the imposition of industry-specific taxes or product-specific taxes and levies and the implementation of environmental policies and safety standards. Our results of operations will be affected by any future changes of such regulatory environment.

Critical Accounting Policies

The preparation of our consolidated financial statements requires our management to select and apply significant accounting policies, the application of which may require management to make judgments and estimates that affect the reported amounts of assets and liabilities, disclosure of contingent assets and liabilities as of the date of our financial statements, and the reported amounts of revenue and expenses during the reporting period. Notwithstanding the presentation of our principal accounting policies in Note 3 to our consolidated financial statements included elsewhere in this annual report, we have identified the accounting policies below as most critical to our business operations and the understanding of our financial condition and results of operations presented in accordance with IFRS. Although these estimates are based on our management s best knowledge of current events and actions, actual results ultimately may differ from those estimates.

Accounting for Oil and Gas Exploration and Production Activities

We use the successful efforts method of accounting, with specialized accounting rules that are unique to the oil and gas industry, for oil and gas exploration and production activities. Under this method, geological and geophysical costs incurred are expensed when incurred. However, all costs for developmental wells, support equipment and facilities, and proved mineral interests in oil and gas properties are capitalized. Costs of exploratory wells are capitalized as construction in progress pending determination of whether the wells find proved reserves. For exploratory wells located in regions that do not require substantial capital expenditures before the commencement of production, the evaluation of the economic benefits of the reserves in such wells will be completed within one year following the completion of the exploration drilling. Where such evaluation indicates that no economic benefits can be obtained, the relevant costs of exploratory wells will be converted to dry well exploration expenses. The relevant costs will be classified as oil and gas assets and go through impairment review if the evaluation indicates that economic benefits can be obtained. For wells with economically viable reserves in areas where a major capital expenditure would be required before production can begin, the related well costs remain capitalized only if additional drilling is under way or firmly planned. Otherwise the well costs are expensed as dry wells. We have no material costs of unproved properties capitalized in oil and gas properties.

Oil and Gas Reserves

The estimation of the quantities of recoverable oil and gas reserves in oil and gas fields is integral to effective management of our exploration and production operations. Because of the subjective judgments involved in developing and assessing such information, engineering estimates of the quantities of recoverable oil and gas reserves in oil and gas fields are inherently imprecise and represent only approximate amounts.

Before estimated oil and gas reserves are designated as proved , certain engineering criteria must be met in accordance with industry standards and the regulations of the SEC. Proved oil and gas reserves are the estimated quantities of crude oil and natural 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 regulation before the time at which contracts providing the right to operate expire, unless evidence indicates that renewal is reasonably certain, regardless of whether the estimate is a deterministic estimate or probabilistic estimate. Therefore, these estimates do not include probable or possible reserves. Our proved reserves estimates are updated annually by independent, qualified and experienced oil and gas reserves engineering firms in the United States, Singapore and Canada. Our oil and gas reserves engineering department has policies and procedures in place to ensure that these estimates are consistent with these authoritative guidelines. Among other factors required by authoritative guidelines, this estimation takes into account recent information about each field, including production and seismic information, estimated recoverable reserves of each well, and oil and gas prices and operating costs as of the date the estimate is made. The price shall be the average price during the 12-month period before the ending date of the period covered by this 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. The costs shall be that prevailing at the end of the period.

Despite the inherent imprecision in these engineering estimates, estimated proved oil and gas reserves quantity has a direct impact on certain amounts reported in the financial statements. In addition to the capitalization of costs related to oil and gas properties on the balance sheet discussed earlier, estimated proved reserves also impact the calculation of depreciation, depletion and amortization expenses of oil and gas properties. The cost of oil and gas properties is amortized at the field level on the unit of production method. Unit of production rates are based on the total oil and gas reserves estimated to be recoverable from existing facilities based on the current terms of our production licenses. Our reserves estimates include only crude oil and natural gas which the management believes can be reasonably produced within the current terms of the production licenses that are granted by the Ministry of Natural Resources, ranging from 30 years to 55 years from the effective date of issuance in March 2000, renewable upon application 30 days prior to expiration. Consequently, the impact of changes in estimated proved reserves is reflected prospectively by amortizing the remaining book value of the oil and gas property assets over the expected future production. If proved reserves estimates are revised downward, earnings could be affected by higher depreciation expense or an immediate write-down of the property s book value had the downward revisions been significant See Property, Plant and Equipment below. Given our large number of producing properties in our portfolio, and the estimated proved reserves, it is unlikely that any changes in reserves estimates will have a significant effect on prospective charges for depreciation, depletion and amortization expenses.

In addition, due to the importance of these estimates in understanding the perceived value and future cash flows of a company s oil and gas operations, we have also provided supplemental disclosures of proved oil and gas reserves estimates prepared in accordance with authoritative guidelines elsewhere in this annual report.

Property, Plant and Equipment

Where it is probable that property, plant and equipment, including oil and gas properties, will generate future economic benefits, their costs are initially recorded in the consolidated statement of financial position as assets. Cost represents the purchase price of the asset and other costs incurred to bring the asset into existing use. Subsequent to their initial recognition, property, plant and equipment are carried at cost less accumulated depreciation, depletion and amortization (including any impairment).

Depreciation, to write off the cost of each asset, other than oil and gas properties, to their residual values over their estimated useful lives is calculated using the straight-line method.

Table of Contents

The Company uses the following useful lives for depreciation purposes:

Buildings and plant	8-40 years
Equipment and machinery	4-30 years
Motor vehicles	4-14 years
Other	5-12 years

No depreciation is provided on construction in progress until the assets are completed and ready for use.

The assets residual values and useful lives are reviewed, and adjusted if appropriate, at the end of each reporting period.

Property, plant and equipment, including oil and gas properties, are reviewed for possible impairments when events or changes in circumstances indicate that the carrying amount may not be recoverable. Determination as to whether and how much an asset is impaired involves management estimates and judgments such as future crude oil prices, prices of refined products and chemical products, the operation costs, the product mix, production volumes and the oil and gas reserves. Certain estimates and assumptions adopted by the management in the impairment reviews and calculations are formed by the internal professional team (including operations and finance teams) by reference to external institutions analysis reports and taking into account current economic conditions. The other estimates and assumptions are consistent with the assumptions used in our business plans.

In forming the relevant estimates and assumptions for impairment tests by our management, our internal professional team (including operations and finance teams) forms a preliminary conclusion by reference to the external institutions analysis reports and our historical financial data, and taking into account current economic conditions and our business plans. Then, the preliminary conclusion is reviewed and approved by the management. The approved estimates and assumptions are then utilized by our subsidiaries and branches to perform the impairment tests.

When determining whether there are indications of impairment for oil and gas properties, we consider internal factors, mainly including the decline of production and reserves volumes at the late development stage of certain oil blocks and a significant drop in economic benefits of certain oil blocks resulting from the lower price of crude oil, and external factors, mainly including a significant drop in international prices of crude oil, resulting from the imbalance of supply and demand of global crude oil. When an indication of impairment of certain oil blocks is identified, we will perform the impairment tests on the oil blocks. An impairment loss is recognized for the amount by which the carrying amount of the cash-generating unit exceeds the higher of its fair value less costs to sell and its value in use. Value in use is determined by reference to the discounted expected future cash flows to be derived from the cash-generating unit.

The expected medium-to-long-term future international prices of crude oil utilized by us when estimating the expected future cash flows are determined mainly based upon the forecast of the international prices of crude oil made by principal international investment institutions combined with the judgment and analysis of the future trends of international prices of crude oil made by us. We calculated the expected future cash flows of each oil block according to the estimates of future production volume levels per year stated in the oil and gas reserves reports, the estimates of operation costs of oil and gas made by us, and taking into account its future capital expenditure plan. We refer to the weighted average cost of capital of the oil and gas industry when determining the discount rate and makes relevant adjustments according to specific risks in different countries or regions. In the year ended December 31, 2017 and 2018, the after-tax discount rates adopted by most of our oil and gas regions were between 7.6% and 11.0%, and between 7.3% and 11.5%, respectively.

Given the broad scope of our property, plant and equipment, the impairment test involves numerous assumptions, which are interrelated to each other to a certain extent. For example, the estimates and judgments

Table of Contents

with respect to the product mix, production costs and oil and gas reserves may vary along with the changes in crude oil prices. The sensitivity analysis performed after taking into account the interrelationship among all of the estimates and judgments would be neither cost efficient nor time efficient. As a result, the management believes that a sensitivity analysis of relevant assumptions on impairment is not practicable. Favorable changes to some assumptions might have avoided the need to impair any assets or make it necessary to reverse an impairment loss recognized in prior periods, whereas unfavorable changes might have caused an additional unknown number of other assets to become impaired, or resulted in larger impacts on impaired assets.

Our operating results in the following fiscal year may deviate from management s estimates or judgments. This would require an adjustment to the provision for impairment of the property, plant and equipment disclosed in Note 15 to the consolidated financial statements.

Gains and losses on disposals of property, plant and equipment are determined by reference to their carrying amounts and are recorded in the consolidated profit or loss.

Interest and other costs on borrowings to finance the construction of property, plant and equipment are capitalized during the period of time that is required to complete and prepare the asset for its intended use. Costs for repairs and maintenance activities are expensed as incurred except for costs of components that result in improvements or betterments which are capitalized as part of property, plant and equipment and depreciated over their useful lives.

Asset Retirement Obligation

Provision is recognized for the future decommissioning and restoration of oil and gas properties. The amounts of the provision recognized are the present values of the estimated future expenditures. The estimation of the future expenditures is based on current local conditions and requirements, including legal requirements, technology, price level, etc. In addition to these factors, the present values of these estimated future expenditures are also impacted by the estimation of the economic lives of oil and gas properties. Changes in any of these estimates will impact the operating results and the financial position of the Company over the remaining economic lives of the oil and gas properties.

Operating Results

The following discussion is based on our historical results of operations. As a result of the factors discussed above, such results of operations may not be indicative of our future operating performance.

Our statement of comprehensive income for each of the years ended December 31, 2016, 2017 and 2018 is summarized in the table below.

	Year Ended December 31,		
	2016	2017	2018
	(RMB in millions)		
Revenue	1,616,903	2,015,890	2,353,588
Operating expenses	(1,556,268)	(1,948,168)	(2,232,591)
Profit from operations	60,635	67,722	120,997
Exchange gain/(loss), net	1,257	(1,094)	1,145
Interest expense, net	(20,857)	(19,507)	(18,583)

Share of profit of affiliates and joint ventures	4,105	5,968	11,647
Profit before income tax expense	45,140	53,089	115,206
Income tax expense	(15,768)	(16,296)	(42,790)
Profit for the year attributable to non-controlling interests	21,515	13,995	19,825
Profit for the year attributable to owners of the Company	7,857	22,798	52,591

Table of Contents

The table below sets forth our revenue by business segment for each of the years ended December 31, 2016, 2017 and 2018 as well as the percentage changes in revenue for the periods shown.

	2016	2017	2017 vs. 2016	2018	2018 vs. 2017
	(RMB in millions, except percentages)				
Revenue					
Exploration and production	412,484	505,430	22.5%	658,712	30.3%
Refining and chemicals	582,510	707,804	21.5%	874,125	23.5%
Marketing	1,301,616	1,660,456	27.6%	2,003,105	20.6%
Natural gas and pipeline	247,477	295,786	19.5%	362,626	22.6%
Headquarters and others	2,197	2,057	(6.4)%	2,376	15.5%
Total	2,546,284	3,171,533	24.6%	3,900,944	23.0%
Less intersegment sales	(929,381)	(1,155,643)	24.3%	(1,547,356)	33.9%
Consolidated net sales from operations	1,616,903	2,015,890	24.7%	2,353,588	16.8%

The table below sets forth our operating income by business segment for each of the years ended December 31, 2016, 2017 and 2018, as well as the percentage changes in operating income for the periods shown. Other profit from operations shown below consists of research and development, business services and infrastructure support to our operating business segments.

	2016	2017	2017 vs. 2016	2018	2018 vs. 2017
	(RMB in millions, except percentages)				
Profit/(loss) from operations					
Exploration and production	3,148	15,475	391.6%	73,519	375.1%
Refining and chemicals	39,026	39,961	2.4%	42,756	7.0%
Marketing	11,048	8,279	(25.1)%	(6,450)	(177.9)%
Natural gas and pipeline	17,885	15,688	(12.3)%	25,515	62.6%
Headquarters and others	(10,472)	(11,681)	11.5%	(14,343)	22.8%
Total	60,635	67,722	11.7%	120,997	78.7%

Year Ended December 31, 2018 Compared to Year Ended December 31, 2017

Consolidated Results of Operations

Overview

In 2018, our revenue was RMB2,353,588 million, representing an increase of 16.8% as compared with 2017. Net profit attributable to owners of the company was RMB52,591 million, representing an increase of 130.7% as compared with 2017. Basic earnings per share were RMB0.29, representing an increase of RMB0.17 as compared to 2017.

Revenue Our revenue increased by 16.8% from RMB2,015,890 million in 2017 to RMB2,353,588 million in 2018. This increase was primarily due to an increase in the prices of a majority of our oil and gas products.

Table of Contents

The table below sets out the external sales volume and average realized prices for our major products in 2017 and 2018 and the respective percentage changes for the periods shown:

	Sales Volume (000 ton)			Average Realized Price (RMB/ton)		
	2017	2018	Percentage of Change (%)	2017	2018	Percentage of Change (%)
Crude oil*	114,930	110,457	(3.9)	2,392	3,213	34.3
Natural gas (hundred million cubic meters, RMB/ 000 cubic meter)**	1,989.59	2,167.54	8.9	1,235	1,367	10.7
Gasoline	65,293	71,125	8.9	6,386	7,024	10.0
Diesel	87,324	86,904	(0.5)	4,600	5,478	19.1
Kerosene	16,849	19,469	15.5	3,552	4,540	27.8
Heavy oil	23,395	19,964	(14.7)	2,380	3,335	40.1
Polyethylene	4,739	4,644	(2.0)	8,559	8,816	3.0
Lubricant	1,283	1,158	(9.7)	7,693	7,875	2.4

Note: * The sales volumes of crude oil listed in the table above represent all of our external sales volumes. The decrease in crude oil sales volume in 2018 as compared to 2017 was primarily due to the decrease in our international trading volume of crude oil.

** As the sales volume of urban gas was included in the sales volume of natural gas beginning in 2018, the sales volumes and average realized prices for 2016 and 2017 were retrospectively adjusted by applying the same approach. The increase in natural gas average realized price in 2018 as compared to 2017 was primarily due to the combined effects of an increase in the entrepôt trading price of natural gas and effective measures taken by the Company to optimize the structure of natural gas sales.

Operating Expenses Operating expenses increased by 14.6% from RMB1,948,168 million in 2017 to RMB2,232,591 million in 2018.

Purchases, Services and Other Expenses Purchases, services and other expenses increased by 19.7% from RMB1,285,716 million in 2017 to RMB1,539,010 million in 2018. This increase was primarily due to an increase in expenses relating to the purchase of oil and gas products and other trading activities as a result of the increase in oil and gas prices.

Employee Compensation Costs Employee compensation costs (including salaries and additional costs such as insurance, housing funds and training fees) were RMB144,027 million in 2018, representing an increase of 14.9% from RMB125,384 million in 2017. This increase was primarily due to an increase in our employee salaries and costs according to our performance-based remuneration system and in line with the general increase in average employee salaries in the industry.

Exploration Expenses Exploration expenses decreased by 21.6% from RMB23,884 million in 2017 to RMB18,726 million in 2018. This decrease was primarily due to the fact that, we optimized our exploration deployment resulting in a decrease in dry well expenses.

Depreciation, Depletion and Amortization Depreciation, depletion and amortization decreased by 2.3% from RMB237,375 million in 2017 to RMB231,929 million in 2018. This decrease was primarily due to a decrease in the depletion of oil and gas properties as a result of an increase in the proved undeveloped reserves and the decrease in depletion ratio caused by the rise of oil and gas prices, partially offset by an increase in asset impairment provision in 2018 as compared to 2017.

Selling, General and Administrative Expenses Selling, general and administrative expenses decreased by 4.0% from RMB77,042 million in 2017 to RMB73,986 million in 2018. This decrease was primarily due to our continuing efforts to broaden our income sources, reduce expenditure and costs, enhance efficiency, and strictly control our non-production related expenses.

Table of Contents

Taxes other than Income Taxes Taxes other than income taxes increased by 9.7% from RMB198,022 million in 2017 to RMB217,267 million in 2018. This was primarily due to the increase in crude oil prices in 2018 as compared to 2017. In particular, (i) we incurred a crude oil special gain levy of RMB4,750 million in 2018 due to the increase in crude oil prices as a special gain levy is payable only if the crude oil price reaches US$65 per barrel or above, while in 2017, no crude oil special gain levy was incurred; (ii) the consumption tax we paid increased by RMB6,747 million from RMB142,708 million in 2017 to RMB149,455 million in 2018; and (iii) the resource tax we paid increased by RMB6,339 million from RMB18,000 million in 2017 to RMB24,339 million in 2018.

Other Expenses, net Net other expenses was RMB7,646 million in 2018, representing an increase of RMB6,901 million from RMB745 million in 2017. This was primarily due to the combined effects of the increase in the losses from disposal of assets, as partially offset by the increase in the VAT refund relating to the importation of natural gas as recognized in 2018.

Profit from Operations The profit from operations in 2018 was RMB120,997 million, representing an increase of 78.7% from RMB67,722 million in 2017.

Net Exchange Gain /(Loss) Net exchange gain in 2018 was RMB1,145 million, as compared to the net exchange loss of RMB1,094 million in 2017. This was primarily due to the appreciation of US Dollar against Renminbi as compared with the end of 2017.

Net Interest Expense Net interest expense decreased by 4.7% from RMB19,507 million in 2017 to RMB18,583 million in 2018, primarily due to the combined effect of a decrease in the average balance of interest-bearing borrowings, a decrease in interest expenses and an increase in income from deposits as compared with 2017.

Profit Before Income Tax Expense Profit before income tax expense increased by 117.0% from RMB53,089 million in 2017 to RMB115,206 million in 2018.

Income Tax Expense The income tax expense increased by 162.6% from RMB16,296 million in 2017 to RMB42,790 million in 2018, which was primarily due to the increase in taxable income.

Profit for the Year As a result of the foregoing, our profit in 2018 increased by 96.8% from RMB36,793 million in 2017 to RMB72,416 million in 2018.

Profit Attributable to Non-controlling Interests Profit attributable to non-controlling interests increased by 41.7% from RMB13,995 million in 2017 to RMB19,825 million in 2018, which was primarily due to the increase in profits of certain of our subsidiaries in 2018.

Profit Attributable to Owners of the Company Profit attributable to owners of the company increased by 130.7% from RMB22,798 million in 2017 to RMB52,591 million in 2018.

Segment Results

Exploration and Production Segment

Revenue Revenue of the exploration and production segment was RMB658,712 million in 2018, representing an increase of 30.3% from RMB505,430 million in 2017. This increase was primarily due to the increase in the prices of crude oil and natural gas and increase in the sales volume of natural gas. Our average realized crude oil price in 2018 was US$68.28 per barrel, representing an increase of 34.8% from US$50.64 per barrel in 2017.

Operating Expenses Operating expenses of the exploration and production segment increased by 19.4% from RMB489,955 million in 2017 to RMB585,193 million in 2018. This increase was primarily due to the combined effects of (i) an increase in procurement expenditure resulting from the increase in volume and price of imported oil from Russia and Kazakhstan; (ii) the impairment provision for certain oil and gas assets with higher costs of development and production made in accordance with the accounting standards; and (iii) the increase in taxes other than income taxes as compared to 2017.

In 2018, the unit oil and gas lifting cost was US$12.31 per barrel, representing an increase of 6.8% from US$11.53 per barrel in 2017. Excluding the effect of changes in exchange rate, the lifting cost increased by 4.6% from 2017, primarily due to an increase in power, materials and labor costs in 2018 as compared to 2017.

Profit from Operations In 2018, we stressed our low-cost development strategy and meticulous management, continued to promote steady output of crude oil, made greater efforts in exploration and production in main gas areas and optimized our production structure, resulting in a steady increase in gas output. In overseas operations, we took advantage of the Belt and Road Initiative, actively promoted the international cooperation in our oil and gas business, and formulated our development strategy based on project potential and enhanced dynamic control and management of investment. In 2018, the exploration and production segment realized an operating profit of RMB73,519 million, representing an increase of RMB58,044 million from RMB15,475 million in 2017, and returned to its position as a main profit contributor of our company.

Refining and Chemicals Segment

Revenue The revenue of the refining and chemicals segment increased by 23.5% from RMB707,804 million in 2017 to RMB874,125 million in 2018. This increase was primarily due to the increase in the prices of refined products and the fact that we produced more high-profitability products as a result of our optimized product structure. Both the prices and sales volume of certain refined and chemical products increased.

Operating Expenses Operating expenses of the refining and chemicals segment increased by 24.5% from RMB667,843 million in 2017 to RMB831,369 million in 2018. This increase was primarily due to the combined effects of (i) an increase in expenses associated with the purchase of crude oil and feedstock oil from external suppliers; and (ii) an impairment provision made in accordance with the accounting standards for certain facilities scheduled to be deactivated as a result of the regulations to promote the use of ethanol in vehicles.

In 2018, the cash processing cost of our refineries was RMB169.38 per ton, representing an increase of RMB0.34 per ton from RMB169.04 per ton in 2017, primarily due to an increase in power and labor cost as compared to 2017.

Profit from Operations In 2018, in our refining and chemicals segment, in response to market demand, we increased the processing load of the facilities with high efficiency, continued to adjust our product structure, increased production of high value-added and market-favorable products, and intensified management and control over our costs and expenses, maintaining a good position in profit contribution. In 2018, we realized operating profits of RMB42,756 million in the refining and chemicals segment, representing an increase of 7.0% as compared with RMB39,961 million in 2017. The refining operations recorded an operating profit of RMB34,933 million, representing an increase of 7.2% as compared with RMB32,573 million in 2017. Our chemical operations realized an operating profit of RMB7,823 million, representing an increase of 5.9%, as compared with RMB7,388 million in 2017.

Marketing Segment

Revenue Revenue of the marketing segment increased by 20.6% from RMB1,660,456 million in 2017 to RMB2,003,105 million in 2018. This increase was primarily due to the combined effects of (i) the increase in both sales volume and prices of products such as gasoline and kerosene, and the rise in the price of diesel as partially offset by the decrease in the sales volume of diesel; and (ii) the increase in revenue derived from trading of oil products.

Table of Contents

Operating Expenses Operating expenses of the marketing segment increased by 21.6% from RMB1,652,177 million in 2017 to RMB2,009,555 million in 2018, primarily due to an increase in the expenses for purchase of refined oil from external suppliers.

(Loss) /profit from Operations In 2018, facing an unfavorable situation of substantial surplus in domestic resources and fiercer competition in the market, our domestic marketing segment adhered to the principle of market-orientation and efficiency, adopted active measures to address market competition, maximized efforts to increase our market share and enhance efficiency, and effectively ensured the proper downstream operations of our refineries, so as to realize the value of our industrial chain. In international trading, the marketing segment intensified coordination and cooperation with domestic industrial chains, and optimized the import and export of oil and gas resources. In 2018, affected by certain factors including fierce market competition and an adverse effect on profit from inventories due to a sharp decrease in oil prices in the fourth quarter, the marketing segment recorded an operating loss of RMB6,450 million, representing a decrease of RMB14,729 million as compared with the operating profit of RMB8,279 million in 2017.

Natural Gas and Pipeline Segment

Revenue Revenue of the natural gas and pipeline segment amounted to RMB362,626 million in 2018, representing an increase of 22.6% as compared with RMB295,786 million in 2017, primarily due to the increase in the sales volume of natural gas.

Operating Expenses Operating expenses of the natural gas and pipeline segment amounted to RMB337,111 million in 2018, representing an increase of 20.4% as compared with RMB280,098 million in 2017, primarily due to the increase in the expenses for purchasing natural gas.

Profit from Operations In 2018, in the natural gas and pipeline segment, in line with the increased demand for natural gas in the domestic market, we optimized our marketing strategies, made great efforts to expand into the high-end and high-profitability market, and continued to enhance the value of our natural gas business chain. In 2018, we realized an operating profit of RMB25,515 million, representing an increase of 62.6% as compared with RMB15,688 million in 2017.

In 2018, the volume of imported natural gas and liquefied natural gas (LNG) increased substantially. We took active measures to control the loss arising from the imported natural gas, and recorded a net loss of RMB24,907 million in the sale of imported natural gas, representing an increase in loss of RMB960 million as compared to 2017. We will continue to adopt vigorous measures to control losses.

In 2018, our international operations realized revenue of RMB836,619 million, accounting for 35.5% of our total revenue. Profit before income tax expense amounted to RMB4,781 million. Our international operations maintained a healthy development with further improved operating ability.

Our four operating segments are exploration and production, refining and chemicals, marketing as well as natural gas and pipeline. Overseas operations do not constitute a separate operating segment. The financial data of overseas operations are included in the financial data of the respective operating segment mentioned above.

Year Ended December 31, 2017 Compared to Year Ended December 31, 2016

Consolidated Results of Operations

Overview

In 2017, our revenue was RMB2,015,890 million, representing an increase of 24.7% as compared with 2016. Net profit attributable to the owners of the company was RMB22,798 million, representing an increase of 190.2% as compared with 2016. Basic earnings per share were RMB0.12, representing an increase of RMB0.08 as compared with 2016.

Table of Contents

Revenue Our revenue increased by 24.7% from RMB1,616,903 million in 2016 to RMB2,015,890 million in 2017. This increase was primarily due to (i) the increasing selling prices of the majority of oil and gas products and (ii) the increase in the sales volume.

The table below sets out the external sales volume and average realized prices for our major products in 2016 and 2017, respectively:

	Sales Volume (000 ton)			Average Realized Price (RMB/ton)		
	2016	**2017**	**Percentage of Change (%)**	**2016**	**2017**	**Percentage of Change (%)**
Crude oil	100,108	114,930	14.8	1,881	2,392	27.2
Natural gas (hundred million cubic meters, RMB/ 000 cubic meter)	1,928.73	1,989.59	3.2	1,099	1,235	12.4
Gasoline	62,406	65,293	4.6	5,725	6,386	11.5
Diesel	80,168	87,324	8.9	4,127	4,600	11.5
Kerosene	16,533	16,849	1.9	2,869	3,552	23.8
Heavy oil	22,952	23,395	1.9	1,892	2,380	25.8
Polyethylene	4,764	4,739	(0.5)	7,981	8,559	7.2
Lubricant	1,122	1,283	14.3	7,424	7,693	3.6

Note: The sales volumes listed in the table above represent all of our external sales volumes. As the sales volume of urban gas was included in the sales volume of natural gas beginning in 2018, the sales volumes and average realized prices for 2016 and 2017 were retrospectively adjusted by applying the same approach.

Operating Expenses Operating expenses increased by 25.2% from RMB1,556,268 million in 2016 to RMB1,948,168 million in 2017.

Purchases, Services and Other Expenses Purchases, services and other expenses increased by 34.0% from RMB959,640 million in 2016 to RMB1,285,716 million in 2017. This increase was primarily due to the increase in purchase of oil and gas products.

Employee Compensation Costs Employee compensation costs (including salaries and additional costs such as insurance, housing funds and training fees) were RMB125,384 million in 2017, representing an increase of 6.6% from RMB117,662 million in 2016. This increase was primarily due to the improvement of our performance-based remuneration system and the increase in our employee salaries and costs in line with the general increase of employee average salaries in the industry.

Exploration Expenses Exploration expenses increased by 28.6% from RMB18,576 million in 2016 to RMB23,884 million in 2017. This increase was primarily due to the fact that, in order to consolidate the oil and gas resource foundations, we optimized our exploration deployment and increased our investment in oil and gas exploration.

Depreciation, Depletion and Amortization Depreciation, depletion and amortization increased by 8.8% from RMB218,147 million in 2016 to RMB237,375 million in 2017. This increase was primarily due to (i) our provision made for assets impairment, and (ii) an increase in depreciation and depletion as a result of an increase in the cost of property, plant and equipment.

Selling, General and Administrative Expenses Selling, general and administrative expenses increased by 3.8% from RMB74,255 million in 2016 to RMB77,042 million in 2017. This increase was primarily due to the increases in repair expenses and lease expenses as a result of the expansion of our business.

Taxes other than Income Taxes Taxes other than income taxes increased by 4.4% from RMB189,608 million in 2016 to RMB198,022 million in 2017. In particular, the consumption tax increased by RMB2,440 million from RMB140,268 million in 2016 to RMB142,708 million in 2017; and the resource tax increased by RMB3,528 million from RMB14,472 million in 2016 to RMB18,000 million in 2017.

Other Expenses/Income, net Net other expenses in 2017 were RMB745 million, as compared to net other income of RMB21,620 million in 2016. This was primarily due to the combined effects of the following factors: (i) our disposal of certain equity interests in Trans-Asia Gas Pipeline Co., Ltd. (the Trans-Asia Pipeline) in 2016 for which we recognized a net gain of RMB24,534 million, and (ii) the increase in the VAT refund relating to the importation of natural gas as recognized in 2017.

Profit from Operations The profit from operations in 2017 was RMB67,722 million, representing an increase of 11.7% from RMB60,635 million in 2016.

Net Exchange (Loss)/Gain Net exchange loss in 2017 was RMB1,094 million, as compared to the net exchange gain of RMB1,257 million in 2016. This was primarily due to the depreciation of US Dollar against Renminbi in 2017.

Net Interest Expense Net interest expense decreased by 6.5% from RMB20,857 million in 2016 to RMB19,507 million in 2017, primarily due to a decrease in the average balance of interest-bearing borrowings as compared with 2016 as a result of our active measures to control debts and reduce interest.

Profit Before Income Tax Expense Profit before income tax expense increased by 17.6% from RMB45,140 million in 2016 to RMB53,089 million in 2017.

Income Tax Expense The income tax expense increased by 3.3% from RMB15,768 million in 2016 to RMB16,296 million in 2017, which was primarily due to the increase in taxable income.

Profit for the Year As a result of the foregoing, our profit in 2017 increased by 25.3% from RMB29,372 million in 2016 to RMB36,793 million in 2017.

Profit Attributable to Non-controlling Interests Net profit attributable to non-controlling interests decreased by 35.0% from RMB21,515 million in 2016 to RMB13,995 million in 2017, which was primarily due to the fact that the disposal of certain equity interests in Trans-Asia Pipeline in 2016 was attributable to non-controlling interests.

Profit Attributable to Owners of the Company The net profit attributable to owners of the company increased by 190.2% from RMB7,857 million in 2016 to RMB22,798 million in 2017.

Segment Results

Exploration and Production Segment

Revenue Revenue of the exploration and production segment was RMB505,430 million in 2017, representing an increase of 22.5% from RMB412,484 million in 2016. This increase was primarily due to the combined effects of (i) the increase in the price of crude oil as partially offset by the decrease in the sales volume of crude oil, and (ii) the increase in the sales volume of natural gas and shale gas. Our average realized crude oil price in 2017 was US$50.64 per barrel, representing an increase of 33.3% from US$37.99 per barrel in 2016.

Operating Expenses Operating expenses of the exploration and production segment increased by 19.7% from RMB409,336 million in 2016 to RMB489,955 million in 2017. This increase was primarily due to the combined effects of (i) realized gains derived from the disposal of certain equity interests in the Trans-Asia Pipeline in 2016, and (ii) the increase in depreciation, depletion and amortization in 2017.

Table of Contents

We enhanced our control over costs and expenses continuously. Our unit oil and gas lifting cost was US$11.53 per barrel in 2017, representing a decrease of 1.2% from US$11.67 per barrel in 2016.

Profit from Operations In 2017, in response to the increasingly complex development situation, in domestic operations, we adhered to the low-cost strategy and the meticulous management, optimized development plans, and took multi-measures to save energy and tap the potential synergies so as to raise the profit per single well. In overseas operations, we devoted major efforts to broadening sources of income and reducing expenditure as well as cutting costs and enhancing efficiency by various means such as optimizing assets and decreasing inventory. In 2017, the exploration and production segment realized an operating profit of RMB15,475 million, representing an increase of RMB12,327 million from RMB3,148 million in 2016, contributing a substantial increase in the profit level.

Refining and Chemicals Segment

Revenue The revenue of the refining and chemicals segment increased by 21.5% from RMB582,510 million in 2016 to RMB707,804 million in 2017. This increase was primarily due to the increase in oil prices and the production of high-profitability products as a result of our optimized product structure. Both the sales volume and price of most of the refined and chemical products were increased.

Operating Expenses Operating expenses of the refining and chemicals segment increased by 22.9% from RMB543,484 million in 2016 to RMB667,843 million in 2017. This increase was primarily due to the combined effects of (i) the increase in the expenses associated with the purchase of crude oil and feedstock oil from external suppliers; and (ii) impairment provision for some petrochemical assets with higher costs of production and operation in accordance with the accounting standards.

In 2017, we continued to optimize our productions and operations in the refining and chemicals segment. Due to the effects of the increase in the processing volume of crude oil and strengthened control over costs and expenses, the cash processing cost of our refineries was RMB169.04 per ton, representing a decrease of RMB10.89 per ton from RMB179.93 per ton in 2016.

Profit from Operations In 2017, in our refining and chemicals segment, we focused on the principle of market orientation and benefit, energetically pushed forward the structure optimization, reform and innovation, increased the production of high value-added and market-favorable products, and improved internal profit generating capabilities; intensified control over costs and expenses. These efforts resulted in several economic indicators being better than 2016 and maintaining a dominant position in profit contribution. In 2017, we realized operating profits of RMB39,961 million in the refining and chemicals segment, representing an increase of 2.4% as compared with RMB39,026 million in 2016. The refining operations recorded an operating profit of RMB32,573 million, representing an increase of 18.2% as compared with RMB27,565 million in 2016 due to the optimized product structure and the increase in gross profit. Taking advantage of the prosperous cycle of the chemical product market, we increased the sales of high-profitability products. However, as affected by the impairment provision for some petrochemical assets with higher production and operation costs, our chemical operations realized an operating profit of RMB7,388 million, representing a decrease of 35.5%, as compared with RMB11,461 million in 2016.

Marketing Segment

Revenue Revenue of the marketing segment increased by 27.6% from RMB1,301,616 million in 2016 to RMB1,660,456 million in 2017. This increase was primarily due to the combined effects of (i) the increase in both sales volume and prices of such products as gasoline and kerosene, and the rise in the price and the decrease in the sales volume of diesel; and (ii) the increase in revenue derived from trading of oil products.

Operating Expenses Operating expenses of the marketing segment increased by 28.0% from RMB1,290,568 million in 2016 to RMB1,652,177 million in 2017, primarily due to an increase in the expenses for purchase of refined oil from external suppliers.

Profit from Operations In 2017, in active response to the unfavorable condition of fiercer competition in the market, the marketing segment aimed for maximizing the overall results of the company. In domestic operations, we kept strengthening connection between production, sales and inventory management, optimized allocation of resources, enhanced cost and expense control, improved the integration of marketing and increased the profit from our non-oil business. In international trading, the marketing segment intensified the coordination and cooperation with domestic industrial chain, and optimized the import and export of oil and gas resources. In 2017, the marketing segment realized an operating profit of RMB8,279 million, representing a decrease of 25.1% as compared with RMB11,048 million in 2016.

Natural Gas and Pipeline Segment

Revenue Revenue of the natural gas and pipeline segment amounted to RMB295,786 million in 2017, representing an increase of 19.5% as compared with RMB247,477 million in 2016, primarily due to the increase in the sales volume of natural gas.

Operating Expenses Operating expenses of the natural gas and pipeline segment amounted to RMB280,098 million in 2017, representing an increase of 22.0% as compared with RMB229,592 million in 2016, primarily due to the increase in the expenses for purchasing natural gas.

Profit from Operations In 2017, in the natural gas and pipeline segment, we overcame the negative effects of decline in citygate price, optimized the allocation of resources, reduced comprehensive purchase costs, continued to enhance cost control, and realized an operating profit of RMB15,688 million, representing a decrease of 12.3% as compared with RMB17,885 million in 2016. This decrease was primarily due to the effects that (i) the impairment on goodwill related to the acquisition of PetroChina United Pipelines Co., Ltd. Amounted to RMB3,709 million; and (ii) the sales of imported gas recorded a net loss of RMB23,947 million, representing an increase of loss of RMB9,063 million as compared with 2016.

In 2017, our international operations realized a revenue of RMB721,374 million, accounting for 35.8% of the our total revenue. Profit before income tax expense amounted to RMB4,543 million, accounting for 8.6% of our pre-tax profit. Our international operations maintained a healthy development with further improved international operating ability.

Our four operating segments are exploration and production, refining and chemicals, marketing as well as natural gas and pipeline. Overseas operations do not constitute a separate operating segment. The financial data of overseas operations are included in the financial data of the respective operating segment mentioned above.

Liquidity and Capital Resources

Our primary sources of funding include cash generated by operating activities and short-term and long-term borrowings. Our primary uses of funds were for operating activities, capital expenditures, repayment of short-term and long-term borrowings and distributions of dividends to shareholders. Our payments to CNPC are limited to dividends and payments for services provided to us by CNPC. For the year ended December 31, 2018, we distributed as dividends 45% of our reported income for the year attributable to owners of the Company together with additional interim and final special dividends in return to our shareholders. See Item 8 Financial Information Dividend Policy for a discussion of factors which may affect the determination by our board of directors of the appropriate level of dividends.

Our financing ability may be limited by our financial condition, our results of operations and the international and domestic capital markets. Prior to accessing the international and domestic capital markets, we must obtain approval from the relevant PRC government authorities. In general, we must obtain PRC government approval for any project involving significant capital investment for our refining and chemicals, marketing and natural gas and pipeline segments. For a more detailed discussion of factors which may affect our ability to satisfy our financing requirements, see Item 3 Key Information Risk Factors Risks Related to Liquidity .

We plan to fund the capital and related expenditures described in this annual report principally through cash from operating activities, short-term and long-term borrowings and cash and cash equivalents. Net cash flows from operating activities in the year ended December 31, 2018 was RMB351,565 million. As of December 31, 2018, we had cash and cash equivalents of RMB85,598 million. While each of the projects described in this annual report for which significant capital expenditures will be required is important to our future development, we do not believe that failure to implement any one of these projects would have a material adverse effect on our financial condition or results of operations. If the price of crude oil declines sharply in the future, it is likely that we would delay or reduce the scale of the capital expenditures for our exploration and production segment.

We currently do not have any outstanding options, warrants or other rights for any person to require us to issue any common stock at a price below its market value. We do not currently intend to issue any such rights or to otherwise issue any common stock for a price below its market value.

In addition, as of December 31, 2018, we did not have any transactions, arrangements or other relationships with unconsolidated entities or other persons that are reasonably likely to materially affect the liquidity or availability of or requirements for our capital resources.

The table below sets forth our cash flows for each of the years ended December 31, 2016, 2017 and 2018 and our cash equivalents at the end of each year.

	Year Ended December 31,		
	2016	2017	2018
	(RMB in millions)		
Net cash flows from operating activities	265,179	366,655	351,565
Net cash flows used for investing activities	(175,887)	(243,546)	(267,732)
Net cash flows used for financing activities	(67,007)	(94,725)	(123,515)
Currency translation difference	2,873	(3,538)	2,503
Cash and cash equivalents at year end	97,931	122,777	85,598

Our cash and cash equivalents decreased by 30.3% from RMB122,777 million as of December 31, 2017 to RMB85,598 million as of December 31, 2018.

Net Cash Flows from Operating Activities

Our net cash flows from operating activities amounted to RMB351,565 million for the year ended December 31, 2018, representing a decrease of 4.1% from RMB366,655 million for the year ended December 31, 2017. This was mainly due to a combined effect of the changes in inventories, receivables and payables and other working capital and the increase in taxes, employee fees during the reporting period. As of December 31, 2018, we had cash and cash equivalents of RMB85,598 million. Our cash and cash equivalents were mainly denominated in Renminbi and US Dollars (approximately 46.2% were denominated in Renminbi, approximately 49.1% were denominated in US Dollars, approximately 2.1% were denominated in HK Dollars and approximately 2.6% were denominated in other currencies).

Our net cash flows from operating activities amounted to RMB366,655 million for the year ended December 31, 2017, representing an increase of 38.3% from RMB265,179 million for the year ended December 31, 2016. This was mainly due to a combined effect of an increase in profit and strengthened management over inventories, payables and other working capital during the reporting period. As of December 31, 2017, we had cash and cash equivalents of RMB122,777 million. Our cash and cash equivalents

Table of Contents

were mainly denominated in Renminbi and US Dollars (approximately 57.8% were denominated in Renminbi, approximately 36.4% were denominated in US Dollars, approximately 4.9% were denominated in HK Dollars and approximately 0.9% were denominated in other currencies).

Our net cash flows from operating activities amounted to RMB265,179 million for the year ended December 31, 2016, representing an increase of 1.5% from RMB261,312 million for the year ended December 31, 2015. This was mainly due to a combined effect of a decrease in profit and the decrease in tax expenses during the reporting period. As of December 31, 2016, we had cash and cash equivalents of RMB97,931 million. Our cash and cash equivalents were mainly denominated in Renminbi and US Dollars (approximately 52.6% were denominated in US Dollars, approximately 44.3% were denominated in Renminbi, approximately 1.7% were denominated in HK Dollars and approximately 1.4% were denominated in other currencies).

Net Cash Flows Used for Investing Activities

Our net cash flows used for investing activities in 2018 amounted to RMB267,732 million, representing an increase of 9.9% from RMB243,546 million in 2017. The increase was primarily due to a combined effect of the adjustment of our investment plans based on the oil price trend and market changes and the increase in capital expenditures in 2018.

Our net cash flows used for investing activities in 2017 amounted to RMB243,546 million, representing an increase of 38.5% from RMB175,887 million in 2016. The increase was primarily due to a combined effect of the adjustment of our investment plans based on the oil price trend and market change and the increase in capital expenditures in 2017.

Our net cash flows used for investing activities in 2016 amounted to RMB175,887 million, representing a decrease of 18.5% from RMB215,879 million in 2015. The decrease was primarily due to a combined effect of the adjustment of our investment plans based on the oil price trend and market change, a decrease in capital expenditures during the current reporting period and payment of considerations for integration of certain pipelines assets in 2015.

Net Cash Flows Used for Financing Activities

Our net cash flows used for financing activities in 2018 was RMB123,515 million, representing an increase of 30.4% from RMB94,725 million in 2017. This was primarily due to our efforts in optimizing our debt structure, the decrease in amount of debts and the decrease in new borrowings in 2018.

Our net cash flows used for financing activities in 2017 was RMB94,725 million, representing an increase of 41.4% from RMB67,007 million in 2016. This was primarily due to a combined effect of (i) our efforts in optimizing our financial arrangement and debt structure; (ii) the decrease in amount of debts and financing cost, (iii) the decrease in long-term borrowings in 2017, and (iv) the increase in balance of short-term borrowings as of December 31, 2017.

Our net cash flows used for financing activities in 2016 was RMB67,007 million, representing an increase of 47.5% from RMB45,439 million in 2015. This was primarily due to a combined effect of (i) our efforts in optimizing financial arrangement and debt structure, and strengthening the management of our interest-bearing borrowings, (ii) the decrease in financing cost, (iii) the decrease in long-term borrowings in 2016, and (iv) the increase in balance of short-term borrowings as of December 31, 2016.

Table of Contents

Our net borrowings as of December 31, 2016, 2017 and 2018 were as follows:

	As of December 31,		
	2016	2017	2018
	(RMB in millions)		
Short-term borrowings (including current portion of long-term borrowings)	143,384	175,417	137,738
Long-term borrowings	372,887	289,858	269,422
Total borrowings	516,271	465,275	407,160
Less: cash and cash equivalents	97,931	122,777	85,598
Net borrowings	418,340	342,498	321,562

Our total borrowings as of December 31, 2018 consisted of approximately 49.5% of fixed-rate loans and approximately 50.5% of floating-rate loans. Of our borrowings as of December 31, 2018, approximately 71.5% were denominated in Renminbi, approximately 26.2% were denominated in US Dollars and approximately 2.3% were denominated in other currencies.

Our total borrowings as of December 31, 2017 consisted of approximately 54.5% of fixed-rate loans and approximately 45.5% of floating-rate loans. Of our borrowings as of December 31, 2017, approximately 71.4% were denominated in Renminbi, approximately 26.7% were denominated in US Dollars and approximately 1.9% were denominated in other currencies.

Our total borrowings as of December 31, 2016 consisted of approximately 54.8% of fixed-rate loans and approximately 45.2% of floating-rate loans. Of our borrowings as of December 31, 2016, approximately 72.1% were denominated in Renminbi, approximately 26.5% were denominated in US Dollars and approximately 1.4% were denominated in other currencies.

Our debt to capital ratio (calculated by dividing interest-bearing debts by the aggregate of interest-bearing debts and shareholder s equity) as of December 31, 2016, 2017 and 2018 was 27.3%, 25.2% and 22.4%.

As of December 31, 2018, the outstanding amount of our debts secured by CNPC and its subsidiaries and other third parties was RMB27,685 million.

Capital Expenditures and Investments

In 2018, we focused on the principles of quality and profitability for capital expenditures, continued to optimize our investment structure and control our overall capital expenditures, with a focus on the investment in upstream oil and gas projects in order to enhance our sustainable development capability. In 2018, our capital expenditures were RMB255,974 million, representing an increase of 18.4% from RMB216,227 million in 2017.

Table of Contents

The table below sets forth our capital expenditures and investments by business segment for each of the years ended December 31, 2016, 2017 and 2018 as well as those anticipated for the year ending December 31, 2019. Actual capital expenditures and investments for periods after January 1, 2019 may differ from the amounts indicated below.

	2016		2017		2018		2019 Anticipated	
	(RMB in millions)	%	(RMB in millions)	%	(RMB in millions)	%	(RMB in millions)	%
Exploration and production[(1)]	130,248	75.56	161,997	74.92	196,109	76.61	228,200	75.91
Refining and chemicals	12,847	7.45	17,705	8.19	15,287	5.97	38,800	12.91
Marketing	7,983	4.63	10,982	5.08	17,010	6.65	14,600	4.86
Natural gas and pipeline	20,340	11.80	24,529	11.34	26,502	10.35	17,800	5.92
Headquarters and others	968	0.56	1,014	0.47	1,066	0.42	1,200	0.40
Total	172,386	100.00	216,227	100.00	255,974	100.00	300,600	100.00

(1) If investments related to geological and geophysical exploration costs are included, the capital expenditures and investments for the exploration and production segment in 2016, 2017, 2018 and the estimates for the same in 2019 would be RMB139,135 million, RMB176,426 million, RMB206,256 million and RMB239,200 million, respectively.

As of December 31, 2018, the capital commitments contracted but not provided for were approximately RMB41,989 million.

Exploration and Production

A majority of our capital expenditures and investments relate to our exploration and production segment. For each of the three years ended December 31, 2016, 2017 and 2018, capital expenditures in relation to the exploration and production segment amounted to RMB130,248 million, RMB161,997 million and RMB196,109 million, respectively. In 2018, our capital expenditures were primarily used for the exploration projects in our 16 domestic oil and gas fields, construction of production facilities in our oil and gas fields, and the exploration and development projects in our five major overseas oil and gas cooperation regions.

We anticipate that the capital expenditures for our exploration and production segment in 2019 would amount to RMB228,200 million. Domestic exploration activities will be focused on the key basins such as Songliao Basin, Erdos Basin, Tarim Basin, Sichuan Basin and Bohai Bay Basin. Domestic development activities will be focused on a growth in the production of crude oil and natural gas by developing oil and gas fields in Daqing, Changqing, Liaohe, Xinjiang, Tarim and the Southwest region and enhancing the development of unconventional resources such as shale gas. Overseas operations will be aimed at continued cooperation with our current partners in the operation of the existing projects and the development of new projects in the Middle East, Central Asia, the Americas and the Asia-Pacific regions to ensure an effective growth of our reserves and production.

Refining and Chemicals

Our capital expenditures for our refining and chemicals segment for each of the years ended December 31, 2016, 2017 and 2018 were RMB12,847 million, RMB17,705 million and RMB15,287 million, respectively. In 2018, our capital expenditures were mainly spent on the construction of large-scale refining and chemicals facilities, including the projects of Liaoyang Petrochemical and Huabei Petrochemical and certain other oil product quality upgrading projects.

We anticipate that the capital expenditures for the refining and chemicals segment in 2019 would amount to RMB38,800 million, which are expected to be used primarily for the refining-chemical integration project of

Guangdong Petrochemical, Daqing Petrochemical s project in relation to adjustment and upgrading of product structure, the large-scale refining-chemical projects of producing ethylene out of ethane in Changqing and Tarim, and certain refining-chemical transformation and upgrading projects.

Marketing

Our capital expenditures for our marketing segment for each of the years ended December 31, 2016, 2017 and 2018 were RMB7,983 million, RMB10,982 million and RMB17,010 million, respectively. Our capital expenditures for the marketing segment in 2018 were mainly used for the construction of service stations, storage facilities and other facilities for our sales network.

We anticipate that the capital expenditures for our marketing segment for the year of 2019 will amount to RMB14,600 million, which are expected to be used primarily for the construction and expansion of refined oil sales networks and the construction of the overseas oil and gas operation centers.

Natural Gas and Pipeline

Our capital expenditures for the natural gas and pipeline segment for each of the three years ended December 31, 2016, 2017 and 2018 were RMB20,340 million, RMB24,529 million and RMB26,502 million, respectively. Our capital expenditures for the natural gas and pipeline segment in 2018 were mainly used for construction projects including the Fujian-Guangdong branch line of the Third West-East Gas Pipeline, the north section of the China-Russia East Natural Gas Pipeline, the Second China-Russia Crude Oil Pipeline and the Jinzhou-Zhengzhou Refined Oil Pipeline.

We anticipate that our capital expenditures for the natural gas and pipeline segment in 2019 will amount to approximately RMB17,800 million, which are expected to be used primarily for the construction of key natural gas transmission projects such as the China-Russia East Natural Gas Pipeline, Fujian-Guangdong branch of the Third West-East Gas Pipeline, the LNG equipment and other facilities for peak regulation, storage and transportation, the natural gas interconnection projects, as well as the construction of gas branches and sales terminals.

Headquarters and Others

Our non-segment-specific capital expenditures and investments for each of the years ended December 31, 2016, 2017 and 2018 were RMB968 million, RMB1,014 million and RMB1,066 million, respectively, which were primarily used for research activities and development of the IT system.

Our anticipated capital expenditures for the headquarters and others in 2019 will amount to RMB1,200 million. These planned capital expenditures and investments mainly include capital expenditures for scientific research activities and the development of the IT system.

Off-Balance Sheet Arrangements

As of December 31, 2018, there were no off-balance sheet arrangements that had or were reasonably likely to have a current or future effect on our financial condition, changes in financial condition, revenues or expenses, results of operations, liquidity, capital expenditures or capital resources that is material to investors.

Long-Term Contractual Obligations and Other

Commercial Commitments and Payment Obligations

All information that is not historical in nature disclosed under Item 5 Operating and Financial Review and Prospects Long-Term Contractual Obligations and Other Commercial Commitments and Payment Obligations is deemed to be a forward looking statement. See Forward-Looking Statements for additional information.

Table of Contents

The tables below set forth our long-term contractual obligations outstanding as of December 31, 2018.

		Payment Due by Period			
Contractual Obligations	Total	Less Than 1 Year	1-3 Years	3-5 Years	After 5 Years
		(RMB in millions)			
Long-term debt	344,792	75,370	178,543	52,865	38,014
Capital lease obligations	1,165	138	253	254	520
Operating leases	227,935	12,664	20,477	18,745	176,049
Capital commitments	41,989	7,936	34,025	28	
Other long-term obligations					
Debt-related interest	35,693	11,460	13,626	4,742	5,865
Total	651,574	107,568	246,924	76,634	220,448

We are obligated to make annual payment with respect to our exploration and production licenses to the Ministry of Natural Resources. The table below sets forth the estimated amount of the annual payments in the next five years:

Year	Annual Payment (RMB in millions)
2019	800
2020	800
2021	800
2022	800
2023	800

Assets Retirement Obligation

A number of provinces and regions in which our oil and gas exploration and production activities are located have promulgated environmental protection regulations, which set forth specific abandonment and disposal processes for oil and gas exploration and production activities. We have established standard abandonment procedures, including plugging all retired wells, dismantling all retired metering stations and other related facilities and performing site restoration, in response to the issuance of these provincial and regional regulations. As of December 31, 2018, the balance of assets retirement obligation was RMB132,780 million.

Research and Development

We have a research and development management department, directly under which there are three research institutions. Except for our branch companies which are engaged in marketing activities, each of our branch companies has its own research and development management department. Most of our branch companies have their own research institutions. Our research and development management departments are mainly responsible for managing and coordinating the research and development activities conducted by each of the research institutions. As of December 31, 2018, we had 39,377 employees in our research and development departments and institutions.

In each of the years ended December 31, 2016, 2017 and 2018, our total expenditures for research and development were approximately RMB17,565 million, RMB18,601 million and RMB21,045 million, respectively.

Table of Contents

Exploration and Production

Most of China s major oil and gas fields are characterized by a broad range of geological conditions, and a majority of China s oil and gas fields are in continental sedimentary basins with complex structures. Our research and development efforts with respect to our exploration and production business focus on:

- theories and technologies of crude oil and natural gas exploration;
- oil and gas development theories and technologies;
- engineering technologies and equipment;
- theories and technologies for oil and gas storage and transportation; and
- technologies for security, energy conservation and environmental protection.

Refining and Chemicals

Currently, our research and development efforts in the refining and chemicals segment are focusing on the following areas:

- technologies for clean refined oil products;
- technologies for unqualified heavy oil processing;
- refining-chemical integration technologies;
- technologies for production of olefin aromatics;
- technologies for new products of synthetic resin and synthetic rubber;
- new catalyst and catalytic materials; and
- technologies for safety, energy saving and environmental protection.

Trend Information

In 2019, the global economy is expected to recover slowly with the economic environment still facing risks and challenges. As supply and demand in the global oil market eases, international oil prices are likely to demonstrate a wide-range of volatility and remain uncertain to a large extent. China s economy is expected to stay within a reasonable ambit and the consumption demand for oil and gas in China is expected to maintain growth momentum generally while the consumption of natural gas in particular is expected to continue on a fast track. Given a series of favorable policies, such as the expedited implementation of structural reform on the oil and gas sector, formulation of rules for a fair, open and transparent market and build-up of a business environment based on the rule of law, as well as tax and duty cuts on an even larger scale, a fairer market environment will be nurtured which is expected to facilitate our long-term business development. We will continue to adhere to our steady development guidelines, insist on quality-based business development, fully implement our four major strategies regarding resources, market, globalization and innovation, continue to optimize the structure of our industry chain, improve the value of our oil and gas business chains, and vigorously intensify measures to broaden our sources of income and to reduce expenditure as well as cut costs and enhance efficiency, in an effort to maintain a steady and positive improvement of our production and operations, and continue to improve our market competitiveness and corporate value.

In respect of exploration and production, we will insist on efficient exploration and development at a low cost, and make great efforts to increase reserves and production as well as improve profitability. With regards to our oil and gas exploration, we aim to explore large-scale and high quality reserves, strengthen centralized exploration and precise exploration of major basins and key series and strata, promote comprehensive exploration of resources including tight oil and gas, shale oil and gas and coalbed methane to consolidate the resource base, and strive to acquire mineable reserves with economies of scale. With respect to our oil and gas production, we will, on the basis of stable output of oil and increase of gas, carry out construction of key projects to increase our production capacity, endeavor to ensure stable production in existing oil fields and start-up of new projects, both in pursuit of efficiency and profitability, focusing on optimization, arrangement and adjustment of development plans, achieve lean manufacturing driven by innovation and a balance between production and efficiency, advance unconventional oil and gas businesses such as coalbed methane and shale gas in an orderly manner and endeavor to increase both production and efficiency.

In respect of refining and chemicals, we will, taking into account efficiency, resources and market conditions, make scientific and reasonable arrangements for processing load, continue to optimize resource allocation and product structure, in order to achieve the most efficient utilization of resources and to maximize overall value. In respect of the refining business, we will endeavor to ensure a reasonable diesel-gasoline ratio, increase production of high-profitability and featured products; in respect of the chemical business, we will, in consideration of the market cycle, broaden sources of quality chemical raw materials, accelerate research and development on new products needed by the market, enhance the proportion of products that are