



2016 Annual Report





Energize · Harmonize · Realize

China National Petroleum Corporation (CNPC) is an integrated international energy company, with businesses covering oil and gas operations, oilfield services, engineering and construction, equipment manufacturing, financial services and new energy development.



Contents

Message from the Chairman	03
Report of the President	04
Operation Highlights	07
Board of Directors · Top Management · Organization	09
2016 Industry Review	12
Safety, Environment, Quality and Energy Conservation	14
Human Resources	18
Technology · Innovation	22
Annual Business Review	26
Financial Statements	50
Major Events	60
Glossary	63





Message from the Chairman

Year 2016 was an extraordinary and unforgettable one featured by slow recovery of the world economy, profound adjustments in the global energy industry, volatile oil and gas prices at low level, and an ongoing oversupply in the market.

Facing the severe situation and challenges, CNPC kept focusing on oil and gas operations, and adjusted production strategies for stabilizing growth, restructuring business, shoring up weakness, improving profitability and controlling risks. We spared no efforts in cutting cost and increasing efficiency and survived the cold winter of low oil price. We secured a good start of the 13th Five-Year Plan Period by maintaining overall profit and positive free cash flow.

Sound growth in core business: Focusing on core business of oil and gas, our domestic oil and gas reserves maintained a peak growth, refining and petrochemical earnings hit record high, oil products sales continued to increase, natural gas and pipeline business raised sales volume with steady profit, and overseas operation performance grew against unfavorable situation. Meanwhile, we further enhanced our market competitiveness in oilfield services, engineering construction, equipment manufacturing, international trade and financial services, with our sustainability continued to build up.

Optimized production organization: A market-oriented and efficiency-focused approach was adopted to optimize production organization and facilitate the overall balance in production, transportation, marketing, storage and trading. We maintained smooth and steady production by taking the initiative in holding back high-cost crude output, shutting down marginal wells and blocks, allocating feedstock to high-performing refining and petrochemical facilities, reducing diesel-gasoline ratio, and optimizing market allocation between domestic gas and imported gas.

Improved operation and management: Against the winter time of the industry, we took special actions to improve quality and boost efficiency. A mechanism linking investment decision-making with cash flow and profit was set up. When making investment, we gave priority to core business and debottlenecking projects, guided funds into market expansion and profit

generation efforts, implemented life-cycle cost control across the whole value chain, and took effective measures for non-performing subsidiaries. With all those endeavors, we successfully reduced costs and expenses.

Generated vitality by reform and innovation: We vigorously promoted reform and innovation in key areas and processes, released guidelines for deepening reform in an overall way, improved corporate governance, optimized functional positioning and organization structure at headquarters, pushed forward business restructuring and listing, made more efforts on implementing performance-based remuneration, deepened reform on subsidiary empowerment, reformed natural gas marketing management, tackled key problems in technological R&D, and further integrated IT with business operation. These efforts helped us successfully improve efficiency and profit.

Controlled HSE risks: Practicing green development concept of safety, low carbon and resource conservation, we continued to promote the building of HSE standard with a focus on safety surveillance in key areas. We set up a mechanism on environmental risk control, strengthened measures on pollution prevention, greenhouse gas emissions and renovation of energy efficiency technologies, facilitated the building of eco-friendly production sites and green communities, and realized harmony between the business and the nature.

Rebuilt corporate image: With strong commitment to regulatory compliance and corporate social responsibilities, we made great efforts in rebuilding corporate image. We received growing understanding, recognition and support from the society which resulted in improvement of our reputation and influence. CNPC was one of the Top 10 SOE Brands, the Top 20 Listed Companies with Best Practices in Corporate Supervision, and the International EAP Quality Award winners.

The past year saw CNPC withstanding many severe challenges and achieving hard-won victories. On behalf of the Board of Directors and the top management, I would like to express my heartfelt thanks for your help and support!

The world goes on in a never-ending process of the new replacing the old. Year 2017 is very important to CNPC for implementing the 13th Five-Year Plan and pushing forward reform and innovation. Despite continued challenges and pressure, there are favorable and positives factors as well. Looking ahead, we see more opportunities than challenges. We will maintain a prudent and proactive approach to business development and vigorously implement our strategies of resources, market, internationalization and innovation. We will further our efforts in internal reform and structural adjustment, and promote innovation-driven growth with improved quality and efficiency. Targeting at being an integrated international energy corporation, enriched by the "petroleum spirit", CNPC is committed to achieving steady growth, with great corporate image and HSE performance, and make greater contributions to China's socio-economic development.

Chairman



Report of the President

In 2016, despite complex and challenging circumstances resulting from low oil prices, the company made great efforts to cut costs and increase profits by optimizing production management, adjusting resource allocation and improving operational mechanisms. Our production and management were on a smooth and controlled track, with overall performance better than expected. We registered a full-year turnover of RMB 1,871.9 billion and a total profit of RMB 50.7 billion, marking a good start to the 13th Five-Year Plan period.

Domestic E&P met target and loss-making controlled

Our preliminary prospecting and fine exploration in China's major petroliferous basins and favorable zones led to 22 significant discoveries, with six 100 million ton and five 100bcm uncompartimentalized oil and gas blocks identified. In particular, the multilayer 3D exploration of lithologic reservoirs in Changqing resulted in 370 million tons of newly added proven reserves. Twelve major discoveries were made in exploring new zones/areas, including 91.54 million tons of controlled + predicted reserves in place at Mahu sag in Xinjiang, two gas-bearing structures with newly added predicted reserves of up to 130bcm at Keshen tectonic belt in Tarim, a dolomite buried hill reservoir at Makit slope in southwestern Tarim, and high-yield oil and gas flow from buried hill reservoirs at Langfang-Gu'an sag in Bohai Bay Basin. In 2016, 649.29 million tons of oil in place and 541.9 billion cubic meters of gas in place were added, exceeding 1 billion tons of oil equivalent in total for the tenth consecutive year.

Our domestic development activities kept improving management through measures like fine reservoir description, precision water-flooding, restoration of selected dormant wells, and field testing of chemical flooding and gas flooding techniques. A number of capacity expansion projects were underway, and the Changning-Weiyuan national shale gas demonstration block in Sichuan was completed. We continued to

optimize E&P programs and production mix, promote standardized design for surface engineering and EPC drilling services, strengthen downhole operation management, streamline management tiers and reduce workforce, achieving a drop in both lifting cost and all-in cost per barrel. Our domestic fields produced 105.45 million tons of crude and 98.1 billion cubic meters of gas throughout the year.

Refining & chemicals achieved historical high

With efforts in production optimization, we allocated resources to high-performing facilities, increased utilization ratio of refining-petrochemical complexes and enhanced the production of ethylene fed by light hydrocarbons and diesel distillate. In 2016, we processed 147.09 million tons of crude, and produced 99.32 million tons of refined products and 5.59 million tons of ethylene in China, with 16 key technical and financial indicators improved compared with the previous year. In particular, fuel and electricity consumption of ethylene units was reduced by 17.6 kgoe/ton. The product mix continued to improve, leading to a decline in the diesel-gasoline ratio by 0.24 and a continuous increase in the output of high-efficiency refined products and profitable chemicals. All major construction projects were making headway. A total of 23 upgrading projects for National V gasoline and diesel fuels were completed as planned. Yunnan Petrochemical was getting ready for operation. The marketing strategy for chemical products saw a shift to e-commerce resulting in sales of 26.80 million tons, an increase of 6% year-on-year.

Refining product marketing enhanced profitability

We coordinated marketing both for domestic and overseas markets to increase exports. Sales incentives were implemented focusing on gasoline, kerosene and diesel fuels. The upgrading and conversion to National V oil products was carried forward. Full-year oil products sales in China and for

Implementing strategies of resources, market, internationalization and innovation, CNPC focused on core business of oil and gas and achieved steady growth through ongoing efforts to stabilize production, restructure business portfolio, shore up weakness, improve profitability and control risks.

exports reached 113.03 million tons and 11.23 million tons respectively. Integrated marketing of oil products, prepaid fuel cards, non-fuel products and lubricants were stepped up. Retail service was upgraded through "Internet + Marketing". Marketing costs were significantly reduced by expanding distribution network, improving under-performing service stations (with low sales and low profits), and optimizing logistics, transportation and resource allocation.

Natural gas and pipelines increased supply

In view of market demand and seasonal changes, adjustments were made on domestic gas production to optimize gas import volume and LNG delivery schedule under long-term contracts to ensure reliable and stable gas supply. We ensured that branch lines were fed with gas and new customers were connected as planned. Resources were allocated to high-profit markets and high-end customers. In particular, the Bohai Rim and the Yangtze River Delta region, etc. absorbed 70.1% of the total supply. In 2016, we sold 131.5 billion cubic meters of natural gas in the domestic market, up 7.2% year-on-year. We improved the layout of pipeline network in that the eastern section of the Third West-East Gas Pipeline was put into operation and that new projects construction were commenced such as the Second Russia-China Crude Pipeline and the Fourth Shaanxi-Beijing Gas Pipeline. Meanwhile, substantial steps were taken on the system reform of natural gas marketing and pipeline operations, as evidenced by the incorporation of PetroChina Natural Gas Marketing Company and PetroChina Pipeline Company, completing the integration of end-user business. These efforts laid a solid foundation for enhancing our gas marketing capability.

Overseas operations maintained steady growth

Our overseas E&P efforts focused on major projects, seeing significant progress in risk exploration at the Right Bank of Amu Darya in Turkmenistan and Block 6 in Sudan. A number of high-quality, readily producible discoveries were made by progressive exploration in Chad and Ecuador. Newly added recoverable equity reserves amounted to 43.44 million tons of oil and gas equivalent for the full year. We produced 76.01 million tons of equity oil, an increase of 5.5% year-on-year, through optimizing

development programs, adjusting production dynamics, boosting productivity and enhancing oil recovery. The North Azadegan project in Iran came on stream and began cost recovery. Progress was made in international oil and gas cooperation with partnership agreements or MOUs signed with countries including Russia, Saudi Arabia, Mozambique, Algeria, Peru and Venezuela.

Service business further expanded market

The size of our oilfield services crew was reduced but competitive edge sharpened with lower operating costs and higher service quality. Maintaining a strong presence in the domestic market, our engineering construction business saw new breakthroughs in the high-end international market, winning the bids for Shell's Basrah Gas Plant renovation project in Iraq and the Ras Tanura Pipeline project of Saudi Aramco, etc. Our equipment manufacturing subsidiaries continued to promote international cooperation on capacity building, strengthened life-cycle management, extended to new service areas and increased steel pipe exports. On international trading business, we increased oil and gas imports, signed more processing trade contracts, sold more equity oil from Iran and Iraq, and expanded the efficient international market. The full-year trading volume stood at 450 million tons worth USD 141.2 billion. Our financial services provided strong support to oil and gas operations and made headway in market exploration and product innovation. We sped up the separation of utilities (water, electricity and heating) and property management services from our logistics services and made substantial progress.

Technological innovation and IT application supported core business

The company continued to encourage technological innovation and IT application in supporting core business development. We pushed ahead major scientific and technological projects, and launched 36 projects and 16 demonstration projects listed in the 13th Five-Year Plan. Our R&D efforts resulted in a number of achievements, ensuring continuous and steady growth of proven reserves and oil recovery in our major oilfields, facilitating the upgrading of oil products and the adjustment of product mix, as well as enhancing the competitiveness of oilfield services, engineering

construction and equipment manufacturing sectors. Information technologies were further integrated into production and management activities, with ERP system and Internet of Things covering more business. In addition, the cloudization of 40 application systems including service station management was completed.

Corporate reform saw positive results

New progress was made in reform of key businesses and procedures, as evidenced by optimizing functions of departments at headquarters, improving management system of specialized companies, separating oil and gas pipeline operation from natural gas marketing, closing equity transaction of CNPC Trans-Asia Gas Pipeline Company Limited, and listing the newly formed China Petroleum Engineering & Construction Corp. (CPEC) and CNPC Capital Company Limited. Additionally, new reform initiatives targeting at R&D system and business autonomy expansion in selected subsidiaries were implemented smoothly, and the reform of unlisted business and logistics services kept deepening.

HSE performance improved

Our HSE performance was improved comprehensively with implementation of the newly amended *Safety Production Law* and *Environmental Protection Law*. Efforts were made in the prevention and control of hidden risks, with zero reporting of major safety and

environmental pollution accidents throughout the year. A quantitative review of the HSE system was conducted to reinforce risk control and boost emergency response capabilities, ensuring our production process in a safe and controlled way. We strengthened measures to reduce greenhouse gas emissions and implemented real-time monitoring of environmental risks, meeting the target for pollutant discharge and emission reduction. We pilot-tested energy management system and promoted energy-saving technologies, resulting in further improvement of energy efficiency.

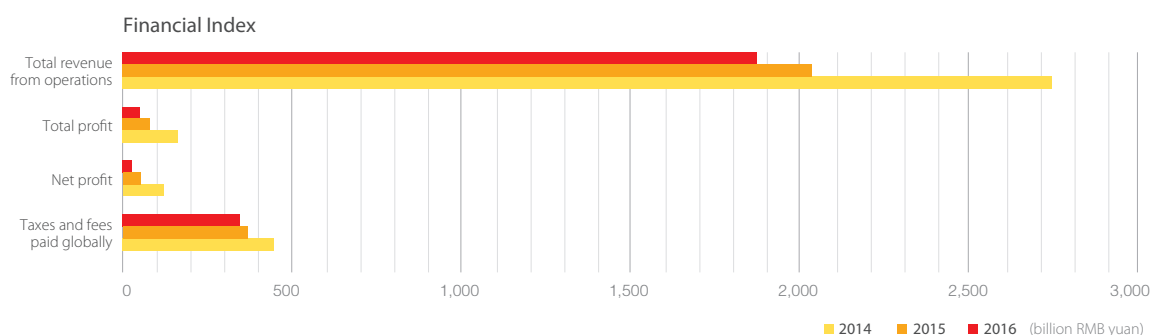
In 2017, we will strive for a healthy, steady and harmonious growth and meet all business objectives with strong confidence, while bearing in mind the bottom line of positive profit and free cash flow. Targeting at efficiency improvement with light asset, we will continuously take the market-oriented approach, deepen benchmarking and fine management, optimize resource allocation and production, and make more efforts in HSE as well as energy conservation and emission reduction.

President

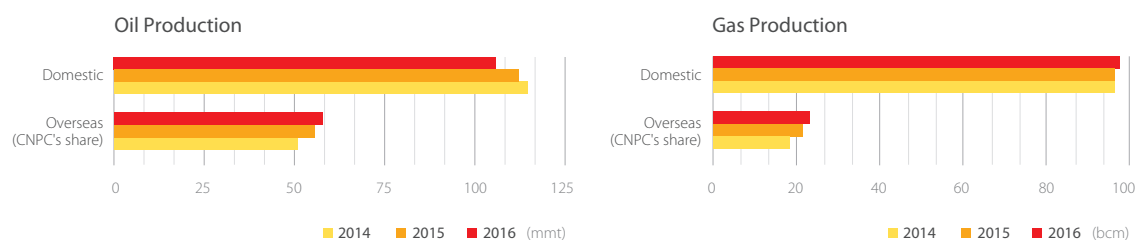
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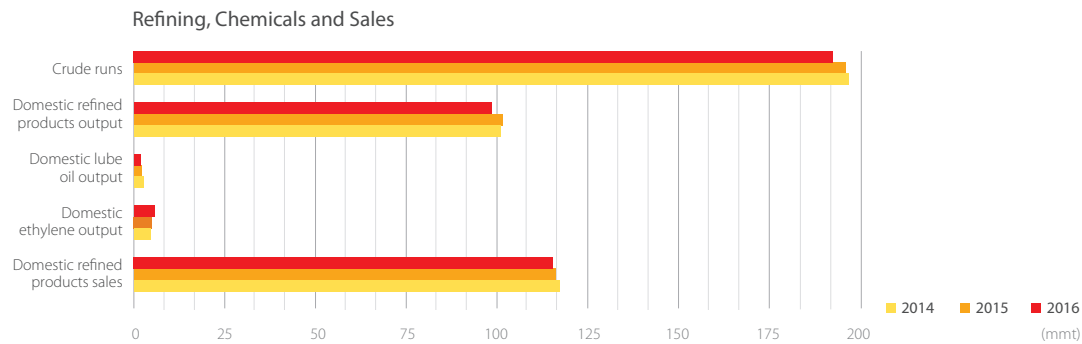
Operation Highlights



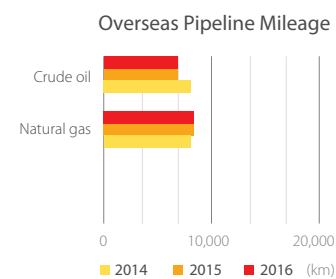
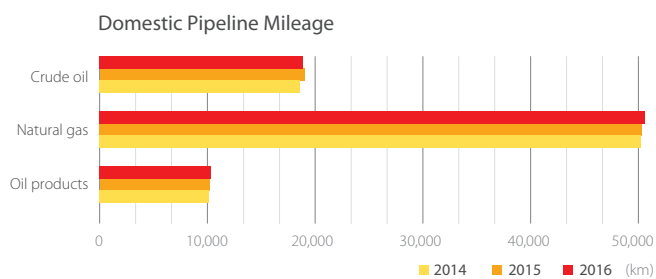
Financial Index	2014	2015	2016
Total revenue from operations (billion RMB yuan)	2,730.0	2,016.8	1,871.9
Total profit (billion RMB yuan)	173.4	82.5	50.7
Net profit (billion RMB yuan)	123.8	56.2	26.8
Taxes and fees paid globally (billion RMB yuan)	458.9	375.7	349.7



Oil and Gas Production	2014	2015	2016
Oil production (mmt)	164.17	166.57	162.98
Domestic	113.67	111.43	105.45
Overseas (CNPC's share)	50.50	55.15	57.53
Gas production (bcm)	113.92	116.67	121.30
Domestic	95.46	95.48	98.11
Overseas (CNPC's share)	18.45	21.19	23.19



Refining, Chemicals and Sales	2014	2015	2016
Crude runs (mmt)	196.98	195.24	191.67
Domestic	150.16	151.32	147.09
Overseas	46.82	43.92	44.57
Domestic refined products output (mmt)	101.84	103.69	99.32
Domestic lube oil output (mmt)	1.58	1.21	1.16
Domestic ethylene output (mmt)	4.98	5.03	5.59
Domestic refined products sales (mmt)	117.02	116.25	113.03
Domestic service stations	20,386	20,714	20,895



Pipeline	2014	2015	2016
Domestic pipeline mileage (km)	79,054	79,936	81,191
Crude oil	18,132	18,917	18,897
Natural gas	50,836	50,928	51,734
Oil products	10,086	10,091	10,560
Overseas pipeline mileage (km)	15,218	14,507	14,507
Crude oil	7,653	6,604	6,604
Natural gas	7,565	7,903	7,903

Board of Directors



Wang Yilin
Chairman



Zhang Jianhua
Director



Wang Jiuling
Outside Director



Liu Guosheng
Outside Director



Li Yuhua
Outside Director



Huang Long
Outside Director



Wang Shihong
Employee Director

Top Management



Zhang Jianhua
President



Xu Wenrong
Vice President



Wang Dongjin
Vice President



Yu Baocai
Vice President



Liu Yuezhen
Chief Financial Officer



Liu Hongbin
Vice President



Xu Jiming
Chief of Discipline
& Inspection Group



Hou Qijun
Vice President

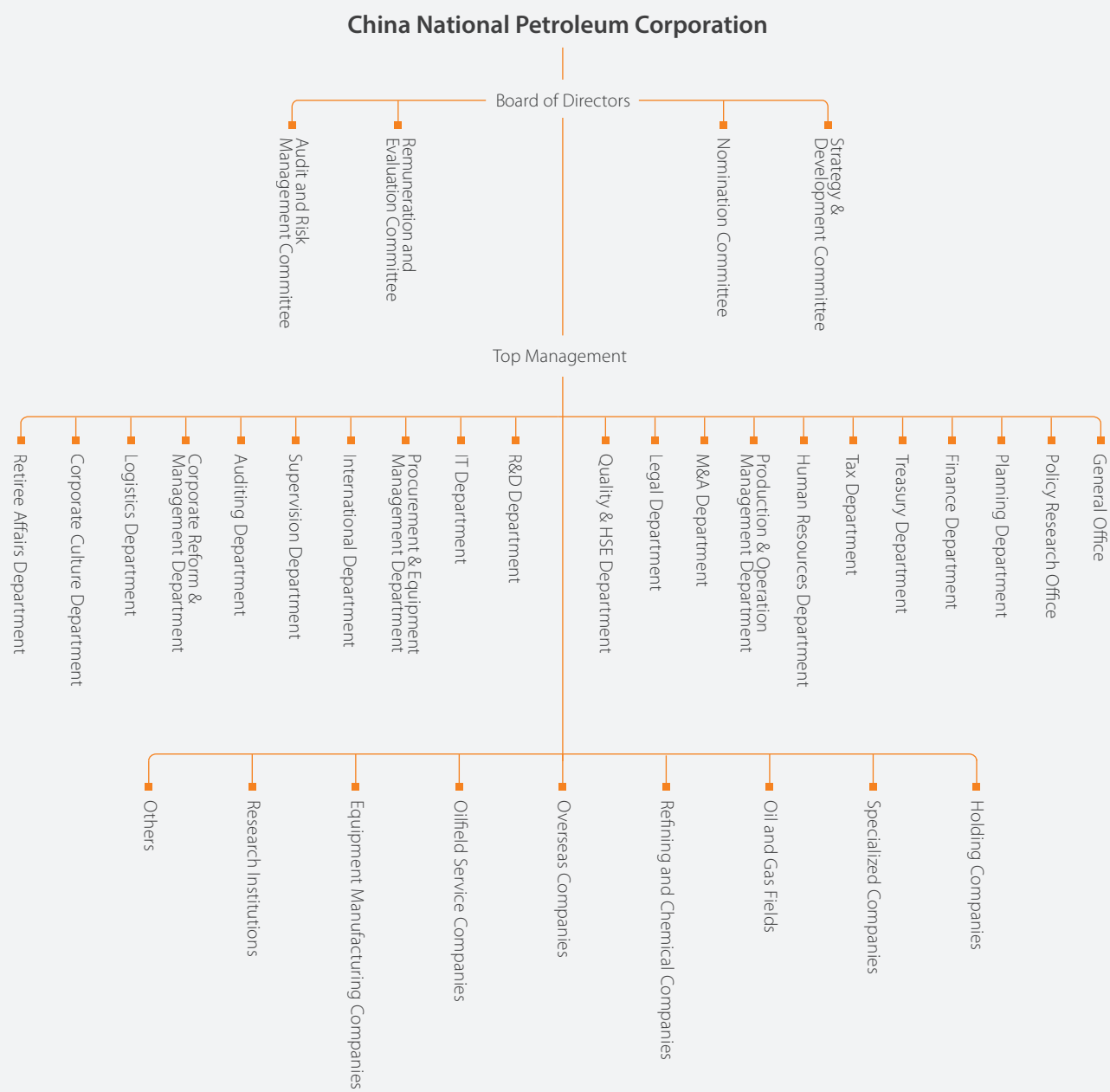


Duan Liangwei
Vice President



Qin Weizhong
Vice President

Organization





2016 Industry Review

The world economy witnessed continued sluggish growth in 2016, and the oil and gas industry struggled forward in the process of rebalancing. Oil prices slumped and then rebounded. The prices of Brent and WTI crude futures fell to USD 27.88 and USD 26.21 per barrel respectively at the beginning of the year, the lowest since 2003, before climbing gradually and averaging at USD 45.13 and USD 43.47 respectively, almost doubled but still down by 15.80% and 10.86% respectively from 2015.

The growth of global oil demand slowed from 1.7 million bbl/d in 2015 to 1.3 million bbl/d. The oil market did not achieve the expected balance due to continuous increase in the OPEC oil supply, but the oversupply was reduced slightly to 600,000 bbl/d throughout the year. At the end of 2016, OPEC reluctantly gave up its policy of maintaining market share by increasing supply and came to terms with some non-OPEC producers on output reduction.

In 2016, global natural gas consumption increased by 1.8% to approximately 3.53 trillion cubic meters, lower than the 10-year average growth of 2.2%. Gas production increased to 3.66 trillion cubic meters, up 2.2%. Newly added LNG liquefaction capacity was 22.6 million tons, 1.6 times greater than that in 2015, boosting the total annual capacity to 310 million tons. The gas market glut deepened, with gas prices falling almost to a 10-year low and bottoming out in the second half of the year. Global gas trade witnessed an increase of 7% in size, greater flexibility in LNG trading, and narrowed price spreads between the US, Europe and Asia-Pacific markets.

Due to sustained lower oil prices, global upstream investment declined for two consecutive years, falling 23% to USD 375.2 billion in 2016, resulting in a 33% shrinkage in the oilfield service market. Oil and gas discoveries continued to decline, but growth was maintained in the world's remaining proven recoverable reserves, registering 241.58 billion tons for oil and 191.2 trillion cubic meters for gas, up 0.2% and 0.3% year-on-year respectively.

Global refining capacity rose to 4.87 billion tons in 2016, with a net increase of 36.3 million tons. Total crude runs of major refineries were 79.18 million bbl/d, almost the same as the previous year. Globally, the utilization rate of refineries was 82.5% on average, down from 84% in 2015. The gross margins showed varying degrees of decline, i.e. 41%, 40.3%, 29.6% and 23.4% in Northwestern Europe, Central United States, the US Gulf of Mexico and Singapore respectively. The global net ethylene production capacity rose by 3Mt/a in 2016, about half of that in the previous year, reaching 162Mt/a. Global demand for ethylene was 153 million tons, an increase of 5.2 million tons from the previous year, while the supply was still tight.

In 2016, the global market saw a growing glut in refined products with inventory level remaining high, and the overall price of refined products was lower than that in the same period of the previous year. Total demand for refined products was approximately 82.76 million bbl/d, an increase of 990,000 bbl/d compared with 2015. The total supply was approximately 83.80 million bbl/d, 1.08 million bbl/d more than last year. Excess supply was 1.04 million bbl/d, 90,000 bbl/d more than that in last year. Supply and demand of gasoline was roughly balanced. Diesel, aviation kerosene and residual fuel oil were in oversupply, but there was a supply shortage in naphtha. The trading scale of refined products expanded with more diversified markets.

Oil and gas companies experienced a continued decline in their operating performance in 2016. Having gradually adapted to the low oil price environment with effective short-term counter measures, their decline in profits was narrowed and losses were reduced. Due to sustained low oil prices, the economy of producing countries and their payment capacity was weakened. Operational risks in oil and gas cooperation were increased partly because a number of resource countries imposed huge fines on oil companies for environmental damage and improper business activities such as unreasonable tax avoidance. With Donald Trump being the US

president, the US energy policies might see material change and thus impact global energy transition and greenhouse gas emission reduction process. In addition, the further release of US oil and gas potential (including shale oil and gas) may offset the efforts of other oil producers to raise prices by cutting output.

Year 2016 saw China's economy grew steadily at slower rate with energy consumption increased slightly. Preliminary results were achieved in the supply-side structural reform and the energy structure continued to be optimized. The 13th Five-Year Plan of China's energy industry was issued where greater reforms were drafted and clearer picture were seen in energy development concepts and objectives, as well as the future direction and roadmap of reforms.

China's oil consumption growth slowed remarkably in 2016, with annual apparent oil consumption stood at 556 million tons, an increase of 2.8% year-on-year, and 1.5 percentage points below the 2015 level. Net oil imports grew by 9.2% to 356 million tons, 3.3 percentage points more than the previous year. Oil dependence rate was 64.4%, 3.8 percentage points above the 2015 level. Consumption of refined products decreased for the first time, and consumption growth of the top three oil products reduced on the whole. There was a deepened glut in refined products in 2016. The annual apparent consumption of refined products dropped 1% year-on-year to approximately 313 million tons, and its growth rate fell by 6.2 % against 2015. Meanwhile China's output of refined products increased by 2.4% to 345 million tons. Net exports of refined products rose from 21.35 million tons in 2015 to 32.55 million tons in 2016, achieving a stunning 52.4% increase over the 2015 results. China's share in total Asia-Pacific net exports climbed from 12.7% to 17.9%, replacing Singapore as the third-largest exporter of refined products in the Asia-Pacific region.

China's natural gas consumption growth was lower than expected in 2016, with apparent consumption of around 204 billion cubic meters, increasing by 6.5% year-on-year. Domestic gas production in slack season declined due to lower demand and increased gas imports. The annual domestic gas production growth rate was 1.4%, down from 3.9% in 2015; natural gas imports rose 19% to 73.3 billion cubic meters, and the natural gas dependence rate soared to 36.6%. The market-oriented reform on natural gas was accelerated with more diversified market entities, and the LNG business layout was expedited.

In 2016, investment in the upstream sector continued to shrink significantly. Newly added proven oil and gas in place still exceeded 1 billion tons and 500 billion cubic meters respectively. The first three quarters saw overall losses occurred in domestic oil and gas exploration and development for the first time since the turn of the century. Focus was shifted to fine exploration of mature oilfields and scaled development of efficient reserves. We reduced high-cost oil and gas production and costly EOR measures. Domestic crude production was approximately 198 million tons for the year, a sharp decrease of 7.1%. National gas production growth continued to slow down, with annual output declined to 137.8 billion cubic meters, only 2.1% higher than that in the previous year.

In 2016, China's annual refining capacity increased slightly to 750 million tons, and the oversupply situation remained prominent. Annual crude runs were 539 million tons, up by 3.2%; and refinery utilization rate edged up 1.3 percentage points to 76.7%. The diesel and gasoline production ratio in refineries decreased slightly, offsetting to some extent the oversupply of domestic diesel in the market. In 2016, the ethylene production capacity totaled 23.1 million tons, and the output increased 4.4% to 17.9 million tons.

The global energy market is heading for a new round of changes in 2017, and the oil and gas industry is expected to see recovery. A modest increase is expected in global oil demand. The oil market will see a better balance between supply and demand, with a substantial rebound in oil prices. Natural gas will be further oversupplied globally, and will take time to rebalance.

Source: *Report on Oil & Gas Industry Development in 2016* by CNPC ETRI



Safety, Environment, Quality and Energy Conservation

CNPC is committed to resources conservation and environmental friendliness. We strictly abide by China's new *Production Safety Law* and *Environmental Protection Law*, continue to improve our HSE system and pursue green and low-carbon growth.

With priority on environment, safety, quality and people, we keep deepening our HSE and quality management focusing on operational safety and environmental protection, in a bid to achieve harmony between energy, environment and corporate growth through safe, clean and energy-saving development.

Operational Safety

In 2016, we beefed up control measures against safety hazards and introduced a dual system covering both risk prevention and hazards control. Meanwhile, we pushed ahead with HSE performance monitoring, analyzed and evaluated HSE practices in key business units and projects, and followed up with corrective actions on major problems and hazards identified to ensure all major risks were under control.

We set up the safety technology center for hazardous chemicals and accelerated the building of a hazardous chemical safety control information platform, in order to further standardize the all-process management of production, storage and transportation. Safety inspections on offshore operations and port terminals were carried out to ensure safe and smooth offshore production. We launched a safety hazard remediation program and eliminated major hazard risks in all long-distance pipelines and in 73% of the chemical tank farms. Emergency response capabilities were enhanced to cover well control, pipeline, offshore operation center, fire prevention and environmental monitoring. In our overseas projects, we effectively took actions against wildfires in Canada and organized employee evacuation amidst armed conflict in South Sudan.

HSE system management was further improved in both domestic and overseas operations, resulting in good HSE performance for the whole year without major safety or environmental accidents. Quantitative HSE review for key business units was carried out with quality and standards further improved. Standard HSE practices were implemented across grassroots

stations and crews to guide their production and operation activities. Employee HSE training was conducted under a matrix mode to improve training effect. As to our overseas projects, assessments on HSE handbooks for six major businesses including well drilling and workover were completed. Reviews on HSE system, security management and emergency plan filing were well under way. Our HSE management excellence was recognized by host countries and relevant international organizations. In 2016, CNPC received Zero Exploration Accident Award and Zero Operation Accident Award from the Ministry of Employment of Indonesia.

Environmental Protection

Climate change has been CNPC's long-standing focus of attention. In 2016, we joined the Oil and Gas Climate Initiative (OGCI) and signed the *Joint Collaborative Declaration* on low-carbon development. We worked with international peers under the OGCI Climate Investment to address challenges of climate change. We also played an active role in developing clean energy, enhancing energy efficiency and promoting the utilization of greenhouse gases. Checking and reporting on greenhouse gas emissions were conducted inside CNPC. A *Low-carbon Development Roadmap* was formulated based on analysis of the greenhouse gas emissions reduction potential and the corresponding measures across all business segments. R&D efforts were targeted at low-carbon technologies, including CCS-EOR, aviation bio-fuel production and refining energy system optimization.

Pollutant discharge control was stepped up by accelerating the promotion of desulphurization and denitration technologies for coal-fired units, upgrading and revamping refining facilities to meet stricter pollutant discharge standards, phasing out small coal-fired boilers, and taking integrated measures to treat volatile organic compounds (VOCs). Sources of environmental risks were examined with emphasis on controlling hazardous waste and radioactive pollution.

Incidents of environmental pollution during our production and operation were further prevented and reduced to ensure the greatest extent possible of control, mitigation and elimination of environmental hazards and adverse effects. Taking our engineering construction projects as an example, we further specified and standardized duties and responsibilities, procedures and guidelines of safety and environment management. We put online a management information platform to ensure regulatory compliance in regard to operational safety and environmental protection. In 2016, our North Azadegan project in Iran received an honorary certificate of environmental protection from the local government for its excellence in the conservation of the wetlands and eco-systems in the area of operation.

Energy Efficiency

In 2016, CNPC continued to strengthen the management of energy use in production and operation and issued the *Opinion on Promoting Energy Management*. The energy use management system was tested at oil production plants in Changqing Oilfield Company, refining facilities in Jinzhou Petrochemical Company and drilling sites in Chuanqing Drilling Engineering Company. The refining energy system optimization was implemented at a faster speed, the renovation of energy-saving technologies was reinforced and the energy-saving potential was further released to boost energy efficiency. We reduced energy consumption by 950,000 tons of standard coal and water consumption by 13.39 million cubic meters throughout the year. Our comprehensive energy consumption was reduced by 1.42% year-on-year.

Soil Restoration by Using Microorganism Repair Technology

To protect the ecological environment where we operate and minimize the impact of our activities on land resources, we have made great efforts in exploring the use of microorganism repair technology in soil restoration and achieved remarkable progress.

Given the local climate and soil conditions, a research team at Jilin Oilfield tested the microbial restoration method using renewable, low-cost materials and screened out a group of microorganisms for high-efficiency hydrocarbon degradation. Follow-up evaluation indicated that after a restorative cycle of eight weeks, the microorganisms could degrade the polluted soil to a degree of above 80%, making it ready for phytoremediation. At Southwest Oil and Gas Field, microorganism repair technology was used in a trial treatment of solid wastes of two old wells, rehabilitating a 2,000 square meters land which was once used as solid wastes pool. Unlike traditional treating methods, the technology can transform harmful substances in wastes into carbon dioxide and water and make the soil cultivable again with the metabolites from microbial growth.

In the years to come, we will continue to develop and improve this technology and promote its wide application.



Wetland ecological protection at the North Azadegan project in Iran

Occupational Health

Sticking to an integrated, prevention-oriented approach, CNPC continues to strengthen occupational health infrastructure to safeguard employee health through occupational health check and better health management and services. In 2016, over 98% of our employees exposed to workplace hazards received occupational health check and the surveillance ratio of workplace hazard factor also stood above 98%.

In 2016, we launched a special scheme to eliminate airborne dust-related occupational hazard by promoting video monitoring to substitute manpower at dust-exposed worksites. Programs on weight control and health promotion were rolled out to comprehensively manage chronic diseases of our employees and improve their health.

Targeting at continuous improvement of occupational health for our overseas employees, we issued the *Guidelines for Health Risk and Healthcare Provider Competence Assessment on Overseas Projects*, established a quantitative method for the appraisal of nine indicators in six categories, and provided an appropriate matrix for medical personnel allocation. A medical consultation mechanism, together with relevant equipment standard, was introduced to connect hospitals in Beijing and overseas sites. The first stress debriefing clinic under CNPC's Employee Assistance Program was opened to provide mental health services for overseas employees and their families. We were granted the EAP Quality Award 2016 by the Employee Assistance Professionals Association (EAPA).

Quality Control

CNPC upholds a principle of pursuing integrity and excellence in quality control and keeps improving quality management system and enhancing competence in quality control. We strive for a high-quality, high-efficiency and sustainable business growth through continuous improvement in the quality of products, engineering and services.

In 2016, we reviewed the quality management system of 40 affiliated enterprises and completed the pilot project for system integration in five subsidiaries. 100% of CNPC affiliated enterprises set up a third party certified quality management system.

Quality surveillance measures were improved, resulting in a wider coverage and better effectiveness of random sampling. Many rounds of comprehensive quality assurance checks on refined products upgrading were conducted. The quality of projects under construction was closely scrutinized. 1,206 projects were monitored in 2016 under a new scheme comprising day-to-day surveillance measures, expert inspection tours and head office random inspection tours. An integrated approach was adopted for monitoring, prevention and elimination of quality-related risks in key projects such as the Fourth Shaanxi-Beijing Gas Pipeline and the Second Russia-China Crude Pipeline.

CNPC Won EAP Quality Award 2016

The EAP Quality Award 2016 from Employee Assistance Professionals Association (EAPA) was granted to CNPC in November 2016, which was the highest award in EAP ever given to a Chinese company.

CNPC's EAP program started in 2008. We worked with international professionals to enrich program offerings, extend services and benchmark with international peers. The program was pushed ahead in five modes covering employee, work site, family member, operation management and preventive intervention. A series of activities were organized to promote a positive and healthy mindset including on-site counseling, psychological management workshops, as well as mental health hotlines and online counseling etc. Over the past eight years, we have seen a remarkable improvement in employee mental health and a significant drop in their health-risk behaviors.

According to EAPA, CNPC's EAP is logically structured and well organized with effective strategies and proper actions for quality improvement, showing a strong commitment to innovation and ethics that is highly consistent with what EAPA's Quality Award represents.

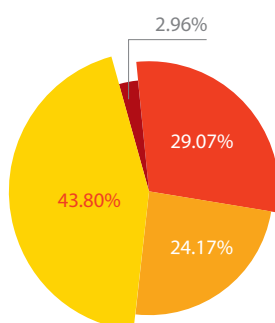


Human Resources

CNPC keeps improving HR mechanisms to cultivate a stronger workforce with greater competency, efficiency and motivation to sustain business growth.

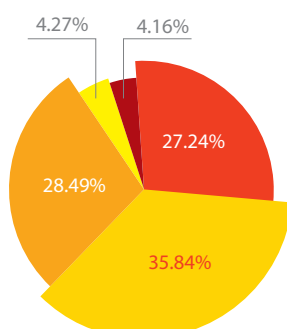
Education background of employees

■ Master's degree and higher ■ Bachelor's degree
■ Junior college ■ Technical secondary school and below



Age groups of employees

■ 25 and below ■ 26-35 ■ 36-45
■ 46-55 ■ 56 and above



We have always committed to "people-first" in HR management and attached great importance to protecting our employees' rights and interests. We create a fair, impartial and harmonious working environment with career development platforms for employees. For building a well-structured, competent and efficient workforce, we promote localization and diversity, and help our employees grow together with the company.

Employment Policy

CNPC pursues equal and non-discriminatory employment policies in compliance with applicable laws and regulations, and ensures equal employment and career development opportunities for employees of different nationalities, races, sexes, religious beliefs and cultural backgrounds. There has been a continuous improvement in our HR management system with sound processes for recruitment, employment, performance evaluation and remuneration. We adhere to the principles of democracy, openness, competition and meritocracy in selecting and recruiting talents from inside and outside the company.

In 2016, we recruited 3,091 college graduates and those who graduated from top universities and petroleum industry-related colleges accounted for 73%. 30% of the new recruits held a master's degree or a doctorate. As of the year end, we had 1,403,000 employees, 32% of which have a bachelor's degree or higher. 34% of our employees are female in which 48 are senior executives and 1,842 are director-level employees.

Employee Training

Our employee training system has evolved over time with better training facilities and innovative online programs in four areas, i.e. management, skills, technologies and international teambuilding. Based on business development needs, different kinds of employee training programs are offered at different levels, resulting in a remarkable improvement in employee's competency and performance.

We send executives and technical experts to leading companies such as Siemens and GE for training. We also have trainees attending programs offered by prestigious universities such as Stanford University, Tsinghua University, and China University of Petroleum. These training programs and courses cover a wide range of subjects, including business management, financial management, information technology, oil and gas exploration and production, petrochemicals and HSE. In 2016, CNPC headquarters organized 163 training programs for over 20,000 participants.

CNPC's online training system was further optimized in e-learning framework, system features, network design and courseware, etc. In 2016, we launched 258 online training programs for 430,000 person-times, with the number of training person-days totaling 38,440.

We promote the awareness of craftsmanship among our employees through a series of skill competitions. In 2016, we held competitions for well cementing, logging and seismic prospecting. In addition, we sent employees to participate in national and international competitions such as the Second National Hazardous Chemical Rescue Competition, the Eighth National Petroleum and Chemicals Skill Competition, the Fourth XCMG National Hoisting Skill Competition and the 2016 (Fourth) ARC Welding Contest. A number of employees were recognized for their excellence in professional skills.

Career Development

CNPC pays high attention on career planning and development of employees. We keep reforming internal mechanisms and build a variety of career paths for our employees to meet their self-actualization and career development goals.

We adopted a knowledge-oriented distribution policy and created an environment encouraging innovation among technological talents. A series of talent-foster programs were developed or launched, including the Petroleum Scientist Program, the Young Talent Program, the Operator Skill Development Program, the Innovation & Efficiency Enhancement Program and the "Petroleum Master" Program etc. Meanwhile, skilled expert studios were set up to groom high-level scientific and technological talents.

CNPC has different kinds of 180,000 technical personnel and 840,000 operating personnel. There are 54 skilled expert studios, including 14 national master studios. In 2016, 175,380 employees participated in verification of professional technical ability, in which 113,595 employees received certificates of different levels.

Cao Hong and Gao Xionghou Were Selected into China's "Ten Thousand Talent Program"

China launched the "Ten Thousand Talent Program" in 2012 in a bid to identify and support 10,000 high-caliber talents in natural science, engineering, philosophy, social sciences and higher education over a 10-year span.

In 2016, CNPC's Cao Hong and Gao Xionghou were selected by the Ten Thousand Talent Program in recognition of their excellence in promoting technological innovation and technological advancement.

Cao Hong, director of the Geophysical Prospecting Laboratory of Research Institute of Petroleum Exploration and Development and a senior expert at CNPC, specializes in basic research, R&D and application of seismic petrophysics and hydrocarbon detection theories. Cao Hong and his team built the most sophisticated seismic petrophysical laboratory in China with prominent achievements in theories and technologies for petrophysical modeling of porous media and seismic detection of natural gas.

Gao Xionghou, vice president of CNPC Petrochemical Research Institute and head of the R&D team on FCC (fluid catalytic cracking), is in charge of a number of R&D projects and has made an exceptional contribution to the upgrading of gasoline quality, efficient conversion of heavy oil, and the production of high value-added chemical materials.

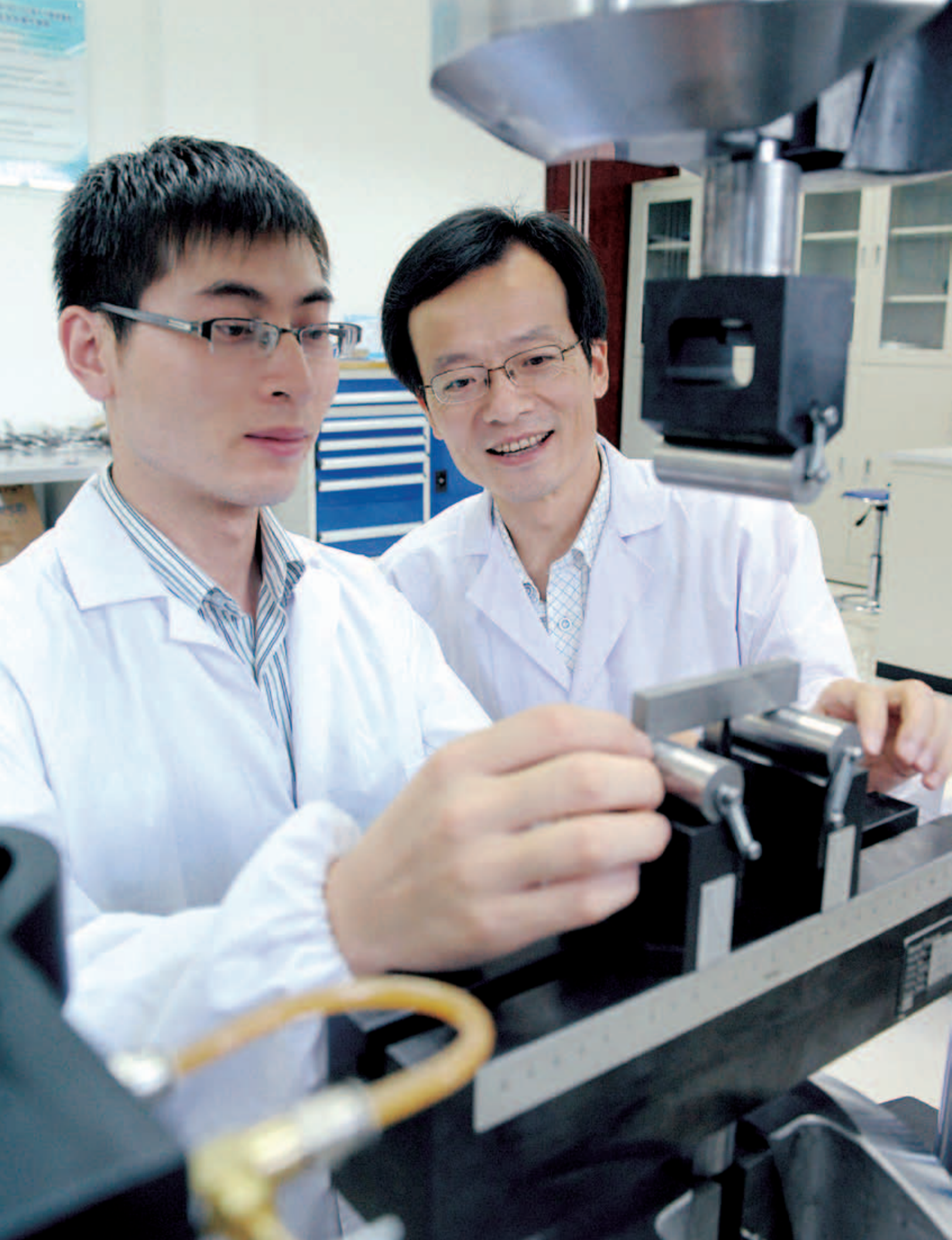
Local Employment

Adhering to the principle of “mutually beneficial cooperation for common development” in overseas operations, CNPC actively creates job opportunities and promotes local employment to support the communities where we operate. By the end of 2016, the company had a total of 50,870 foreign employees, with local employees accounting for 90% of our overseas workforce.

We have an employee training system that offers a range of training programs such as apprenticeship courses, on-the-job training sessions, international training programs, local training programs and training programs in China, to cultivate skills and competencies. Local employees are provided with career development opportunities for various management and technical positions. A unique employee training program known as SHADOW was implemented in Sudan to identify local promising employees and prepare them for important management and technical positions through hands-on training, administrative training and partner training etc. In addition, we actively promoted the Young

Talent Program in local communities. Since 2011, CNPC Southeast Asia Pipeline Company has hired 128 local college graduates and sent them to petroleum colleges in Yangon, Myanmar, and China to learn petroleum storage and transportation knowledge. Coupled with internship at pipeline stations, many of the young employees registered fast progress. Humphery, a Myanmar employee, stood out in the third skill competition on optical fiber fusion splicing held in Mandalay and won the title of “optical fiber fusion splicing dab”.





Technology · Innovation

With implementation of innovation strategy, we strengthen the combination of research with production and technology with market, and strengthen an open-mindset and promote knowledge sharing. We forge a new growth engine through all-round innovation driven by technological innovation.

In 2016, we reformed our technological research system and mechanism and rolled out the "Three Major Programs of Technological Innovation" to improve key technologies and to overcome bottlenecks hampering the development of our core business. As a result, we continuously improved our technological capabilities in that we harvested progress from major programs on basic theory and technology; made breakthroughs in key equipment, software and products; and effectively converted research outcomes into applicable technologies. All of these have underpinned the stable growth of our core business.

Construction of Technological Innovation System

We accelerated reform of technological research system and mechanism. We published the *Program to Deepen the Reform of Technological Research System and Mechanism and to Improve Innovation System*, which specified the objectives, key tasks, and measures to enhance reform. Comprehensive reform of our research institutes made substantial progress in business integration and organization optimization. Our technological programs were more business-oriented and focused on production bottlenecks. Research was integrated with production and technological achievements were converted and applied more faster.

By the end of 2016, we had 84 research institutes, 47 key laboratories and test bases, with a total number of 33,092 researchers.

Major R&D Achievements

Breakthroughs and important achievements were made on our key and matching technologies in that we improved exploration discovery rate, producing degree of reserves, recovery rate of oil and gas, as well as localization of high-end equipment manufacturing. We also addressed challenges on inferior crude processing, chemical feedstock cost cut, and clean energy production.

Exploration and Development

Theoretical breakthroughs were made in multi-path hydrocarbon generation from source kitchen in ancient petroleum systems. These included progress on the ancient source rock development mechanism in deep zones, gas generation potential during the high-over mature stage, and the identification of organic-inorganic composite hydrocarbon generation and the natural gas genesis. The breakthroughs effectively supported the fast growth of oil and gas reserves in Sichuan Basin and Tarim Basin.

Innovative geological modeling of salt-related structures and understanding on the forming of deep gas reservoirs resulted in major breakthroughs in exploration depth and engineering technologies of extremely-thick salt layers, supporting the construction of a gas-producing region with a reserve of more than one trillion cubic meters at Keshen tectonic zone in the Tarim Basin.

Discoveries were continuously made in the Mahu sag of the Junggar Basin, guided by the patterning of high-efficiency oil generation in natron-lake source rocks and extensive-reservoir forming in large shallow-water fan deltas, as well as creative matching technologies for conglomerate fracturing.

With an innovative seepage theory of micro-fracture networks in carbonate gas reservoirs, we created core technologies for forecasting high-yield abundance zones in ancient karst reservoirs and built up matching technologies for the development of large carbonate reservoirs. This enabled the efficient development of Anyue Gas Field, China's largest monomer uncompartimentalized carbonate gas reservoir.

An innovative reservoir-forming theory and seismic thin-interbed forecasting technology helped prove new oil and gas reserves in Yanchang Formation of the Ordos Basin. Creative key technologies such as multi-type cluster wells, high-performance fracturing fluids, and low-density proppant reduced operating costs by 30%.

A series of technologies used to stabilize production, control water-cut, and increase recovery in sandstone oilfields following high-speed development under natural drive was created and integrated, significantly improving development and curbing natural depletion at mature oilfields in Kazakhstan and Sudan.

A series of technologies for unconventional oil and gas development helped realize high output from SAGD wells completed as part of our oil sand project in Canada and new high-yield wells drilled as part of our CBM project in Australia.

Refining and Chemicals

Effective gasoline quality upgrading was enabled by technical packages for National V standard gasoline production. Nine grades of catalysts including catalytic gasoline selective hydrogen desulfurization, and five key technologies such as staged hydrogen desulfurization and oriented olefin conversion were created. Two series of technologies including selective hydrogen desulfurization (DSO) and hydrogen desulfurization-modification (M-DSO, GARDES) were developed, addressing the bottleneck in the production of clean gasoline.

Good results were achieved from industrial application tests of PHR residual oil hydrogenation catalysts. The design and preparation methods were developed for catalyst configuration by shape, pore structure and activity. These catalysts provided strong technical support for processing high-sulfur crude oil.

Major breakthroughs were made in the development of commercial production technology and safety evaluation for medical polyolefin resin. The physical and chemical criteria for medical resin packaging products and the safety requirements for medical polyolefin were met. The Good Manufacture Practice (GMP) specifications for medical polyolefin raw material, production, packaging, storage, and management system were formulated. New polyolefin materials for fuel gas pipes, medical devices, vehicles, and premium film were developed and customized for high-end clients.

The technological package for rare earth butadiene rubber and the development of new NBR and SSBR products helped to drive the application of our products in high-performance tires.

Oilfield Services and Storage & Transportation

Geophysical Prospecting: Micro-seismic real-time monitoring software with our proprietary intellectual property was developed, realizing integrated acquisition, processing and interpretation for downhole and surface micro-seismic monitoring data. GeoEast-ESP and GeoMonitor have become the mainstream software for China's micro-seismic monitoring and played an important role in the cost-effective development of unconventional resources. Low-frequency vibroseis and matching processing technologies took shape and the next-generation broadband

excitation source was upgraded, increasing the reliability of oil and gas detection and coincidence of reservoir prediction.

Well Logging: Logging evaluation technologies focusing on source rock quality, reservoir quality and operation quality, as well as the corresponding logging data processing and evaluation software were developed. Playing an irreplaceable role in the discovery and production-capacity building of unconventional reserves, these technologies were applied in the development of tight oil in the Ordos, Songliao and Junggar basins and shale gas in South Sichuan. An imaging-while-drilling system generated images by scanning the well perimeter in a rotary manner in a field test, increasing the encounter rate of horizontal wells in complex reservoirs.

Well Drilling: Openhole expansion pipe plugging technology was developed, effectively packing off complex formations and controlling severe lost circulation without changing the casing program, providing a cost-effective and safe approach to the target horizon of design. The creative one-pass drilling of horizontal wells reduced the round-trip time and bit consumption, shortening the drilling cycle by 10%-20%.

Downhole Operations: Horizontal well staged-fracturing with totally soluble bridge plug, which features high strength soluble materials, prefabricated fragment soluble slips, and a bionic structure and material component optimization, saw success in industrial tests at several oil and gas fields in China.

Storage and Transportation: A major breakthrough was made in gas pipeline full-scale burst testing technology. A full-scale pipeline burst testing ground with a maximum diameter of 1,422mm and a maximum pressure of 20MPa was independently completed. Three successful burst tests were conducted for high steel grade and large diameter gas pipelines. The construction of the eastern route of the Russia-China Gas Pipeline and other major projects was facilitated by the innovative X80/Φ1422mm gas pipeline construction technologies and 16 categories of domestically made equipment such as 30MW gas-driven compressor units and heavy-duty oil pump units.

Energy Efficiency

We developed four new types of heating furnaces including a condensing one, and created seven key technologies such as online monitoring of steam-injection boilers, boosting the overall efficiency of the furnaces in our oil and gas fields by 5% and saving 270,000 tons of standard coal.

Technological Cooperation

We conducted technological exchanges and worked with domestic and foreign oil companies, high-end manufacturers, high-tech players, and research institutions in EOR, unconventional oil and gas development, treatment and recycling of oil-containing sludge, and new engineering technologies. Continuous progress was made in R&D projects, international talents training, and technological exchanges. In collaborating with Shell and GE, we made breakthroughs in the in-situ upgrading of shale oil and treatment of heavy oily sludge. We also worked with the Chinese Academy of Sciences (CAS) and the National Natural Science Foundation of China (NSFC) to promote theoretical and technological innovation. Having more international resources in place, our Houston technological research center played a bigger role as a platform for international cooperation and exchange.

Scientific and Technological Awards and Intellectual Property Rights

In 2016, four of our major achievements won China's national science and technology awards. "Innovative Exploration Theory and Technology of Ancient Carbonate Rock and Major Discovery of Super-large Anyue Gas Field" and "Technical Package and Key Equipment of Large-scaled Ethylene Units and Their Industrial Application" were awarded the second prize of National Science and Technology Progress Award. "Special Drilling Fluids for Complex-structure Wells and Their Industrial Applications", which was made with other parties, won the second prize of National Technical Invention Prize. "Quantitatively Calculation Method of Oil Saturation in Fractured Reservoirs" was awarded the China Patent Golden Medal.

In 2016, we applied for 5,017 patents home and abroad in which there were 2,797 invention patents. We were granted 4,855 patents in which 1,205 were invention patents.

Patents applied

5,017



Patents granted

4,855



Effective Deep Zone Exploration Achieved with Theoretical Breakthroughs in Multi-path Hydrocarbon Generation from Source Kitchen in Ancient Petroleum System

Research progress was made in ancient source rock development mechanism in deep zones, the gas generation potential during high-over mature stage, and the identification for organic-inorganic composite hydrocarbon generation and natural gas genesis.

Highlights: 1) Three types of gas-generating materials in an ancient gas bearing system were presented, namely, retained hydrocarbon, ancient reservoir and "semi-aggregated and semi-dispersed" liquid hydrocarbon, bringing more attention to high-over mature zones for gas reservoir formation. 2) Organic matter-rich Proterozoic–Paleozoic shale deposition was controlled by the Earth's orbital force, atmospheric circulation and stratified thalasso chemical environment; the hydrocarbon generating potential of ancient kerogen was determined by the type of microorganism and the redox conditions. The development of seven sets of high-quality source rocks from the Proterozoic Era provided a basis for resource potential evaluation and exploration prospect forecasting of ancient petroleum systems. 3) The organic-inorganic composite hydrocarbon generation mechanism under high temperature and high pressure revealed the hydrogenation reaction mechanism of different water-rock systems and its contribution to gas generation. The transition metal element promoted the reproduction of microorganism and the evolution of hydrocarbon generating. These results provided a new approach to explore the oil and gas generation potential of ancient petroleum system. 4) Late-stage pyrolysis gas generation in multiple-source kitchens of ancient formation was the key factor for large scale gas accumulation in Lower Paleozoic. High-over mature zones had higher exploration potential according to the "multiple golden belts" gas enrichment theory. Pyrolysis gas filling and gas wash fractionation were the key mechanism for secondary condensate gas reservoir formation.

The research results added 220 billion cubic meters of proven gas in place in the Sichuan Basin, and added 2.19 billion tons of oil and gas in place in the Tarim basin since 2013.



Annual Business Review

Efforts were made to optimize production organization and resource allocation, and promote the harmonious integration of production, refining, marketing and trading, in order to maximize the overall efficiency.

Exploration and Production

In 2016, our E&P sector fulfilled all the set targets. Domestic oil and gas reserves and output remained stable. Our focus on exploration was to obtain reserves with economies of scale, optimize deployment schemes, and strengthen geological study and R&D of key engineering technologies, resulting in a number of significant discoveries and achievements. We focused on overall efficiency in oil and gas field development, improved yield structure and enhanced production management, maintaining smooth operation throughout the year.

Exploration

We obtained a new understanding of geological theories, strengthened preliminary prospecting and risk exploration of major basins and oil/gas-rich sags, and made an in-depth evaluation of exploration potential, resulting in the identification of six 100Mt-grade uncompartimentalized oil zones and five 100bcm-grade gas zones. In 2016, 649.29 million tons of proven oil in place and 541.9 billion cubic meters of proven gas in place were added in China, exceeding 1 billion tons of oil equivalent in total for the 10th consecutive year, which laid a solid foundation for the sound development of our oil and gas business.

Newly proven oil in place (Domestic)

649.29 mmt



Newly proven gas in place (Domestic)

541.9 bcm



Reserves and operating data (Domestic)

	2014	2015	2016
Newly proven oil in place (mmt)	689.80	728.17	649.29
Newly proven gas in place (bcm)	484.00	570.20	541.90
2D seismic (kilometers)	19,170	15,909	24,885
3D seismic (square kilometers)	11,739	9,095	8,764
Exploration wells	1,584	1,588	1,656
Preliminary prospecting wells	910	924	865
Appraisal wells	674	664	791

Major Discoveries

Significant achievements were made in oil exploration, in that 370 million tons of oil in place was newly proved in multi-layer stereo exploration in Changqing; a dolomite reservoir was discovered and high-yield oil and gas flow obtained in the Tarim Basin, adding over 60 million tons oil reserves; 91.54 million tons of controlled and predicted reserves were identified in Mahu Sag and 160 million tons of proven, controlled and predicted reserves were identified in the Chefeng and Jinlong areas in the Junggar Basin; a 100Mt-grade reservoir was discovered in deep subsalt layers in Qinghai; and high-yield oil and gas flows were obtained from buried hill reservoirs in the Bohai Bay Basin.

Progress was made in natural gas exploration, including over 600 billion cubic meters of basically proven gas in place newly added in Sulige; over 200 billion cubic meters of controlled and predicted reserves identified in Shenmu and Longdong respectively; and two new gas bearing structures discovered in the Keshen area of Tarim Basin, adding 300 billion cubic meters of proven gas in place to the whole Keshen area. In addition, new gas bearing strata were encountered in Well Shuangtan-3 in northwest Sichuan, and a giant gas zone with 1.5 trillion cubic meters of gas in place took shape in the Gaoshiti-Moxi area in central Sichuan.

Development and Production

Domestic oil and gas production remained steady in 2016. Oil and gas field development continued to be based on a low-cost model with enhanced production management, as well as an optimized production structure and capacity deployment. We strengthened the evaluation of project returns and sought to maximize overall performance. We achieved production capacity increments of 10.32 million tons for crude oil and 10.9 billion cubic meters for natural gas, and produced 183.63 million tons of oil equivalent.

Crude Oil

In 2016, we focused on expediting some major capacity building projects in Xinjiang, Changqing, Tarim and Daqing. In order to maximize the potential of mature fields, efforts were made to improve matching technologies and implement key measures such as fine reservoir description, fine water-flooding, standardized design and construction of ground work, and restoration of long shut-down wells. We produced 105.45 million tons of crude oil throughout the year.

Daqing Oilfield produced 36.56 million tons of crude through strengthening fine water flooding, promoting tertiary recovery technology, optimizing polymer flooding and rolling out ASP flooding. Changqing Oilfield continued to improve the technology for low-permeability reservoir development, accelerated the commissioning of new wells, took measures to treat stripper wells and renovated long shut-down wells, achieving an annual output of 23.92 million tons. Xinjiang Oilfield focused

Crude production (Domestic)

105.45 mmt



Natural gas production (Domestic)

98.1 bcm



on the optimization of resource structure and the development of light and shallow oil reservoirs, producing 11.13 million tons of crude. Liaohe and Tarim, among other oilfields, made proactive efforts to overcome the negative impact of new capacity cuts, adjusted their production structure and achieved annual targets.

Fine Water-flooding

We continued to develop matching technology of fine water-flooding, and promoted the regular practice of fine water-flooding and thus improved the outcomes of oilfield development in a sustained manner. The natural decline rate and composite decline rate were lower than 10% and 7% respectively, while the water cut growth rate remained below 0.7%.

The long-term effect mechanism of fine water-flooding was further improved, and progress was made in various indicators such as the separate-layer injection rate of injectors, the acceptance rate of separate-layer injection, and the water quality compliance rate. We have made headway in the R&D and field testing of fourth-generation zonal water injection and metering, and realized real-time monitoring of production parameters and automatic control of the water injection rate. In Daqing Oilfield, reservoirs were further layered for water injection, and fine water-flooding technology has been widely applied for more than seven layers. Tarim Oilfield continued to increase the scale of water-flooding and developed matching technologies for water injection per well and per unit, seeing a constant improvement in the water-flooding effect.

Huabei Oilfield significantly lowered its natural decline rate and effectively controlled the water cut growth rate through implementing innovative moderate water-flooding measures featuring "multiple wells with less injection for an overall balance".

Pilot Development

In 2016, we focused on strategic replacement technologies and carried out development tests of key technologies to improve chemical flooding, explore gas flooding, and enhance per-well output of low-permeability reservoirs.

Chemical flooding entered the stage of industrial application. Polymer flooding was commercially applied in Daqing, Dagang and Xinjiang oilfields. Major breakthroughs were made in polymer/surfactant flooding in Liaohe, Dagang and Xinjiang oilfields where the composite water cut decreased and the oil recovery rate increased substantially. Technological obstacles for ASP flooding such as emulsification, scaling and produced liquid treatment were resolved and the technology was applied on an industrial scale in Daqing Oilfield. Gas flooding made great progress and pilot fire flooding projects facilitated an annual heavy oil output of 330,000 tons. Miscible gas injection and gravity flooding helped Liaohe, Tarim and Huabei oilfields slow production declines. Field application of CCS-EOR in Jilin and Daqing

saw further improvements in miscible flooding mechanism and related techniques. R&D and testing of EOR technology for low-permeability reservoirs proceeded smoothly in Changqing Oilfield. Pilot air foam flooding in Jing'an Oilfield made progress in the control of water cut growth, with the production decline rate dropping from 23.2% to 3.3%.

Natural Gas

In 2016, CNPC made efforts to improve per-well output and development efficiency, optimize deployment schemes, and strengthen project management. Steady progress was made in key projects such as Sulige in Changqing, Tazhong in Tarim, and Longwangmiao in Sichuan. Our annual gas production totaled 98.1 billion cubic meters, an increase of 2.6 billion cubic meters year-on-year.

Changqing Oilfield, China's largest gas production and processing base, produced 36.5 billion cubic meters in 2016, around 37% of CNPC's total domestic gas production. Tarim Oilfield continued to accelerate gas development in Kuche region, especially in Kela-2 and Dina-2 gas fields, achieving an annual production of 23.6 billion cubic meters. Southwest Oil and Gas Field continued to accelerate the capacity building and maintaining the stable production of Longwangmiao Fm reservoir in

A 4Mt/a Industrialized ASP Flooding Base Built in Daqing

After more than 50 years of development, Daqing Oilfield has entered into the ultra-high water cut phase in the late stage of development. As a new generation of technology independently developed by Daqing, ASP flooding can enhance oil recovery by an additional 20 percentage points under the maximum limit of a 98% water cut. ASP flooding was successfully applied in 2011 and began industrial application in 2014, seeing an annual increment in crude production of 1 million tons since then. In 2016, 14 blocks using ASP flooding reached a combined capacity of 4 million tons.

Thanks to years of continuous technological R&D and field tests, Daqing Oilfield has overcome various bottlenecks, such as scaling in artificially lifted wells, cost-efficiency of surfactants, polymer solubility, adsorption loss of various chemical agents and treatment of produced liquid, and developed a sophisticated technological package for ASP flooding. Now the world's largest ASP flooding base of industrialized production has taken shape in Daqing, which boasts the most full-fledged set of matching techniques, the most productive ASP flooding application, and a world-leading position in the field of composite oil flooding technology.

According to the characteristics of produced fluid from ASP flooding, a combined treatment procedure was developed, featuring "air floatation - hydrolysis acidification/contact oxidation - two-stage sand filtration". We also developed a water quality stabilizer and demulsifier, as well as new treatment devices for free water removal and electric dehydration to ensure produced fluid via treatment reaches the reinjection standard.

Since its field test and large-scale application, ASP flooding has mobilized total reserves of 209 million tons and yielded 20.56 million tons of crude. The success of ASP flooding has substantively bolstered the sustainable development of Daqing Oilfield, and served as a role model in the effective development of similar reservoirs with 100 billion tons of reserves both at home and abroad.

Moxi Block, Changning-Weiyuan shale gas block and Luoqiaozhai gas field, producing 19 billion cubic meters throughout the year. Qinghai Oilfield took measures to increase production and enhance comprehensive water and sand control efforts, ensuring stable production at its major gas fields.

Sulige Gas Field

Located in the northern rim of Ordos Basin, Sulige is the largest uncompartimentalized onshore gas field in China. Since development started, a unique development and construction mode with 12 matching technologies has been formed, which enabled efficient commercial exploitation of low permeability, low pressure and low abundance tight gas reservoirs. In recent years, technological breakthroughs were made in horizontal and cluster well drilling and reservoir stimulation, realizing the transition from vertical well development to a factory-like development mode. In 2016, Sulige produced 22.7 billion cubic meters of natural gas and its cumulative production totaled 146.8 billion cubic meters.

Longwangmiao Fm Gas Reservoir

Located in the middle of the Sichuan Basin, Longwangmiao Fm gas reservoir in the Moxi Block of Anyue Gas Field is by far the largest monomer marine uncompartimentalized gas reservoir in China with proven gas in place of 440.38 billion cubic meters. Since its discovery in 2012, the development of the reservoir was accelerated and an annual capacity of 11 billion cubic meters

was built up in 2015. In 2016, 10 new high-yield wells were completed and put into production, boosting its daily capacity to 33.5 million cubic meters. Throughout the year, the gas reservoir produced a total of 8.3 billion cubic meters of natural gas.

Exploration and Development of Unconventional Oil and Gas

In 2016, CNPC continued to carry out the exploration and development of CBM, shale oil and gas, tight oil and gas, and other unconventional hydrocarbons. Capacity building projects proceeded smoothly, innovations and improvements were made in key and matching technologies, and a series of important achievements were made.

CBM

In 2016, the CBM business registered solid growth with steadily increased production. Our focus was the Qinnan and Erdong areas, where efforts were made to constantly improve the exploration and development technology of different coal seams, optimize the drainage and extraction systems and enable dynamic production adjustments. Annual production reached 1.68 billion cubic meters. Well Hexihao-3 at Daning-Jixian block in Erdong yielded industrial gas flows during testing. The predicted gas reserve of coal measure strata was about 200 billion cubic meters in this area. Sweet spots featuring high pressure gas-enrichment were identified in the Benxi Formation for the first time, marking a major breakthrough in the stereo-exploration of coal strata in Erdong. Also for the first time, Baode field in Shanxi Province saw the annual output exceed 500 million cubic meters, becoming the model project of large scale CBM development in China. Hancheng block in Shaanxi Province witnessed big rally in well casing pressure, which demonstrated initial success in its comprehensive management.

Shale Gas

In 2016, based on experience in building demonstration zones in the Changning-Weiyuan and Zhaotong shale gas blocks, CNPC achieved large scale and profitable shale gas development and production through multiple modalities such as self-management, risk operation and international cooperation. The Changning-Weiyuan national shale gas demonstration zone was fully completed with daily capacity increasing to 7.6 million cubic meters. Meanwhile, construction of the Zhaotong demonstration zone proceeded smoothly. These two demonstration zones, with a combined annual capacity of 3 billion cubic meters, produced 2.84 billion cubic meters, an increase of 1.54 billion cubic meters compared with 2015.



Gas processing plant of the Longwangmiao Fm reservoir at the Anyue Gas Field

Tight Oil

In 2016, we made progress in the R&D of tight oil exploration and development technologies, facilitating the large scale development of the Ordos, Sichuan, Songliao, Qaidam and Santanghu basins. Experiments on highly-deviated selective multi-stage fracturing and the reconstruction of vertical wells were carried out in Changqing, paving the way for the identification and exploitation of large-scale reserves. A field test of the CO₂/sand dry-fracturing technique achieved success in a number of blocks, effectively saving water and enhancing efficient development of tight oil. R&D of horizontal well fracturing technology was strengthened in Tuha Oilfield, helping to build the Ma-56 block in the Santanghu Basin into a national demonstration base for the development of tight oil. Over the past two years, we have made 29.62 million tons of tight oil reserves in Tuha producible and achieved a total output of 213,000 tons of tight oil, with an annual capacity of 187,000 tons.

Joint E&P in China

In 2016, we continued to cooperate with international partners to explore and develop oil and gas resources in China. Most of the joint projects focused on low-permeability reservoirs, heavy oil, tidal and shallow water zones, sour gas, high-temperature and high-pressure gas reservoirs, CBM, and shale gas.

By the end of 2016, we had 38 joint E&P projects in operation, producing 3.13 million tons of crude oil and 7.5 billion cubic meters of natural gas, which totaled 9.13 million tons of oil equivalent.

Executive Summary of Major Projects

Zhaodong Oil Project

The project covers 77 square kilometers at the tidal and shallow water zone in the Bohai Bay Basin. New XCL-China LLC. and Australia's ROC Oil (Bohai) Company are our partners.

We have maintained safe and stable oil production since the takeover of operatorship in April 2015. The project produced 560,000 tons of crude oil in 2016, with the actual operating costs lower than expected.

Changbei Natural Gas Project

The project covers 1,691 square kilometers in the Ordos Basin. Shell Group is our partner in the project.

On January 1, 2016, CNPC officially became the operator of the phase-I project under the operatorship handover agreement, and we reached a natural gas sales agreement with Shell. In 2016, the phase-I project produced 3.6 billion cubic meters of natural gas, and the phase-II project with an annual capacity of 2.4 billion cubic meters proceeded in an orderly manner.

Chuandongbei Natural Gas Project

The project is located in the Sichuan Basin, covering an area of 876 square kilometers. Chevron is our partner in the project.

On May 27, 2016, Luojiashai Sour Gas Field became fully operational. It is capable of processing 9 million cubic meters of natural gas per day and purified 1.1 billion cubic meters of gas in 2016.

In addition, we teamed up with MI Energy Corporation and Global Oil Corporation (GOC) to develop the Da'an project in Jilin. Measures were taken to stabilize oil production and control the water cut along with fracture-network fracturing. The natural decline rate and water cut growth rate continued to decline in mature wells. At the Hainan-Yuedong project in cooperation with Tincy Group Energy, we conducted steam stimulation tests in 58 wells, kicked off 47 wells, basically completed the development program, and pushed ahead with marine engineering work in an orderly manner. Changqing's South Sulige development project with Total and the Zhoushan project in Daqing with Hong Kong-based Central Asia Petroleum proceeded smoothly.

In 2016, we signed product sharing contracts with BP on the Neijiang-Dazu and Rongchangbei shale gas blocks in the Sichuan Basin with a total coverage of 2,468 square kilometers. For the first time, CNPC served as an operator in the exploration stage. We also signed an MOU with Shell, aiming at jointly enhancing oil recovery by CO₂ flooding in the Xinjiang Oilfield. In cooperation with EOG Resources, we carried out joint studies on oil and gas exploration in Shaximiao Formation in central Sichuan.

Crude output from joint E&P projects

3.13 mmt



Natural gas output from joint E&P projects

7.5 bcm



Natural Gas and Pipelines

2016 saw steady growth in our natural gas and pipeline business. Oil and gas pipeline networks were operated smoothly, and there was also progress in the construction of key pipelines. We made steady headway in natural gas utilization and market development, and completed the separation of oil and gas pipeline operation from natural gas marketing.

By the end of 2016, we operated a total of 81,191 kilometers of pipelines in China, including 18,897 kilometers for crude oil, 51,734 kilometers for natural gas, and 10,560 kilometers for refined products, accounting for 69.2%, 75.8%, and 42.3% of China's total respectively.

Pipeline Operation and Control

In 2016, we optimized operation schemes to strengthen prior control and process control, and ensured the safe and smooth operation of our crude oil pipelines. The Lanzhou-Zhengzhou-Changsha Pipeline completed the replacement of National V Standard refined products, effectively promoting the upgrading of refined products quality.

We adjusted domestic gas production according to market demand and seasonal changes. By purchasing LNG spot, making the best use of pipeline capacity, and increasing the injection/extraction volume of underground gas storages to enhance peak-shaving capability, we effectively balanced production and sales, and guaranteed safe and stable gas supply for winter heating and other special purposes.

Underground Gas Storages

We continued to expand our existing gas storage capacity to the maximum and build new storage facilities. We have built and operated 10 underground

storages including Dagang, Jintan, Xiangguosi and Hutubi with continuously enhanced peak-shaving capacities up to 6.1 billion cubic meters, which made us more responsive to potential emergencies. Shuang-6, the first underground gas storage in Northeast China, officially became operational.

Storage and Transportation Facilities

In 2016, we continued to optimize pipeline layout and build new pipelines. The eastern section of the Third West-East Gas Pipeline and the Baodi-Xianghe-Xiji connecting line of the Fourth Shaanxi-Beijing Gas Pipeline were completed and became operational. We commenced the construction the Fourth Shaanxi-Beijing Gas Pipeline, the Second Russia-China Crude Pipeline, and the Zhongwei-Jingbian connecting line of the Third West-East Gas Pipeline. Construction of the Jinzhou-Zhengzhou and Yunnan refined products pipelines proceeded smoothly.

The Third West-East Gas Pipeline

The pipeline has a total length of 5,777 kilometers, including one trunk, one major branch, three branches and one connecting line. It starts at Horgos in the Xinjiang Uygur Autonomous Region and ends at Fuzhou in Fujian Province. The 5,278 km-long trunk has a pipe diameter of 1,016-1,219mm, designed pressure of 10-12MPa and an annual transmission capacity of 30 billion cubic meters. It was constructed and put into operation on a section-by-section (eastern, middle and western sections) basis.

The western section runs from Horgos to Zhongwei in the Ningxia Hui Autonomous Region, with a total length of 2,445 kilometers. Construction of this section began in October 2012, and was completed on August 25, 2014. The eastern section runs from Ji'an in Jiangxi Province to Fuzhou in Fujian Province, with a total length of 817 kilometers. Construction of this section commenced in August 2013 and the section became operational on December 12, 2016. Construction of the Zhongwei-Jingbian connecting line began on May 21, 2016, and it is expected to be operational in 2017.

The Fourth Shaanxi-Beijing Gas Pipeline

The pipeline consists of one trunk and three branches. The trunk runs from Jingbian in Shaanxi Province through Inner Mongolia and Hebei to Gaoliying in Beijing. The current phase of construction includes one trunk and one branch with a total length of 1,114 kilometers, pipe diameter of 1,016-1,219mm, designed pressure of 10-12MPa, and designed annual transmission capacity of 25 billion cubic meters.

Construction of the pipeline started on July 30, 2016, and it is expected to become operational by the end of October 2017.

Crude pipeline mileage in the nation's total

69.2%



Natural gas pipeline mileage in the nation's total

75.8%



The Second Russia-China Crude Pipeline

The Second Russia-China Crude Pipeline runs from Mohe in Heilongjiang Province through Inner Mongolia to Linyuan in Daqing. Running parallel to the First Russia-China Crude Pipeline, it has a total length of 951km, pipe diameter of 813mm, designed pressure of 9.5-11.5MPa, and an annual transmission capacity of 15 million tons.

Construction of the pipeline commenced on July 20, 2016 and it is expected to be completed by the end of October 2017. According to our contract with Rosneft, the crude supply from Russia to China will be increased by 15 million tons annually through the Second Line upon its commercial operation in January 2018.

Natural Gas Utilization and Market Development

With continuous improvement of our natural gas pipeline network, CNPC delivers natural gas to 32 provinces, municipalities, autonomous regions and special administrative regions. In 2016, we adopted a flexible pricing promotion strategy, advocating fair and open access to pipeline and network facilities, and improving the service quality to major direct supply customers. We prioritized resource allocation to highly profitable markets and high-end users. 70.1% of our gas was sold in Central China, the southeast coastal region, the Bohai Rim, and the Yangtze River Delta region. The percentage of urban gas and direct supply to industrial and power generating users rose to 91%. We signed 85 new long-term purchase and sales contracts with an annual contracted gas volume of 6.1 billion cubic meters. We marketed 131.5 billion cubic meters of natural gas throughout the year, an increase of 8.9 billion cubic meters or 7.2% year-on-year.

We made new progress in tapping the natural gas terminal market. The sales growth of urban gas and LPG terminals reached 10.1% and 10.6% respectively year-on-year. Our gas projects became operational in Dali and six other cities. Branch pipeline construction proceeded in an orderly way, with the length of newly built pipelines reaching 280 kilometers. The Industrial Park branch under Qinzhou Petrochemical became operational, and the construction of Tengchong, Xiangyun and Shidian branches in Yunnan Province were basically completed. Construction of the Yangzhou, Bengbu and Taihe branches proceeded on schedule. Construction of four branches, including the Changsha-Liuyang and Lianyuan-Xinhua sections, commenced. We also vigorously implemented projects including substituting urban coal with gas, replacing industrial coal with fuel gas, and using gas instead of oil in industrial processes. Our CNG/LNG terminal marketing network was expanded through multiple channels, with more combined oil-and-gas stations being built.



Liquefied Natural Gas (LNG)

In 2016, we had 13 LNG plants in operation with a total annual capacity of 4.77 billion cubic meters and we produced 640 million cubic meters of LNG, an increase of 15% year-on-year. We had 438 LNG refueling stations in operation and 33 under construction. Our annual terminal sales of LNG totaled 1.35 billion cubic meters.

In 2016, our Jiangsu, Dalian and Tangshan terminals played a more important role in securing gas supply and peak shaving, receiving a total of 5.65 million tons of LNG. The Phase II projects of the Jiangsu and Dalian terminals were completed and became operational with their annual capacity rising to 6.5 million tons and 6 million tons respectively, which further ensured stable gas supplies to the West-East Gas Network and the Yangtze River Delta region in winter.

Refining and Chemicals

Our refining and chemical business achieved its best ever performance in 2016. We highlighted quality and efficiency, optimized production and operation, prioritized resource allocation for more efficient units and facilities, and increased the utilization of integrated plants. We continued to adjust the structure of refined and chemical products, reduce the diesel-to-gasoline ratio and raise the percentage of highly profitable products, resulting in enhanced profitability.

Domestically, we processed 147.09 million tons of crude and produced 99.32 million tons of refined products. Output of profitable products registered a growth rate of 5.5 percentage points. Output of jet fuel, high-grade gasoline and aromatics was increased by 1.8%, 12.9% and 6.4%, respectively. Production of fuel oil decreased by 21%, and the diesel-gasoline ratio dropped by 0.24.

We produced more highly profitable and better quality chemical products. Our ethylene units were running at an 11.1% higher utilization rate than the previous year, yielding 5.59 million tons of ethylene, an increase

Crude runs (Domestic)

147.09

 mmt


Refined products output (Domestic)

99.32

 mmt


Refining and chemicals operating data (Domestic)

	2014	2015	2016
Crude runs (mmt)	150.16	151.32	147.09
Utilization rate of refining units (%)	82.6	84.5	80.9
Refine products output (mmt)	101.84	103.69	99.32
Gasoline	34.10	36.47	33.97
Kerosene	7.14	8.34	9.32
Diesel	60.60	58.88	52.03
Lubricating oil output (mmt)	1.58	1.21	1.16
Ethylene output (mmt)	4.98	5.03	5.59
Synthetic resin output (mmt)	8.07	8.32	9.20
Synthetic fiber output (mmt)	0.07	0.07	0.06
Synthetic rubber output (mmt)	0.75	0.71	0.76
Urea output (mmt)	2.66	2.57	1.90
Synthetic ammonia output (mmt)	1.89	1.85	1.53

of 11.1% year-on-year. We sold 26.8 million tons of chemical products throughout the year, an increase of 6%. In particular, sales of synthetic resin and synthetic rubber increased by 10% year-on-year.

Construction and Operation of Large Refining & Petrochemical Bases

In 2016, our major refining and petrochemical facilities in China maintained stable operation at a rate of 99.4%. Their 16 technical and economic indicators were better than those in 2015. In particular, the fuel and electricity consumption of ethylene fell by 17.6 kgoe/ton year-on-year. Both the energy and material consumption of polyethylene and polypropylene production decreased.

Construction of our new refining and petrochemical projects proceeded smoothly. The 10Mt/a refining unit at Yunnan Petrochemical was delivered and ready for operation. The refinery upgrading project at Huabei Petrochemical was well underway. The renovation of Liaoyang Petrochemical's Russian crude processing facilities was launched. Steady progress was made in projects at Guangdong Petrochemical.

Upgrading of Refined Products and Development of New Products

In response to severe air pollution, CNPC continued to accelerate quality upgrading of its refined products. In 2016, 23 quality upgrading projects were completed and became operational at Jilin, Sichuan and Lanzhou Petrochemicals. All of our 26 refining and petrochemical enterprises were capable of producing National V gasoline and diesel. We produced 26.11 million tons of National V gasoline and diesel, an increase of 109.9% year-on-year.

We continued to invest in the R&D of new chemical products. A total of 84 new brands/series were launched throughout the year with production of 1.03 million tons, including 788,000 tons of synthetic resin and 65,000 tons of synthetic rubber. Among them, 42 brands/series realized industrial production for the first time. Significant progress was made in the R&D of auto fuel tank materials and IBC barrel materials at Daqing Petrochemical, and medical materials and special materials for Goodyear tires at Lanzhou Petrochemical. We also succeeded in the market promotion of 10 new products, including Dushanzi Petrochemical's m-LLDPE, Daqing Refining and Chemical's PA14D-2, and Fushun Petrochemical's impact resistant plastics.



Dushanzi Petrochemical

Marketing and Sales

In 2016, we enhanced our ability to adapt to the needs of retail market. Refined products, pre-paid fuel cards, non-fuel products, and lube oil products were marketed in an integrated manner. Service stations were upgraded from oil retailers to comprehensive service platforms. As a result, our overall business operation improved.

Refined Products

In 2016, our domestic sales of refined products remained flat at 113.03 million tons. Sales of high value-added 98# gasoline and jet fuel increased by 689% and 11.3% year-on-year, respectively.

Marketing Network

We continuously optimized and expanded our marketing network, achieving both higher quality and greater coverage. In 2016, 467 service stations were built and 420 stations were put into operation, increasing our retailing capacity by 2.63 million tons. By the end of 2016, we had 20,895 service stations operating in China.

With more extensive and improved functions, the stations provide diversified services to satisfy customers' needs. Convenience stores were available at 89% of these stations, and 306 "2S" car service shops opened. The stations also improved their retail services by means of "Internet +

Marketing" such as "Smart Service Stations", the "uSmile e-Station" app, Alipay and WeChat based mobile payment, and installed self-service terminals for pre-paid fuel cards. With the accelerated integration of online and offline marketing, we had a much greater capability to provide comprehensive services. In 2016, 19.39 million "Kunlun pre-paid fuel cards" were issued, increasing the total issuance to more than 100 million cards.

Non-Fuel Products

Our non-fuel products registered significant growth in both revenue and profit. Our convenience stores' shelf sales ratio and revenue grew by 7% and 43% respectively, thanks to optimized product selection and enhanced marketing. "2S" shops were deployed to push forward car services in cooperation with SAIC Motor. Revenue from self-produced products grew by 179% year-on-year as a result of enhanced marketing. We also explored emerging business and extended value-added services at a faster pace. In 2016, our non-fuel products reported revenue of RMB 14.4 billion and profit of RMB 1.7 billion, up 16% and 17% year-on-year respectively.

Lube Oil and Miscellaneous Refined Products

As a high value-added product, lube oil is becoming a new profit growth point. With continued exploitation of sales channels and enhanced market development, we secured more advantages in both brand and technology, and made breakthroughs in the research and development of new products. Gear oil for CRH trains was tested at a speed of 250-350km/h on multiple units running for 600,000 kilometers. Gearbox oil for wind turbines was tested in 1.5kW turbines, and its application was extended to wind turbines of up to 1MW. In 2016, we sold 1.17 million tons of lube oil. Sales of automobile lube and byproducts grew by 15% and 57% year-on-year respectively.

Our miscellaneous refined products became more profitable. By integrating crude supply and refined products purchases at local refineries, we increased sales of Venezuelan heavy oil by 52% year-on-year. By developing the end-user market, we accumulatively sold 7.12 million tons of asphalt, accounting for 25% of the domestic market total. We also introduced innovative modes of sale for distillates and slurry, and supplied a higher percentage of directly-supplied naphtha without consumption tax. In 2016, our miscellaneous refined products registered sales of 33.36 million tons, with pre-tax profits increasing by 16% year-on-year.

Refined products sales (Domestic)

113.03 mmt



Service stations in China

20,895





Overseas Oil and Gas Operations

Against the complicated international environment and uncertainties emerging from overseas investment projects, our operating results improved steadily in 2016, thanks to a holistic approach toward optimizing project management, reducing operating costs and conducting capital operation. Oil and gas exploration activities saw important results. Major overseas projects proceeded well and safely. Projects under construction went ahead smoothly. By the end of 2016, CNPC operated in more than 30 countries. In particular, there are 49 cooperation projects in 19 countries along the Belt and Road routes, which have become the main source of the company's oil and gas output and revenue outside China.

Exploration and Development

In 2016, our overseas oil and gas exploration activities were targeted at high-quality and readily producible reserves through the queuing and selection of suitable projects worldwide. Pursuing a low cost strategy, exploration investment focused on key projects, highlighting cost-effectiveness and success rate. These activities resulted in a number of breakthroughs and progress, with newly added recoverable oil and gas reserves amounting to 96.23 million tons of oil equivalent.

Progressive exploration of high-quality reserves: A number of new oil reservoirs were discovered in the buried hill rocks in Chad; high-yield oil and gas flows were obtained from exploration at Hope Oilfield in the Pre-Caspian Central Block in Kazakhstan; new pay zones were identified at the western uplift of Jabung Block in Indonesia; and significant new reserves were achieved in Ecuador (Andes project), Kazakhstan (PK) and Oman.

Major progress in risk exploration: In Turkmenistan, two new gas reservoirs were discovered at the Amu Darya project; in Sudan, breakthroughs were made at the southern slope of the Sufyan Sag of Block 6 and a new oil-bearing bed series of Amal Formation was detected at the central uplift.

Breakthrough in deep-water exploration: In Brazil, well tests resulted in a high yield from the northwest section of the Libra Block, including well NW-3 with a daily capacity of more than 10,000 tons and well NW-2 with a 400m+ thick reservoir. A giant uncompartimentalized oil prospect with proven oil in place of up to 1.2 billion tons was basically confirmed.

Production

In 2016, our overseas projects achieved steady growth in oil and gas production by boosting fine management, development optimization, capacity building and cost control efforts. The full-year operating production reached 146.32 million tons of oil equivalent, of which CNPC's equity production was 76.01 million tons, an increase of 5.5% year-on-

year. The operating production and equity production of crude oil were 121.51 million tons and 57.53 million tons respectively; and the operating production and equity production of natural gas were 31.1 billion cubic meters and 23.2 billion cubic meters respectively.

Central Asia and Russia: CNPC International in Kazakhstan accelerated development planning for its four major oilfields, optimized drilling workload and improved the production efficiency of new wells. The PK and Aktobe projects saw new progress in oilfield development and the Kashagan project went on stream. In Turkmenistan, CNPC Amu Darya Company sped up the construction of production facilities in new gas fields. The Phase III project at Block B proceeded smoothly with a daily gas processing capacity of 21 million cubic meters. In Uzbekistan, the Mingbulak project moved ahead steadily. In Russia, construction work of the Yamal LNG project was in full swing, seeing 75% of the project schedule completed by the end of 2016.

Latin America: CNPC America was able to maintain stable production with a focus on profit-generating output, production coordination and fine management. In Venezuela, the MPE3 project made significant progress in the integration of production and drilling services, with surface works advancing smoothly; the Zumano and Caracoles-Intercampo projects reduced the capacity of inefficient blocks and ensured that production was safe and well under control. In Ecuador, the Andes project saw the completion of 600Kt/a capacity building at the Johanna East Oilfield, signed exploration contracts on Block 79 and Block 83, and extended the service contract for Block 14 to 2025. In Peru, despite the adverse impact of El Niño, the planned targets for production were exceeded without new drilling activities.


CNPC's share in overseas crude production

57.53 mmt



CNPC's share in overseas natural gas production

23.2 bcm



Middle East: We completed business restructuring and realized smooth transition. New wells became operational as planned and water-flooding projects advanced well. Operating fields in Oman, and Al-Ahdab, Rumaila, Halfaya and West Qurna in Iraq saw production targets remarkably exceeded. Meanwhile, their production capacity grew steadily. The North Azadegan project in Iran was put into operation. The Abu Dhabi project and the restoration of Iran's MIS project proceeded smoothly.

Africa: CNPC International Nile adopted differentiated approaches to oil production in Sudan and South Sudan, with an emphasis on geological research and fine management. A total of 60 new wells started pumping to create a new capacity of 380,000 tons. In South Sudan, new well production picked up in Block 3/7 and workover operation was carried out efficiently. The average daily output per well reached a three-year high; and surface engineering work was completed to enable the timely treatment of produced fluid. In Sudan, a series of measures targeted at idle wells and unproductive wells were implemented to boost production in Block 6 and Block 1/2/4. In Chad, the Phase-2.2 oilfield project advanced steadily.

Asia-Pacific: In Australia, our local company achieved production and operation targets successfully despite the challenge of low oil prices. Sticking to a low-cost strategy, the Arrow project focused on the development of the Surat Basin. The Daandine Expansion project came on stream; and the Browse project restarted Concept Select. Our projects in Indonesia, Mongolia and Singapore actively implemented cost reduction and revenue generating measures to ensure steady and effective operations.

Other regions: The Phase I MacKay River Oil Sands Project in Canada became operational with the targets of construction and steam injection achieved on schedule, laying the foundation for oil production and bitumen sales beginning in 2017. Located in northern Alberta, the project is expected to produce 35,000 barrels a day upon completion of Phase I.

Pipeline Construction and Operation

As of 2016, the company operated a total of 14,507 kilometers of overseas oil and gas pipelines including 6,604 kilometers of crude pipelines and 7,903 kilometers of natural gas pipelines, which transported 25.93 million tons of crude oil and 43.9 billion cubic meters of natural gas throughout the year. The Kazakhstan-China Crude Pipeline, the Russia-China Crude Pipeline and the Myanmar-China Gas Pipeline maintained safe and steady operation. The Myanmar-China Crude Pipeline was successfully connected with water transportation system; Line C of the Central Asia-China Gas Pipeline was fed with gas sources in Uzbekistan, with the annual transmission capacity of Line A, B and C totaling 51 billion cubic meters.

Key overseas pipeline projects made headway. The No.4 and No.8 compressor stations along the Kazakhstan section of Line C of the Central Asia-China Gas Pipeline became operational. The Second Kazakhstan-China Gas Pipeline reached an annual capacity of 6 billion cubic meters. The Chinese section of the Eastern Route of the Russia-China Gas Pipeline proceeded smoothly. In Kazakhstan, the subsea pipeline of the Kashagan Oilfield was thoroughly repaired to transport crude oil successfully for



The Yamal LNG project in Russia

North Azadegan Project in Iran Became Operational

On April 13, 2016, the North Azadegan project in Iran was put into official production and began to deliver crude oil.

Located 80 kilometers west of Ahvaz, the capital city of Khuzestan Province, the North Azadegan project is a major investment of CNPC in Iran. It has a production capacity of 4 million tons of crude per year and of 700,000 cubic meters of natural gas per day.

The project company adopted a number of innovative technologies to ensure the efficient development of the oilfield, including large-scale gas lift, 3D directional cluster well drilling and horizontal well drilling, as well as inclosed transportation and processing of crude. Meanwhile, an internationally leading data acquisition, monitoring and security system was put in place to enable automated production management and safety protection.

As the North Azadegan Oilfield is situated in a national wetland reserve, the project company kept improving its HSE system and emphasized the importance of ecological environmental accountability. No environmental accidents have been reported since the project was launched in 2009. The project company received an honorary certificate of environmental protection from the local government for its environmental efforts, making it the only holder of this certificate among foreign companies operating in Iran.

the first time. In Canada, the Phase I project of the Grand Rapids Pipeline System saw 100% completion of winter engineering and 90% completion of summer engineering, with stations along the route basically completed.

Refining and Chemicals

In 2016, CNPC's overseas refineries operated in a safe and stable manner and processed 44.57 million tons of crude. In Sudan, the takeover of equity and operatorship of the Khartoum Refinery was completed smoothly. In Niger, Zinder Refinery made significant progress in negotiations with Sonidep on sales and pricing of oil products and signed a new sales agreement. In Kazakhstan, Shymkent Refinery saw steady progress in its renovation and upgrading project.

Project Cooperation and Development

In 2016, driven by China's Belt and Road Initiative, CNPC continued to deepen and broaden its ongoing efforts in international oil and gas cooperation by signing a range of cooperation agreements and memorandums with the governments of Russia, Venezuela, Peru, Mozambique, Algeria, etc. and their energy companies.

In Central Asia-Russia, CNPC and Gazprom signed a Memorandum of Understanding on promoting cooperation in underground gas storage and gas power generation projects in China, in an effort to promote relevant collaboration and seek a wider range of joint venture and cooperation

opportunities. The two sides also signed an agreement to cooperate in the mutual recognition of standards and conformity assessment results, and an MOU on feasibility study cooperation in the NGV fuels sector, in a bid to deepen cooperation in standardization and NGV fuels.

In Latin America, CNPC signed MOUs on cooperation progress with PDVSA, and on deepening oil and gas cooperation with the Ministry of Energy and Mines of Peru.

In Africa, CNPC signed a cooperation framework agreement with Mozambique's national oil and gas company ENH. Under the agreement, the two sides will step up collaborative efforts in oil and gas exploration and production, and natural gas processing and marketing. CNPC will not only participate in Mozambique's E&P projects and promote services cooperation, but also train technicians and managers for Mozambique's oil industry.

In addition, CNPC and Total signed a strategic framework cooperation agreement to promote cooperation in oil and gas investment and R&D, and strengthen exchange and cooperation in soft power such as corporate management and corporate social responsibility.

International Trade

With continuous efforts to consolidate and expand its overseas marketing network, CNPC promoted the overseas operation hubs which integrate trade, processing, transportation, and storage. On a global scale, we carried out international trade in crude oil, refined products, natural gas, petrochemicals, and carbon emissions, as well as marketing of overseas equity oil and futures on oil and refined products. The scope of trade covered major oil and gas resources and markets in more than 80 countries and regions around the world. Our annual trading volume was 450 million tons, worth USD 141.2 billion.

Our capabilities in resource mobilization in the crude oil sector were further enhanced. The import volume of the Kazakhstan-China Crude Pipeline reached 10.07 million tons. We signed an extended agreement with Rosneft on increasing the oil supply to 10 million tons per year. We also took full advantage of our global marketing network to increase sales of overseas equity oil. For the first time, the North Azadegan project in Iran began oil take and sales.

The scale of refined products processing has been expanding as we strived to develop high-end markets with greater efficiency. The annual quantity of processed and exported refined products was 9.94 million tons, an increase of 17% year-on-year. Efforts were made to further tap the retail market with a focus on ship refueling, airport fueling and gas station retail. The annual fuel oil sale of bonded ships in the Chinese market was 4 million tons, accounting for 45% of the national total. We expanded airport fueling services to 17 airports in six countries and regions with an annual supply of 4 million tons. Our market share of gas station retail in Singapore, Kazakhstan and Hong Kong was 21%, 16% and 12% respectively.

As for natural gas, we optimized the pipeline gas and long-term supply of LNG, with adjustment on import volumes, optimized the shipping schedule of LNG, and ensured stable supply of natural gas. Our LNG marketing network was further expanded to Argentina, Italy, and Dubai for supply. In addition, we also sourced from countries like Nigeria, Australia, and Russia, which also drove the growth of LNG ship chartering.

Chemicals trading became more technology-intensive, and we continued to raise the level of integrated operation. The delivery volume of our PTA futures contract ranked first at the Zhengzhou Commodity Exchange, which suggested a steady growth in market influence.

A variety of measures were taken to reduce shipping costs. We established cooperation with 40 ship owners around the world, which enabled direct transactions accounting for 50% of the total and thus reduced freight rates. To strengthen shipping safety management, we developed a process for marine accident analysis and feedback to ensure safe operations.

Trade volume

450 mmt



Trade value

141.2 billion USD



Overseas Operation Hubs

Based on three overseas operation hubs in Singapore, London and New York, CNPC continued to improve the capabilities of its global resource optimization.

Our Singapore branch further improved its market influence in Asia. In Malaysia, we took 55% of the ship refueling market. In Myanmar and Sri Lanka, our market share of refined products exceeded 40%. In Iran, our market share of gasoline was over 25%. We were also awarded an oil supply contract for 2017 by Ethiopia, which accounts for more than 35% of the country's market of refined products. Our Hong Kong branch expanded its refueling business in Dubai and Songshan Airport in Taiwan, and became the largest oil supplier for Hong Kong Airport for the fifth consecutive year. For the first time, our Japan branch exported inventory crude oil from Dalian to the Japanese market, actively promoted cost-cut and efficiency improvement of the joint venture refinery, and expanded LNG sales to end-users in Japan and South Korea. Our Kazakhstan branch maintained its position as the third-largest local retailer of refined products.

In Europe, our London branch further enhanced the operational capacity of Brent crude oil and local diesel, and further strengthened regional and local market expansion of refined products.

In the Americas, our branch sold crude oil to Venezuela through successful procurement of WTI. We signed new contract on USD 10-billion financing and oil supply, which further consolidated our resource advantage in the region.

Oilfield Services, Engineering Construction, and Equipment Manufacturing

In 2016, CNPC gave full play to its advantages in integrated operation to overcome difficulties caused by low oil price and a shrinking market. We continued to carry out geophysical prospecting, drilling, logging, downhole operations, and other technical services in oil and gas fields around the world with improved competitiveness. We made new breakthroughs in exploring high-end overseas market and worked on many engineering and construction projects in oil and gas field surface projects, large refining and petrochemical facilities, pipelines and storage tanks. We accelerated the transition to a "Manufacturing + Services" mode in our equipment manufacturing sector and sold petroleum materials and equipment to 82 countries and regions through a marketing network covering most of the world's oil producers.

Oilfield Services

In 2016, we had 5,988 crews providing oilfield services in 50 countries worldwide. By reducing the size of our operation crews, optimizing the investment structure and improving service competence and quality, we took a much larger market share in China and achieved revenue growth in overseas markets despite the downturn in the oil industry.

Geophysical Prospecting

In 2016, we deployed 132 seismic crew-times (61 2D and 71 3D) in 255 projects, acquiring data of 162,684 kilometers of 2D lines and 58,120 square kilometers of 3D profiles. With 100% acceptance for both on-site data

acquisition profiles and final data processing profiles, the 2D and 3D surveys recorded shots per average day increased by 8.3% and 8.7%, respectively.

Efforts were made to promote the application of "wide azimuth, broadband and high density" technology, efficient data acquisition by vibroseis, and digital seismic crews in onshore exploration. We completed 3D shale gas prospecting at the Zi-201 well-block in Weiyuan of Sichuan Province, and the 2D MT project in Tajikistan. PDO in Oman and S77 in Saudi Arabia among other projects proceeded smoothly. We took the largest share of the global onshore market for the 14th consecutive year. As for deep water exploration, we focused on key market areas, optimized overseas market layout, and completed the Heare project in Papua New Guinea and the Buscador project in Mexico, with highly recognized quality. A number of new projects, including the NWAAM17 project in West Africa, were commenced smoothly. In terms of transitional zone prospecting, our enhanced management performance resulted in high operating efficiency at the KOC project in Kuwait and the S78 project in Saudi Arabia. In addition, we strengthened the R&D of special technologies such as borehole seismic, unconventional exploration, and integrated geophysical & chemical prospecting, seeing enlarged markets and an extended business reach.

New progress was made in the R&D of core software and equipment, and remarkable results were achieved in the application of packaged technologies. A new 3.0 version of GeoEast software was released, with great improvements in seismic-steering horizontal well design, reservoir prediction, facies-controlled property modeling, well-seismic combined sequence stratigraphic interpretation, and conventional structural interpretation. Functions such as the real-time monitoring of vibroseis, ADS (-TA, -TE) data analysis and large data volume transmission were added to KLSeis II software. Important breakthroughs were made in terms of charging speed, data downloading speed and high-precision synchronous sampling in the R&D of the eSeis node instrument, and the field acquisition test and physical test were completed. The EV56 high-precision vibroseis was developed successfully. The SN5-5 low-frequency wave detector was launched into large-scale application in China. The G3i and Hawk systems saw improvements both in stability and reliability.

In 2016, although investment in geophysical prospecting declined significantly in the international market, we obtained new contracts worth more than USD 100 million in established markets in Oman, Saudi Arabia and other countries in the Middle East. We won the deep-sea OBN project in Indonesia, and made breakthroughs in emerging markets like Egypt, Cuba, and Kyrgyzstan.

Geophysical prospecting operations

	2014	2015	2016
Seismic crews in operation	166	166	165
Domestic	96	96	96
Overseas	70	70	69
2D seismic data acquired (kilometers)	103,645	132,714	162,684
Domestic	42,798	22,521	35,919
Overseas	60,847	110,193	126,765
3D seismic data acquired (square kilometers)	63,990	47,219	58,120
Domestic	14,485	10,722	10,844
Overseas	49,505	36,497	47,276

Drilling

In 2016, our 1,205 drilling crews drilled 9,232 wells and completed 9,328 wells, with a total footage of 19.5 million meters.

We advocated EPC in bidding for drilling projects and promoted the large-scale application of efficiency improving measures like deep well drilling, ROP speed up, factory operation, and horizontal drilling, which greatly boosted our drilling efficiency on projects home and abroad. Our Chuanqing Drilling Engineering Company completed 13 deep wells at Anyue Gas Field in Sichuan, with an average well depth of 5,460 meters, and the average monthly drilling rate and ROP increased by 9.3% and 15.3% year-on-year. The average drilling period was 177 days, 27.5 days shorter compared with 2015. In particular, well Moxi-116 was completed at a depth of 5,475 meters within 124 days, the shortest drilling cycle in the area. By using the PCD system, Xibu Drilling Engineering Company obtained an oil flow of 273 tons per day and a gas flow of 10,000 cubic meters per day during the formation test at well Shi-1-3-1 in Qinghai Oilfield and effectively protected the reservoirs. Bohai Drilling Engineering Company completed six wells at Changning shale gas block in Sichuan by adopting factory drilling, of which well H8-2 created two technical records in the Changning Block: maximum hole deviation (98°) and the shortest drilling cycle (83.9 days) at a depth of over 4,800 meters. Great Wall Drilling Company completed horizontal well SEB-24 in Cuba at a depth of 7,300 meters, with a maximum extended reach of 6,167 meters, a Dep/TVD ratio of 3.39, and seven drilling records in Cuba.

Drilling operations

	2014	2015	2016
Drilling crews in operation	1,018	1,230	1,205
Domestic	824	979	943
Overseas	194	251	262
Wells drilled	12,286	9,387	9,328
Domestic	10,970	8,289	8,686
Overseas	1,316	998	642
Footage drilled (million meters)	24.92	20.89	19.50
Domestic	21.98	18.38	17.96
Overseas	2.94	2.51	1.54

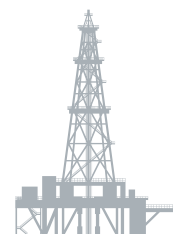
The R&D and application of new technologies were strengthened and made remarkable achievements. A high-performance compound drilling bit was successfully developed and tested at well Shuang-66 and well Shuangshen-1 in Daqing Oilfield, registering a footage increase of 44%, a drilling rate increase of 53% and a cost reduction of 50%, with greatly improved performance. Newly developed multi-dimensional impact drilling tools, featuring pulsed jet and shock vibration drilling, can make both axial and rotational impacts to increase the average ROP by 56%, which is expected to substantially accelerate drilling in hard rock formations. Expandable open-hole liner sealing technology underwent a field test at well Ha-31-H3 in Liaohe Oilfield, succeeding in the one-time sealing of a 435m-long open-hole interval at 2,493-2,928m and showing excellent performance in sealing complex formations and addressing severe leakages. The intelligent closed-loop rotary steering system was field tested at four wells, and achieved the largest single-well footage of 1,150 meters at well Gang-1601 in Dagang Oilfield with an average ROP of 10.8 m/h.

In the international market, we won new drilling contracts in Algeria, Iraq, Venezuela, Pakistan, Turkmenistan and other countries. Our drilling rig utilization rate reached 100% at the Ahdab project in Iraq and projects in Venezuela.

Well Logging and Mud Logging

In 2016, CNPC deployed 797 well logging crews and completed 79,231 well-times of logging in 17 countries; and 1,223 mud logging crews and completed mud logging at 7,929 wells.

Satisfactory results were achieved in the application of mature logging technology, as evidenced by the ELOG "One-String" fast logging tools applied at Changqing, Tuha and Qinghai oilfields in China, with logging operations exceeding 5,000 well-times throughout the year. The LEAP800 logging system was applied in five countries and regions outside China.



Well logging operations

	2014	2015	2016
Logging crews in operation	760	803	797
Domestic	623	662	663
Overseas	137	141	134
Well logging operations (well-time)	93,533	88,926	79,231
Domestic	88,000	83,933	75,591
Overseas	5,533	4,993	3,640

Logging performance and efficiency for complex wells were further improved by using our unique techniques. We developed bypass casing well logging technology and applied it to highly-deviated well cementing quality assessment and open-hole horizontal well logging. In Changqing Oilfield, this technology completed open-hole logging at 107 horizontal wells with average single-well operation efficiency increasing by 50%. Crawler technology was used to complete logging operations at 87 horizontal wells, increasing per-well operation efficiency by 64% compared with the conventional wet connector logging. Improved coiled tubing logging technology saw successful application in Iran and Iraq. Storage type variable density logging tools connecting coiled tubing and drill tools helped us enhance well cementing quality assessment for large extended-reach wells and slim-hole wells in Liaohe Oilfield and shale gas wells in south Sichuan, with operation efficiency increasing by more than 50%. The "3+3" multi-level logging scheme was adopted at Mahu block in Xinjiang Oilfield, which reduced the tool sticking occurrence ratio from 22% in 2015 to 5.5% in 2016 during logging operation.

Downhole Operations

In 2016, our 1,914 crews completed 112,643 well-times of downhole operations and 8,515 layers of formation testing.

Our downhole operation performance was further improved through the application of new technology and techniques. We vigorously promoted the factory fracturing operation mode and continued to develop our shale gas reservoir fracturing technology, resulting in remarkable stimulation effects. The output from the fourth round of well testing in the Changning block in Sichuan was 112% higher than that in the first round. The second round of well testing in the Weiyuan block yielded 45% more shale gas than that in the first round. Annular sand fracturing by coiled tubing with a bottom sealing ring was tested in a number of fields. In Changqing Oilfield,

hydraulic jet fracturing was applied to 80 layers (intervals) in 20 wells, with a maximum of eight layers (intervals) being fractured in one trip. Snubbing operations for gas wells at a pressure higher than 21MPa (maximum 28MPa) were also made possible.

In 2016, we made major breakthroughs in the development of CO₂ fracturing technology, especially CO₂ dry fracturing technology. Techniques for CO₂ energizing and injection as well as foam fracturing became more sophisticated. The key equipment, inclosed CO₂ sand mixing device independently developed by CNPC, boosted the effective volume per single unit to 20 cubic meters with a maximum sand transmission rate of 0.8 cubic meters/minute. We developed a CO₂ fracturing fluid system and established an evaluation method for CO₂ dry fracturing fluid tests. We also had CO₂ fracturing stimulation facilities in place, which enabled dynamic simulation and equipment performance testing under full operating conditions. We conducted CO₂ foam fracturing and dry fracturing tests for 132 well-times, seeing a remarkable increase in oil and gas production.

Downhole operations

	2014	2015	2016
Downhole operation crews	2,090	2,153	1,914
Domestic	1,849	1,929	1,676
Overseas	241	224	238
Downhole operations (well-time)	143,405	128,879	112,643
Domestic	140,713	126,062	110,818
Overseas	2,692	2,817	1,825
Formation test (layers)	6,965	7,782	8,515
Domestic	5,099	5,051	5,555
Overseas	1,866	2,731	2,960



Construction of the Second Russia-China Crude Pipeline

Engineering and Construction

Despite a greatly reduced workload and a substantially shrinking market, we managed to enhance our competitiveness and profitability through reinforcing project management and process control, promoting standardized design, factory prefabrication and modular construction, emphasizing high-end business such as EPC, PMC, consultancy and design, and establishing a service system and management process that cover the entire process of feasibility study, investment and financing, and project implementation. At the same time, we continued to advance business transition and upgrading, and accelerated the shift from an EPC contractor to an integrated service provider.

CNPC has been closely following the nation's Belt and Road Initiative and made proactive efforts to tap market potential. We continued to optimize our domestic and international business layout, further consolidated the traditional domestic market, and expanded our share of overseas high-end markets, with a business development network covering regional markets and major countries in Central Asia, the Middle East, Africa, Asia-Pacific, and the Americas. In 2016, CNPC carried out a total of 60 major projects on oil and gas field surface engineering, refining and chemicals, long-distance pipelines, storage tanks and LNG, etc.

Oil and Gas Field Surface Engineering

CNPC maintained its domestic leading position in capacity building for onshore oil and gas fields. We possess a series of surface engineering technology packages for conventional oil and gas fields, complicated oilfields with high water cut, low permeability, ultra heavy oil or high

condensate content, and gas fields with high formation pressure, high yield or high sulfur content. We are capable of building 20Mt/a oil production capacity and 20bcm/a gas production capacity.

In 2016, our major capacity building projects proceeded smoothly. The project for light hydrocarbon deep recovery from condensate gas in Tarim Oilfield was launched. The project to overcome bottlenecks at Block 3/7 in South Sudan was completed. A gas processing plant in Tanzania became operational and began to export commercial gas. Other projects were well under way including Phase-I of Mender Oilfield in Abu Dhabi, Phase-2.2 of Chad and the West Qurna Oilfield in Iraq, and MPE3 expansion in Venezuela. Preliminary work was carried out smoothly on the newly signed renovation project for Basra Gas in Iraq.

Construction of Refining and Chemical Facilities

CNPC is capable of designing and building 10Mt/a refining and 1Mt/a ethylene facilities. In China, we are the leader in independently developed technologies for the production of 400Kt/a ABS resin, 400Kt/a polyester, and 1.2Mt/a PTA. We have also developed technology packages for the production of 450Kt/a synthetic ammonia and 800Kt/a urea.

In 2016, projects on upgrading gasoline and diesel quality and technology renovation were completed at Changqing Petrochemical, Daqing Refining and Chemicals, Jinzhou Petrochemical and Urumchi Petrochemical. The 10Mt/a refinery at Yunnan Petrochemical and the 4Mt/a coal-to-oil plant at Shenhua Ningmei were delivered. The fertilizer project in

Ningxia approached completion and was ready for commissioning. The 10Mt/a refinery upgrading project of Huabei Petrochemical made steady progress. Overseas, the Phase-I renovation project of Shymkent Refinery in Kazakhstan was carried out in an orderly manner, and newly inked projects, such as expansion of Algiers Refinery and polypropylene production in Malaysia, were underway.

Pipeline and Storage Tank Construction

With regard to long-distance pipeline construction, we have mastered an entire set of design and construction technologies for pipelines featuring large diameter ($\Phi 914$ - $\Phi 1219$ mm), high pressure, high grade steel (X70, X80), and thick wall (14.5-33mm). We also possess the design technology for the orderly transmission of refined products as well as design and laying technologies for shallow-water pipelines. We are capable of designing and building 150,000m³ oil tanks and 10,000m³ spherical tanks, with an annual construction capacity of 26 million cubic meter for oil tanks and 16 million cubic meters for refined products. In addition, we can design and build natural gas liquefaction plants and LNG terminals, as well as cryogenic LNG tanks with per unit capacity of 200,000 cubic meters.

In 2016, we completed and put into operation the eastern section of the Third West-East Gas Pipeline, the Baodi-Xianghe-Xiji connecting line of the Fourth Shaanxi-Beijing Gas Pipeline, and the directional crossing of the

Lantau-Changzhou Island subsea pipeline in Hong Kong. Other projects were proceeding as planned, including the Jinzhou-Zhengzhou and Yunnan refined products pipelines, renovation of the Tieling-Dalian Crude Pipeline, and the Chinese section of the Eastern Route of the Russia-China Gas Pipeline. Construction commenced of the Fourth Shaanxi-Beijing Gas Pipeline, the Zhongwei-Jingbian connecting line of the Third West-East Gas Pipeline, and the Second Russia-China Crude Pipeline. Outside China, we completed the refined products pipeline in Kenya and the Majinon FCP Gas Pipeline in Iraq. In addition, we were awarded the pipeline construction projects such as the rerouting of the Ras Tanura Pipeline in Saudi Arabia and building of a gas pipeline in the Cordoba province of Argentina.

In 2016, new progress was made in storage tank and LNG engineering projects. The LNG project of Huagang Gas in Jincheng Shanxi was completed and put into operation. The Shandong Dongming LNG project was commenced. Three modules of Russia's Yamal LNG project were loaded for shipping. The refined products depot in Mozambique was completed and became operational. The Nassiriya oil depot in Iraq and the expansion of Angola's products depot proceeded steadily. In addition, new projects were signed, such as the national refined products reserve storage in Hubei.



CPP601 pipe-laying vessel in operation

Offshore Engineering

CNPC has the capability to provide integrated and comprehensive services for offshore production, well drilling, well completion, well cementing, production test, downhole operation, design and construction of marine engineering, as well as vessel services.

In May 2016, the CPOE 17 jack-up drilling rig was officially delivered and arrived at its designated place in the waters of the Yellow Sea to start operations. By the end of 2016, we had 16 offshore drilling and operating platforms and 25 vessels. Our vessels provided service for 4,783 working days throughout the year, with the vessels of 4,000HP or higher duty utilized at a rate of 61.7%.

Our major projects in the Bohai Sea, the Yellow Sea, the Persian Gulf and other sea areas were proceeding smoothly. We completed the Zhenhai-Mamu sea-crossing water pipeline of the Phase-III Zhoushan water diversion project in Zhejiang and the sewage drainage project of the Liaodong Bay New District. Low permeability reservoir fracturing in pilot wells at the BZ25-1 Oilfield of the Bohai Bay was successfully completed with a total liquid injection volume of 1,967 cubic meters and a total sand injection volume of 163 cubic meters, becoming the largest offshore fracturing project in China. The total footage of our offshore drilling operation in 2016 amounted to 44,000 meters.

Our Qingdao offshore engineering construction base and Tangshan production support base were further developed with enhanced capabilities. The Qingdao base completed the construction and delivery of MWP4, MWP10A and FWP1D project packages for the Yamal LNG project. In addition to the previously concluded FWP5 project package, we have delivered all Yamal LNG modules as contracted.

Petroleum Equipment Manufacturing

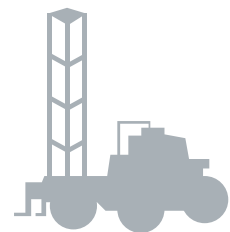
In 2016, the "Manufacturing + Service" mode was adopted in our equipment manufacturing sector. We promoted international cooperation in production capacity, enhanced product lifecycle management, expanded our business into maintenance, repair, and remote diagnosis, and increased exports of our core products such as drilling rigs and steel pipes. Our overseas marketing networks were further optimized. Our petroleum materials and equipment were exported to 82 countries and regions around the world.

We pushed forward steadily with major equipment projects. The manufacturing of 12 fast-moving desert rigs for Abu Dhabi National Drilling Company (NDC) was completed. By the year end, we delivered a total of 39 fast moving desert rigs to NDC. We manufactured and delivered 14 drilling rigs to PDVSA, and provided 64,000 tons of spiral pipes for Saudi Aramco's Phase-I gas pipeline extension project, as well as 110,000 tons of piling pipe for Port Said in Egypt. Also, we proceeded well with line pipe manufacturing for the GAIL pipeline project in India.

Breakthroughs were made in the R&D and promotion of new equipment. Trial manufacturing of new drilling and production equipment achieved successes, including the BOMCO subsea tree, the ZJ30DB automatic drilling rig, and the 2500 fracturing unit. R&D efforts were carried out to develop new products such as SEW 80SS anti-corrosion casing, and the 7-inch BJC-I special spiral casing pipe. We developed the 46m ultra-long pile pipe, $\Phi 2420$ mm water pipe and CT110 coiled tubing among other innovative products. In particular, $\Phi 1219 \times 22$ mm spiral submerged arc welded pipes of X80 steel grade were widely applied at major pipeline projects such as the Fourth Shaanxi-Beijing Gas Pipeline and the Zhongwei-Jingbian connecting line of the Third West-East Gas Pipeline. Field tests of power generating units were held and proved successful of Jichai's 175 diesel genset for electric rigs and the 140 diesel genset for supplementary power generation at well site.

In 2016, we kept expanding overseas markets and realized entry into Paraguay for the first time. We signed contracts with clients from 44 countries and regions, including the contract on selling power generators to Peru and the PC contract on the construction of the Asia Steel Pipe Plant.

In addition, we also stepped up international cooperation in production capacity and technology development. The main project of the warehouse and maintenance center in the US was completed. Construction of a steel pipe plant and an equipment manufacturing base in Kazakhstan was well underway. Agreements were reached with GOES of Germany and GE of the US to jointly produce coiled tubing units, liquid nitrogen pumping equipment and electric drive centrifugal compressor units. We also signed a framework agreement with Schlumberger to further expand the scope of our cooperation based on previous projects, and carry out all-round joint efforts in the R&D, manufacturing, supply chain, and sales of high-end petroleum equipment.







Financial Statements

Consolidated Balance Sheet

million RMB yuan

	2014	2015	2016
Current assets			
Cash and cash equivalent	312,079.87	342,772.93	384,370.93
Funds lent	839.43	3,463.90	2,535.00
Financial assets at fair value through profit or loss	15,889.06	8,386.01	9,249.11
Derivative financial assets	635.02	708.88	843.09
Notes receivable	15,338.15	10,181.47	12,940.35
Accounts receivable	119,564.88	122,464.89	118,138.55
Prepayments	155,799.42	252,184.67	262,372.58
Premium receivable	68.99	83.15	93.75
Reinsurance accounts receivable	105.53	208.18	274.07
Reinsurance reserves receivable	282.62	591.67	697.62
Interest receivable	2,972.90	3,090.63	3,512.85
Dividends receivable	346.47	559.49	301.37
Other receivables	55,360.92	21,331.55	16,773.97
Financial assets purchased under resale agreements	23,680.58	27,306.75	5,844.25
Inventories	271,559.06	228,310.10	228,758.02
Non-current assets maturing within one year	586.69	681.26	142,302.86
Other current assets	57,051.34	69,910.52	63,872.24
Total current assets	1,032,160.93	1,092,236.05	1,252,880.61
Non-current assets			
Loans and advances issued	103,092.73	113,833.13	68,758.77
Available-for-sale financial assets	111,994.01	105,723.80	47,290.02
Held-to-maturity investments	105,424.55	109,347.69	82,602.47
Long-term accounts receivable	67,902.58	76,425.41	92,447.77
Long-term equity investments	136,425.59	93,055.99	107,612.58
Investment properties	983.19	1,522.27	2,258.24
Original value of fixed assets	1,505,478.94	1,656,345.50	1,725,184.01
Less: Accumulated depreciation	627,694.66	700,441.33	767,420.70
Net value of fixed assets	877,784.28	955,904.17	957,763.31
Less: Impairment of fixed assets	63,409.47	64,892.27	81,696.51

Consolidated Balance Sheet (continued)

million RMB yuan

	2014	2015	2016
Fixed assets-net value	814,374.81	891,011.90	876,066.80
Construction-in-progress	365,498.23	340,766.92	283,904.13
Project materials	6,216.90	7,865.15	8,141.70
Disposal of fixed assets	541.08	633.44	674.27
Productive biological assets	0.23	0.72	0.67
Oil and gas assets	959,201.39	957,299.20	958,466.58
Intangible assets	82,562.46	86,054.09	88,474.58
Development expenditure	1,041.12	1,480.82	1,299.82
Goodwill	7,911.06	46,258.07	46,699.93
Long-term deferred expenses	39,248.07	37,822.48	35,874.99
Deferred tax assets	22,111.00	24,618.22	29,078.09
Other non-current assets	49,605.92	48,142.44	87,227.22
Total non-current assets	2,874,134.92	2,941,861.74	2,816,878.63
Total Assets	3,906,295.85	4,034,097.79	4,069,759.24
Current liabilities			
Short-term loans	109,804.13	55,361.49	86,917.37
Borrowings from central bank	25.00	603.12	661.42
Deposits from customers and interbank	204,144.40	205,737.15	195,183.34
Borrowing funds	47,319.41	60,878.57	73,016.02
Derivative financial liabilities	370.59	793.64	561.18
Notes payable	17,584.38	18,544.14	23,067.58
Accounts payable	356,853.92	302,057.78	290,932.91
Receipts in advance	83,494.86	80,306.50	89,127.37
Funds from sales of financial assets with repurchase agreement	12,834.15	13,147.37	7,180.54
Handling charges and commissions payable	21.42	18.21	25.36
Staff remuneration payable	21,306.06	21,311.56	24,047.74
Taxes payable	62,837.70	48,134.39	56,976.06
Interest payable	13,080.53	12,416.15	13,921.36
Dividends payable	1,263.84	1,563.13	6,678.27
Other payables	111,929.05	88,431.51	64,374.87

Consolidated Balance Sheet (continued)

million RMB yuan

	2014	2015	2016
Reinsurance accounts payable	82.10	177.30	288.98
Reserve for insurance contracts	955.84	1,532.18	1,928.84
Funds arising from acting trading of securities	0.01	0.01	0.01
Non-current liabilities due within one year	43,114.03	148,144.36	84,869.42
Other current liabilities	26,944.87	5,110.85	6,932.95
Total current liabilities	1,113,966.29	1,064,269.41	1,026,691.59
Non-current liabilities			
Long-term loan	13,323.57	17,266.61	20,583.12
Bonds payable	389,758.25	378,765.86	393,853.21
Long-term payables	7,633.45	8,163.61	6,849.00
Long-term employee remuneration payable	112.85	123.36	1,489.51
Specific payables	1,522.83	1,314.39	1,271.46
Accrued liabilities	114,240.95	124,243.92	132,281.72
Deferred income	11,222.02	12,790.39	13,675.89
Deferred tax liabilities	24,007.67	23,621.25	25,998.21
Other non-current liabilities	7,192.43	5,250.34	2,169.49
Total non-current liabilities	569,014.02	571,539.73	598,171.61
Total liabilities	1,682,980.31	1,635,809.14	1,624,863.20
Owners' equity			
Paid-up capital (or share capital)	468,007.69	486,855.00	486,855.00
Other equity instruments	109,540.88	209,511.78	209,511.78
Capital reserve	264,289.14	275,212.89	289,747.45
Other comprehensive income	-33,637.66	-44,117.41	-17,190.83
Special reserve	29,894.05	30,961.72	32,365.52
Surplus reserve	1,082,961.47	1,105,198.51	1,085,777.17
General risk provisions	7,072.37	7,752.71	8,706.33
Undistributed profit	18,143.69	8,020.88	2,233.19
Total owner's equity attributable to parent company	1,946,271.63	2,079,396.08	2,098,005.61
Minority interest	277,043.91	318,892.57	346,890.43
Total owners' equity	2,223,315.54	2,398,288.65	2,444,896.04
Total liabilities and owners' equity	3,906,295.85	4,034,097.79	4,069,759.24

Consolidated Profit Statement

million RMB yuan

	2014	2015	2016
Total revenue from operations	2,729,956.16	2,016,756.66	1,871,902.90
Including: Operating income	2,708,477.73	1,998,581.26	1,855,283.73
Interest income	19,302.73	16,263.99	14,272.62
Premiums earned	125.88	95.59	333.04
Handling charges and commission income	2,049.82	1,815.82	2,013.51
Total cost of operations	2,577,876.46	1,967,309.67	1,851,542.17
Including: Operating cost	2,078,216.88	1,505,437.21	1,418,917.78
Interest expenses	7,204.02	7,576.47	6,789.72
Handling charges and commission expenses	138.11	187.35	114.52
Net expenditure for compensation payments	83.55	119.04	193.99
Net amount of provision for insurance contract	91.48	200.51	240.71
Reinsurance costs	-35.21	-89.04	-57.09
Business tax and surcharges	237,755.67	207,785.05	197,241.56
Selling expenses	73,361.80	73,581.19	74,407.67
Administrative expenses	114,585.63	107,646.79	102,538.88
Finance expenses	23,123.44	4,166.32	-10,479.22
Impairments loss of assets	19,454.29	40,875.23	42,512.47
Others	23,896.80	19,823.55	19,121.18
Add: Gains from change in fair value (Loss is represented by "-")	50.07	-15.94	1.47
Gain from investment (Loss is represented by "-")	18,522.42	33,034.59	34,072.87
Exchange gain (Loss is represented by "-")	139.35	543.30	364.06
Operating profit (Loss is represented by "-")	170,791.54	83,008.94	54,799.13
Add: Non-operating income	17,983.14	15,440.45	15,437.55
Less: Non-operating expenditure	15,364.71	15,980.55	19,505.39
Total profit (Total loss is represented by "-")	173,409.97	82,468.84	50,731.29
Less: Income tax expenses	49,565.29	26,226.96	23,937.41
Net profit (Net loss is represented by "-")	123,844.68	56,241.88	26,793.88
Net profit attributable to owners of the parent company	100,798.25	44,560.43	12,406.62
Minority interest income	23,046.43	11,681.45	14,387.26
Net amount of other comprehensive income after tax	-8,001.23	-9,295.46	27,876.33
Total comprehensive income	115,843.45	46,946.42	54,670.21
Total comprehensive income attributable to owners of the parent company	95,463.35	34,080.68	39,247.16
Total comprehensive income attributable to minority interests	20,380.10	12,865.74	15,423.05

Notes to the Financial Statements

A. Description of Principal Accounting Policies and Accounting Estimates

1. Accounting standard and accounting system

CNPC (hereinafter referred to as the Company) follows *Accounting Standards for Business Enterprises—Basic Principles* and the specific rules of accounting standards, guidelines for the application of accounting standards, interpretations of accounting standards and relevant regulations issued by the Ministry of Finance.

2. The fiscal period

The fiscal period starts on January 1 and ends on December 31 each calendar year.

3. Standard accounting currency

The Company and most of its subsidiaries adopt RMB yuan as currency used in bookkeeping. The combined financial statement of the Company is listed in RMB yuan.

4. Accounting basis and valuation

Accounting is based on the accrual system. Unless otherwise specified, all assets are measured at historical cost.

5. Foreign currency accounting and conversion of financial statements in foreign currency

(1) Foreign currency transaction

Our foreign currency transactions are converted into RMB yuan at the spot exchange rate on the days the transactions occurred; the monetary foreign currency items on the balance sheet date are converted into RMB yuan at the spot exchange rate on the balance sheet date. The exchange gains and losses arising from these translations that occurred in construction preparation, production and operation are taken into financial expenses; those related to the acquisition and construction of fixed asset, oil and gas asset and other assets in line with the capitalization condition are handled according to relevant provisions about borrowing costs; and those occurred in the period of liquidation are taken into liquidation gain or loss.

A non-monetary foreign currency asset measured at historical cost is converted into RMB yuan at the spot exchange rate on the trading day, with its amount in RMB yuan unchanged. A non-monetary foreign currency asset measured at fair value is converted into RMB yuan at the spot exchange rate for the date when the fair value was determined,

with the difference thus caused taken into the current profits and losses as a change in fair value.

(2) Conversion of financial statement in foreign currency

All asset and liability items presented in Foreign Currency Balance Sheet are converted into RMB yuan at spot exchange rate on the balance sheet date; the owner's equity other than "undistributed profit" is converted at spot exchange rate when occurred. Foreign incomes and expenses presented in the Income Statement are converted at the average of reference rates for RMB announced by PBC on a daily basis over the period of time covered by the income statement.

The opening balances of cash and cash equivalents in the Foreign Currency Cash Flow Statement are converted at statement's initial exchange rate; and the closing balances are converted at the spot exchange rate on the balance sheet date. And other items are converted at the arithmetic average of reference rates for RMB announced by PBC on a daily basis over the period of time covered by the cash flow statement. The converted difference of cash flow statement arising from the conversions mentioned above is presented separately in Effect of the Change of Exchange Rate on Cash.

6. Recognition of cash and cash equivalents

The cash presented in the Cash Flow Statement comprises cash in hand and the deposits available for payment from time to time. Cash equivalents presented in the Cash Flow Statement are short-term (mature within three months), highly liquid investments that are readily convertible into cash and almost have no risk of change in value.

7. Financial instruments

Financial instruments include financial assets, financial liabilities and comprehensive income.

(1) Categorization of financial instruments

Financial instruments, based on the purpose of obtaining a financial asset or assuming a financial liability, are categorized into: financial assets at fair value through profit or loss; loans and receivables; available-for-sale financial assets; held-to-maturity investments; and other financial liabilities etc.

(2) Recognition and measurement of financial instruments

a. Financial assets at fair value through profit or loss (financial liabilities)

Financial assets/liabilities are initially recognized at fair value (minus: cash dividends declared but unpaid or interests on bonds due but unpaid), with the transaction costs stated in profit and loss accounts.

Interests or cash dividends from the assets held are recognized as investment income. End-of-period change in fair value is recognized in profit or loss. When disposed, the difference between its fair value and initially recognized amount is recognized as gain/loss on investment, and its gain/loss on changes in fair value is adjusted accordingly.

b. Receivables

Accounts receivable for goods supplied and/or services rendered as well as debts of other enterprises other than debt instruments quoted in active market, including accounts receivable, notes receivable and other receivables, are initially recognized at the contractual amount due from the buyer; a receivable for financing is initially recognized at its present value and measured at amortized cost using the effective interest method; when recovered or disposed, the difference between the price of obtaining such investment and the book value of receivable shall be determined as the income statement.

c. Available-for-sale financial assets

Available-for-sale financial assets are initially recognized at fair value (minus: cash dividends declared but unpaid or interests on bonds due but unpaid) plus the transaction costs. Interests or cash dividends from the assets held are recognized as investment income. End-of-period fair value is measured and the change in fair value is recognized in other comprehensive income. When disposed, the difference between the acquisition cost and the carrying value is recorded as investment income; meanwhile, the accumulative amount of the changes in fair value originally recorded in owner's equity and corresponding to the disposition is recorded into losses from investment.

d. Held-to-maturity investments

Held-to-maturity investments are initially recognized at fair value (minus: interests on bonds due but unpaid) plus the transaction costs. Interests from the assets held are measured at amortized cost using the effective interest method and recorded as investment income. The effective interest rate is determined upon acquisition and remains unchanged in the expected life thereof or a shorter period of time, if applicable. When disposed, the difference between the acquisition cost and the carrying value is recorded into profits from investment.

e. Other financial liabilities

Other financial liabilities are initially recognized at fair value plus the transaction costs and measured at amortized cost. The Company's other financial liabilities include accounts payable, borrowings and notes payable etc.

(3) Recognition and measurement of financial assets transfer

Upon the transfer of a financial asset, if all or a substantial part of the risks and rewards incidental to ownership of the asset are transferred to the transferee, the asset should be derecognized; if all or a substantial part of the risks and rewards incidental to ownership of the asset are retained, the asset should not be derecognized.

To decide whether the transfer of a financial asset will lead to the derecognition of such asset, the "substance over form" principle shall apply. There are two types of asset transfer, i.e. full and partial. When a full asset transfer is eligible for the derecognition of such asset, the difference between the two items listed below should be recorded into profits or losses of the current period:

- a. The carrying value of the financial asset being transferred;
- b. The consideration received for the transfer, plus the accumulative amount of the changes in fair value originally recorded in owner's equity (when the financial asset being transferred falls under the category of available-for-sale financial asset).

(4) Derecognition of financial liabilities

A financial liability should be derecognized in whole or in part when the present obligation is fully or partially discharged; if the Company signs an arrangement with its creditor on replacing an existing financial liability with a new financial liability on the terms and conditions that are substantially different from those of the existing financial liability, the existing financial liability should be derecognized and, at the same time, the new financial liability should be recognized. For an existing financial liability with substantial changes in all or part of its terms and conditions, the existing financial liability should be derecognized in whole or in part and such financial liability should be recognized as a new financial liability on the revised terms and conditions. When a financial liability is derecognized in whole or in part, the difference between the carrying value of financial liability derecognized and the consideration paid (including a non-cash asset being transferred or a new financial liability being assumed) should be recorded into profits or losses of the current period. For a partial repurchase of a financial liability, the carrying value of the financial liability as a whole should be allocated between the derecognized part and the retained part at their relative fair values on the date of such repurchase. The difference between the carrying value of the financial liability derecognized and the consideration paid (including a non-cash asset being transferred or a new financial liability being assumed) should be recorded in profits or losses of the current period.

(5) Offsetting between financial assets and financial liabilities

When both parties to a transaction have a legally enforceable right to set off the financial asset and financial liability and intend to settle the financial asset and financial liability on a net basis or simultaneously, the net amount after offsetting should be presented in the balance sheet.

(6) Difference between financial liabilities and equity instruments as well as related treatment

An equity instrument is any contract that evidences residual interest in the assets of an entity after deducting all of its liabilities. A financial liability is any liability that is a contractual obligation to deliver cash or other financial assets to another entity.

Interest, dividends, gains, and losses relating to a financial instrument classified as a financial liability, as well as gains or losses arising from redemption or refinancing, should be included in the current profit and loss.

The issuance, repurchase, sale and cancellation of a financial instrument classified as an equity instrument should be treated as a change in equity instead of being recognized as a change in the fair value of such equity instrument. Distributions to equity holders should be classified as profit distribution.

(7) Impairment of financial assets and write-off principles

An assessment of carrying value of financial assets, except for financial assets at fair value through profit or loss, is made at the balance sheet date to determine whether there is objective evidence of impairment.

i. Impairment of available-for-sale financial assets

An impairment occurs when there is a substantial decrease in the fair value of an available-for-sale financial asset at the end of the period or the downward trend is expected to continue, after taking into account all the relevant factors. In this case, the cumulative loss on the decrease of fair value that was previously recorded in owner's equity should be recognized as impairment loss.

With respect to an available-for-sale debt instrument with recognized impairment loss, if the fair value has increased in a subsequent period and the increase can be related objectively to an event occurring after the impairment was recognized, the previously recognized loss on impairment should be reversed and recognized in the current profit and loss.

For available-for-sale equity instruments, impairment loss should not be reversed through profit and loss.

ii. Impairment of held-to-maturity investments

Impairment loss on held-to-maturity investments should be measured in the same way as impairment loss on account receivables.

When there is no reasonable expectation of recovering a financial asset, the provision for impairment should be written off and the book value of the financial asset should be written down accordingly. The Company will write off the financial asset, either in whole or in part as it may deem fit.

iii. Impairment of account receivables**A. Reserve for bad debts**

The allowance method is used to calculate bad debts and the provision for bad debts is made at the end of every accounting period and included in the current profit and loss. In the event of conclusive evidence of an account receivable being uncollectible, a loss for the debt in question will be determined and the amount of bad debt written off to the profit and loss account.

B. Recognition standard of bad debts

a. The debtor is declared legally bankrupt or dissolved, with remaining property unable to pay up the account receivable;

b. The debtor is dead or declared legally missing or deceased, with property or heritage unable to pay up the account receivable;

c. In the event of receivables involved in the litigation, there is a court judgment/ruling against the Company, or although such judgment/ruling is in the Company's favor, the execution, as being unenforceable, is suspended and resumption is unlikely;

d. The debtor suffers from huge losses due to the major natural disasters or accidents, with property (including insurance indemnity) unable to pay up the account receivable.

(8) Entrusted loans**a. Valuation of entrusted loans and recognition of interests**

Entrusted loans are accounted for at the actual amount being entrusted. The accrued interest receivable at the end of the reporting period is recorded as investment income. For accrued interest that is due and irrecoverable, the accrual of interest should be stopped and withdrawn.

b. Recognition of and provision for impairment of entrusted loans

A comprehensive review of entrusted loans is conducted at the end of the reporting period. If the result indicates the impairment of entrusted loans, the carrying value of such entrusted loans is written down to its present value of estimated future cash flows, with the amount of impairment recognized in profits or losses of the current period.

8. Inventories**(1) Categories of inventory**

Raw materials, work in progress and semi-finished goods, finished goods, goods sold etc.

(2) Acquisition and sales valuation for inventory

Inventories are carried at the actual cost when acquired, using perpetual inventory method; actual cost of delivered or sold inventories are carried at weighted average.

(3) Amortization of low-value consumption goods and packing materials

Low-value consumption goods and packing materials are amortized using one-off amortization method when they are put into use.

(4) Year-end inventory valuation, impairment recognition and inventory provision

Year-end inventories are carried at the lower of cost and net realizable value. Based on wall-to-wall inventory at the end of the period, provision for inventory write-down is retained at the difference between cost and net realizable value of inventory on the individual item basis in the following circumstances, where the net realizable value is lower than the cost. For inventory of large quantity and low unit price, provision for inventory write-down may be recognized by category. The net realizable value is expected selling price less estimated complete cost, selling cost and related tax.

- a. The market price of inventory continues to fall with no hope of recovery in the foreseeable future;
- b. The product using the raw material is manufactured at a cost higher than the selling price thereof;
- c. The existing raw material fails to meet the needs of new products as a result of product upgrading and the market price of such raw material is lower than its carrying cost;
- d. The goods or services are obsolete or there is a preference-driven change in market needs, resulting in a gradual decline in the market price thereof;
- e. Other circumstances demonstrating a substantial impairment of inventory.

9. Long-term equity investment

(1) Determination of investment costs

For a long-term equity investment obtained through a combination of entities under common control, the carrying value of the owner's equity in the combined entity stated in the ultimate controlling party's consolidated financial statements should be recognized on the combination date as investment cost. For a long-term equity investment obtained through a combination of entities not under common control, the combination cost should be accounted for the cost of the long-term equity investment. For long-term equity investments obtained in a manner other than combination of entities, if a long-term equity investment is obtained through payment of cash, the actual purchase price thus paid should be recognized as initial cost of the long-term equity investment; if a long-term equity investment is obtained through issuing equity securities, the fair value of the equity securities being issued should be recognized as initial cost of investment.

(2) Subsequent measurement and profits & losses recognition

a. Long-term equity investments under cost method

The Company's long-term equity investments in its subsidiaries are accounted for using the cost method. In addition to the cash dividends or profits declared but not yet paid as included in the price or consideration actually paid upon acquisition, the cash dividends or profits that the investee has declared to distribute and the Company's is entitled to are recognized in investment income.

b. Long-term equity investments under equity method

Long-term equity investments in associates and joint ventures are accounted for using the equity method. For the positive difference between the initial cost of investment and the investor's share of the fair values of the investee's net identifiable assets on acquisition of the investment, no adjustment to the initial cost of such long-term equity investment is made; for the negative difference between the initial cost of investment and the investor's share of the fair values of the investee's net identifiable assets on acquisition of the investment, such difference is recorded into profits or losses of the current period.

The investor's share of the net profit/loss and other comprehensive income of the investee is recognized in investment income and other comprehensive income respectively, along with the adjustment to the carrying amount of the long-term equity investment; distributions of profits or cash dividends received from the investee reduce the carrying amount of the investment; adjustments in the carrying amount of the investment for the changes in the owner's equity other than those arising from the investee's net profit or loss, other comprehensive income and profit distribution are necessary and recognized as owner's equity.

c. Disposal of long-term equity investments

For disposal of long-term equity investments, the difference between the carrying amount and the actual purchase price is recorded into profits or losses of the current period. Upon disposal of a long-term equity method investment, all amounts previously recognized in the Company's other comprehensive income in relation to that investment are accounted for on the same basis as would have been required if the investee had directly disposed of the related assets or liabilities. The changes in the owner's equity other than those arising from the investee's net profit or loss, other comprehensive income and profit distribution are transferred to profits or losses of the current period in proportion.

(3) Determination of the basis for joint control and significant influence over the investee

Joint control means the contractually agreed sharing of control of an arrangement which exists only when decisions about the

relevant activities require the unanimous consent of the parties sharing control. A joint venture is a joint arrangement whereby the parties that have joint control of the investee have rights to the net assets of the investee.

Significant influence means the power to participate in the financial and operating policy decisions of the investee but not control or joint control of those policies. For an investor with significant influence over the investee, the investee is considered an associate of the investor.

(4) Depreciation test and provisions for depreciation

At the end of the year, the long-term equity investment is reviewed and the provision for the depreciation of the long-term equity investment is retained against the difference between the recoverable amount and the carrying value. Once the provision for the depreciation of the long-term equity investment is retained, it should not be reversed during subsequent accounting periods.

For non-marketable long-term equity investment, depreciation is likely in the following circumstances:

- a. There is a change in the political or legal environment of the invested business, such as an enactment of or amendment to the tax and trade regulations, that may result in huge losses of the invested business;
- b. The goods or services of the invested business are obsolete or there is a change in market needs, resulting in a serious deterioration in the financial conditions of the invested business;
- c. The invested business has lost its competitive edge due to a major technological change etc. in the sector, resulting in a serious deterioration in the financial conditions of the invested business such as clean-up or liquidation;
- d. Other circumstances demonstrating a substantial failure of the invested business to generate economic benefits for the Company.

10. Government subsidies

(1) Types of government subsidies

Government subsidies comprise mainly of treasury funding, interest subsidies, tax rebates and free allocation of non-monetary assets etc.

(2) Acknowledgment of government subsidies

The Company has acknowledged government subsidies that it is eligible for and granted.

Asset-related governmental subsidies are recognized as asset and deferred income when received, and contributed averagely to gains/losses of the period against the expected useful life of such asset. For a disposal upon or before end of the useful life of such asset, the un-contributed deferred income is carried into gains/losses of the period.

Income-related governmental subsidy used to recover related expenses or losses in the subsequent period is recognized upon

receiving as deferred income, and is taken into the income statement of the period in which the related expenses is recognized; those used to recover related expenses and losses occurred in this period are directly recognized upon receiving as the gains/losses of the current period.

For those that are confirmed to be returned by governmental subsidy, involve with related deferred income or write down the book balance of deferred income, and the exceeding portion is taken into the gains/losses of the current period; those that do not involve with related deferred income are directly recognized upon receiving as the gains/losses of the current period.

(3) Measurement of government subsidies

Government subsidies in the form of monetary assets are measured at the amounts received or receivable.

Government subsidies in the form of non-monetary assets are measured at fair value, and in the case of inability to determine fair value reliably, measured at the nominal amount, which is RMB 1.

11. Deferred tax assets and deferred tax liabilities

Deferred tax assets and deferred tax liabilities are recognized at (temporary) difference between the carrying value of an asset or liability and the tax base of such asset or liability. Deductible losses and tax credits that are carried forward to reduce taxable income in future years under the tax provisions are deemed temporary differences and accounted for deferred tax assets. Deferred tax assets and deferred asset liabilities as of the balance sheet date are measured at the applicable rate for the period when such assets or liabilities are estimated to be recovered or settled.

Deferred tax assets are limited to the taxable income that is likely to be obtained to reduce temporary differences, deductible losses and tax credits. For recognized deferred tax assets, when it is unlikely to obtain sufficient taxable income to offset against deferred tax assets by the future period, a write-down of the carrying amount of deferred tax assets is necessary. If it is likely to obtain sufficient taxable income, the write-down amount should be reversed.

Deferred tax assets and deferred tax liabilities are presented on a net basis, provided that the following conditions are satisfied:

- (1) Deferred tax assets and deferred tax liabilities are related to the income tax imposed by the same taxing authority on the same entity in the Company.
- (2) Such entity in the Company has the legal right to offset current tax assets against current tax liabilities.

B. Main Taxes

1. Corporate income tax

The rate of corporate income tax applicable to the Company is 15% or 25%. In accordance with the *Directive on Tax Policy Issues in Relation to the Further Implementation of the Western China Development Strategy* announced by the Ministry of Finance, the General Administration of Customs and the State Administration of Taxation, business establishments in the industries encouraged to develop in the western region are entitled to a reduced corporate income tax rate of 15%. This preferential rate of 15% is applicable to the calculation and payment of corporate income tax of some of the Company's branches and subsidiaries located in western China.

2. Value added tax

The value added tax rate is 17% for petroleum and petrochemical products and 13% for natural gas and LNG. Value added tax rates of 11% and 6% are applicable to some of the Company's pipeline transportation service and R&D technology services respectively.

3. Business tax and its VAT

The business tax rate was 3% for construction, and 5% for oil and gas transportation services, finance and insurance, service industry, transfer of intangible assets and real estate sales before May 1, 2016. In accordance with the Directive CS [2016] No. 36 announced by the Ministry of Finance and the General Administration of Taxation, the replacement of business tax with value-added tax has become applicable to all business tax payers nationwide since May 1, 2016.

In accordance with the announcement made by the Ministry of Finance and the General Administration of Taxation to replace business tax with VAT comprehensively (CS [2016] No. 36), the State Council decided to implement the pilot program for the conversion of business tax to VAT nationwide, starting from May 1, 2016. The Company's leasing services for tangible movables are taxed at a rate of 17%; transportation services, postal services, construction services, real estate leasing services, sales of real estate at a rate of 11%; modern services (leasing services for tangible movables not included) at a rate of 6%; other taxable services as defined by the Ministry of Finance and the General Administration of Taxation at a rate of 0%.

4. Surtaxes and surcharges

The urban maintenance and construction tax rate is 1%, 5% or 7% of the amounts actually paid for business tax, value added tax and excise tax. The rate of education surcharge is 3% of the amounts actually paid for business tax, value added tax and excise tax.

5. Excise tax

In accordance with the *Directive on Continued Increase of Excise Tax on Oil Products* (CS [2015] No.11) announced by the Ministry of Finance and the State Administration of Taxation, the per unit excise tax has increased since January 13, 2015 from RMB 1.40 per liter to RMB 1.52 per liter for gasoline, naphtha, solvent oils and lubricants, and from RMB 1.10 per liter to RMB 1.20 per liter for diesel and fuel oils. A suspension of excise tax remains unchanged for jet kerosene. In accordance with the *Directive on Excise Tax Exemption for Oil Consumption in the Production of Oil Products* announced by the Ministry of Finance and the State Administration of Taxation, the Company has been exempt from excise tax since January 1, 2009 on self-provided refined oils used as fuel, power and raw materials to produce oil products.

6. Resources tax

The resources tax rate is 6%, based on crude oil and natural gas sales.

7. Mineral resources compensation fee

The tax rate is 0%, based on oil and natural gas sales.

8. Special oil gain levy

The special oil gain levy is based on excess sales revenue from domestic crude oil prices exceeding the threshold of USD 65 per barrel and imposed at the five-level progressive ad valorem rates between 20% and 40%.

9. Personal income tax

The employees are responsible for their own income tax, which is withheld and remitted by the Company.

Major Events

January

January 7 CNPC and China FAW Group Corporation (FAW) signed a strategic cooperation agreement to bolster collaboration in member services, marketing, lubricant R&D, internet car and new energy automobiles.

January 11 CNPC and China Aerospace Science and Technology Corporation (CASC) signed a strategic cooperation agreement. The two sides will collaborate in development of internet of things in oil and gas-related energy saving and environmental protection, oil and gas production and engineering technology, and in emergency communication, and enterprise informatization. CNPC and CASC will also reinforce the exchanges of key technologies, promote product R&D and industrial upgrading, and step up joint efforts in talent cultivation and information sharing.

January 25 The Chuandongbei Gas Project, a natural gas E&P project between CNPC and Chevron, became operational. Covering an area of 876 square kilometers and spanning Sichuan and Chongqing, the project is one of the largest onshore natural gas cooperation projects in China.



January 25

March

March 10 CNPC and Alibaba Group signed a strategic cooperation framework agreement. The two sides will deepen cooperation in AliCloud, electronic map, internet car, Tmall.com, and Cainiao logistics, as well as in CNPC's Pocket Business Hall, internet payment, electronic refueling card, internet finance, member service, reward point systems, and co-marketing etc. CNPC and Alibaba Group had already made progress in jointly promoting the use of Alipay in mobile top-up and payment applications.

March 14 CNPC and China Oil & Foodstuffs Corporation (COFCO) inked a strategic cooperation framework agreement. The two companies will carry out comprehensive cooperation in products & commodity, marketing, membership communication, public welfare, and new business areas. Furthermore, CNPC and COFCO will promote O2O cooperation via the internet platform, in order to integrate the marketing channels, enrich commodity combinations, share customer resources, and improve the consumption experiences. The two companies had already launched pilot projects for promoting COFCO's grain and oil products in CNPC's service stations in Beijing, Tianjin, Hebei, Shandong, and Henan, and achieved remarkable results.

March 20 CNPC and Total signed a strategic cooperation framework agreement. The two sides will join hands in oil and gas investment and technological R&D, and strengthen communication and cooperation in corporate management, cultural innovation and corporate social responsibility.



March 20



March 31

March 31 CNPC and BP signed the Neijiang-Dazu Shale Gas production sharing contract (PSC). The contract covers an area of approximately 1,500 square kilometers, with CNPC acting as operator of the project.

April

April 13 The North Azadegan project in Iran went on stream. Located in southwestern Iran, the project has a capacity of producing 4 million tons of crude oil per year and 700,000 cubic meters of natural gas per day.



April 13

May

May 10 A hydrocarbon recovery project was kicked off at Tarim Oilfield to extract low-density hydrocarbon liquids from gas condensate reservoirs. Tarim Oilfield and the government of Bayingol Mongolian Autonomous Prefecture hold a 90% stake and a 10% stake in the project respectively. Scheduled to be completed in the first half of 2017, the project is expected to process 10 billion cubic meters of natural gas and produce 380,000 tons of LPG and 70,000 tons of 1# stabilized liquid hydrocarbon annually.

May 18 CNPC signed a cooperation framework agreement with Mozambique's national oil and gas company ENH. Under the agreement, the two sides will ramp up collaborative efforts in oil and gas exploration and production, and natural gas processing and marketing. Specifically, CNPC will participate in Mozambique's E&P projects, promote cooperation in oil & gas field services, and train technicians and managerial talents for Mozambique's oil industry.



May 10

May 21 The Zhongwei-Jingbian connecting line of the Third West-East Gas Pipeline started construction. Running 377 kilometers from Zhongwei Compressor Station in Ningxia to Jingbian Station in Shaanxi, the pipeline section is designed to deliver 30 billion cubic meters of natural gas per year, and is expected to start operation in 2017.



May 21

June

June 13 CNPC and China National Machinery Industry Corporation (Sinomach) signed a strategic cooperation framework agreement. The two sides will give play to their strengths and collaborate in equipment manufacturing, engineering construction, oil products supply, overseas business expansion, capital operation and financial services.

June 25 CNPC and Gazprom signed an MOU on promoting cooperation in underground gas storage and gas power generation projects in China. Under the MOU, CNPC and Gazprom will push ahead with the underground gas storage and gas power generation projects and explore a wider range of cooperation opportunities.

July

July 20 The Second Russia-China Crude Pipeline started construction in Jiagedaqi, Heilongjiang. The pipeline starts from the Initial Station in Mohe, Heilongjiang, goes across Heilongjiang and Inner Mongolia, and ends at Linyuan Station in Daqing, Heilongjiang. With a total length of 951 kilometers and designed deliverability of 15 million tons per year, the pipeline will run parallel with Russia-China Crude Pipeline which has already become operational.

July 30 Construction commenced at the Fourth Shaanxi-Beijing Gas Pipeline in Ulanqab, Inner Mongolia. The pipeline includes a trunk line and three branches. The trunk line will start from the initial station in Jingbian, Shaanxi, go across Inner Mongolia and Hebei, and end at Gaoliying terminal station in Beijing. For the first phase of the project, the trunk line and a branch covering a total mileage of 1,114 kilometers will be built.



July 30

November

November 7 CNPC and Gazprom signed an agreement to cooperate in mutual recognition of standards and conformity assessment results and an MOU to explore the opportunities for cooperation in the NGV sector, in a bid to bring the two companies' collaboration in standardization and NGV to a higher level.

November 17 CNPC and PDVSA signed a memorandum on cooperation project progress between the two companies.

November 20 CNPC and Peru's Ministry of Energy and Mines signed an MOU on deepening oil and gas cooperation. The two sides will step up joint efforts in E&P, refining, construction of transportation and distribution infrastructure, natural gas transportation and downstream utilization, and R&D.



November 20

December

December 1 The first phase of the MacKay River Oil Sands Project became operational. Located in northern Alberta, the project is expected to produce 35,000 barrels a day upon completion of the first phase.

December 12 The eastern section of the Third West-East Gas Pipeline went on stream. Started in August 2013 with a total length of 817 kilometers, the pipeline section runs from Ji'an in Jiangxi to Fuzhou in Fujian.

December 16 CNPC Capital Company Limited was incorporated to provide CNPC with a platform for integrated financial operations, financial and equity investment, financial asset management and monitoring and financial risk management.



December 12

Glossary

Proven reserves

According to China National Standards, proven reserves are estimated quantities of mineral deposits. They can be recovered from reservoirs proved by appraisal drilling during the period of reservoir evaluation, with a reasonable certainty or a relative difference of no more than 20%.

Oil equivalent

Oil equivalent is the conversion coefficient by which the output of natural gas is converted to that of crude oil by calorific value. In this report, the coefficient is 1,255, i.e. 1,255 cubic meters of natural gas, is equivalent to one metric ton of crude oil.

Recovery rate

The percentage of oil/gas in place that is recoverable from underground.

Decline rate

A decline in production occurs in an oil or gas field that has been producing for a certain period of time. The natural decline rate is defined as the negative relative change of production over a period of time, without taking into account an increase in production resulting from EOR (enhanced oil recovery) techniques. The general decline rate is defined as the rate of decline in the actual production of such an oil or gas field, taking into account an increase in production from the new wells and EOR techniques.

Water injection

The pressure of the reservoirs continues to drop after the oilfield has been producing for a certain period of time. Water injection refers to the method where water is injected back into the reservoir through the water injection wells to raise and maintain the pressure, increase oil recovery, and thereby stimulate production.

Tertiary recovery

Tertiary recovery is also called enhanced oil recovery and is abbreviated as EOR. It is a method to increase the recovery of crude oil by injecting fluid or heat to physically or chemically alter the oil viscosity or the interfacial tension between the oil and another medium in the

formation, in order to displace any discontinuous or hard-to-tap oil in reservoirs. EOR methods mainly include thermal recovery, chemical flooding and miscible flooding.

Polymer flooding

This is an EOR method by which a polymer solution is used as the agent to displace oil. Polymer is injected to increase the viscosity of formation water, changing the oil/water viscosity ratio and reducing the difference between water flowability and oil flowability in the formation. This will increase the swept volume of water flooding and thereby the oil displacement efficiency.

ASP flooding

A flooding system is prepared with alkali, surfactant and polymer. It not only has a high viscosity but also can create ultra-low water-oil interfacial tension to improve the oil-washing capability.

LNG

Liquid Natural Gas is produced by dewatering, deacidifying, dehydrating and fractionating the natural gas produced from a gas field and then turning it into liquid under low temperatures and high pressure.

Horizontal well

A class of nonvertical wells where the wellbore axis is near horizontal (within approximately 10 degrees of the horizontal), or fluctuating above and below 90 degrees deviation. A horizontal well may produce at rates several times greater than a vertical well, enhance recovery efficiency and prolong the production cycle, due to the increased wellbore surface area within the producing interval. Meanwhile, the environmental costs or land use problems that may pertain in some situations, such as the aggregate surface "footprint" of an oil or gas recovery operation, can be reduced by the use of horizontal wells.

EPC

Under an EPC contract, the contractor carries the project risk for quality assurance, safety, schedule and budget within the scope of work, i.e. engineering, procurement and construction.

PMC

Under a Project Management Contract (PMC), the contractor is authorized by the project owner to be responsible for managing the whole process comprising project planning, project definition, bidding, EPC contractor selection, project design, procurement and construction.

HSE management system

The HSE management system provides a framework for managing all aspects of health, safety and the environment. It is defined as the company structure, responsibilities, practices, procedures, processes and resources for implementing health, safety and environmental management.

Occupational diseases

A disease or ailment caused due to excessive exposure to noxious fumes or substances in a working environment.

Internet +

China's Internet Plus action plan refers to the application of the internet and other information technology in conventional industries. It is an incomplete equation where various internets (mobile Internet, cloud computing, big data or Internet of Things) can be added to other fields, fostering new industries and business development in China.

VOCs

Volatile organic compounds (VOCs) refer to organic compounds with saturated vapor pressure over 70Pa under room temperature, and boiling point below 260°C under atmospheric pressure. VOCs also refer to all organic compounds that easily evaporate at temperature of 20°C and vapor pressure of 10Pa or higher.

About this Report

In this report, the expressions "CNPC", "the corporation", and "the company" are used for convenience where references are made to China National Petroleum Corporation in general. Likewise, the words "we", "us" and "our" are also used to refer to China National Petroleum Corporation in general or to those who work for it.

This report is presented in Chinese, English, Russian, Spanish, and French. In case there is any divergence of interpretation, the Chinese text shall prevail.

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