Annual Business Overview

In the past year, the Company maintained a focus on oil and gas operations and leveraged its integrated business approach to ensure fast and steady growth in production and revenue, with key business indicators within expectations and operating results remaining robust as a whole.
Exploration and Production

In 2012, we continued to strengthen oil and gas operations and maintained steady growth in proven reserves and production. A number of important discoveries were made in China’s major petroliferous basins, heralding a boom in reserve growth. Meanwhile, oil and gas production grew steadily in our main oil and gas fields.

Exploration

In 2012, our domestic exploration resulted in newly proven oil and gas in place of 711 million tons and 450.4 billion cubic meters respectively, and proven oil and gas reserves exceeding 1 billion tons of oil equivalent for the sixth consecutive year. A large part of the newly proven reserves are entrapped in low-permeability, lithologic, low-abundance and medium-to-deep reservoirs, which however, are relatively producible thanks to formation integrity, massive scale and certainty of reserves. The reserve replacement ratio remained above 100%.

Major Discoveries

New exploration breakthroughs were made in the Tarim, Sichuan, Ordos, Junggar and Qaidam basins, including a major natural gas discovery in Kuqa Depression of Tarim Basin, new progress in carbonatite exploration in Tadong, an enriched gas accumulation identified in the Cambrian strata in Sichuan Basin, tight oil discoveries in Junggar Basin, favorable prospects in Liahe Depression of the Bohai Bay Basin, and new developments in lithologic reservoir exploration in Fushan Depression of the Beibu Gulf Basin.

In addition, we made 14 major achievements in Jiyuan and Huaqing of the Ordos Basin, Keshen and Tabei of the Tarim Basin, Lukeqin of the Turpan-Hami Basin and Mabei Slope of the Junggar Basin.

<table>
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<tr>
<th>Reserves and operating data (Domestic)</th>
<th>2010</th>
<th>2011</th>
<th>2012</th>
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<tbody>
<tr>
<td>Newly proven oil in place (mmt)</td>
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<td>Newly proven gas in place (bcm)</td>
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<td>Appraisal wells</td>
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<td>774</td>
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Development and Production

In 2012, our domestic oil and gas production was steady and balanced. With a focus on key capacity expansion projects, innovative techniques and processes such as multi-stage fracturing of horizontal wells were widely used to boost per-well flow rates and economic benefits.

We achieved production capacity increments of 16.16 million tons for crude oil and 15.11 billion cubic meters for natural gas. Throughout the year, we produced 173.97 million tons of oil equivalent, up 3.7% year-on-year.

Crude Oil

In 2012, we continued to promote finely controlled water injection, take a series of measures to enhance per-well output at matured fields and boost production growth at new fields. The full-year domestic crude output reached 110.33 million tons, 2.6% higher than the previous year.

Daqing Oilfield maintained steady production at 40 million tons for 10 consecutive years through finely controlled water injection and efficient polymer flooding. Both the natural decline rate and the composite decline rate of water flooding decreased by 2% from the 2009 levels. Production by tertiary recovery, mainly polymer flooding, accounted for about one-third of the field’s total output. At Changqing Oilfield, an integrated approach was used in the exploration and development of Sulige Gas Field and ultra-low permeability oil reservoirs, boosting full-year oil and gas production to 45.74 million tons of oil equivalent.

Waterflood Control Campaign

To enhance the oil recovery of mature fields, CNPC continued to implement a comprehensive development approach based on finely controlled water injection since 2009. By introducing separate layer waterflood, adjusting the development well pattern and carrying out pilot tests in key blocks, the production structure was further optimized, with more reserves being producible and maturing wells accounting for a greater share of the total output. In 2012, the natural decline rate of our mature fields was 0.35% lower year-on-year, with the rise in water cut less than 0.5% and waterflood-enabled producing reserves accounting for more than 80% of the Company’s total production.

Daqing Oilfield continued to unlock potential oil production through finely controlled water injection, keeping the natural decline rate and the composite decline rate of its major field at Changyuan at 5.41% and 2.86% respectively. At Liaohe Oilfield, the temperature of injected water was adjusted and combined water-gas/chemical agent injection was adopted, depending on fault block types, hydrocarbon properties and reservoir characteristics. As a result, 35 waterflooded blocks in the field saw enhanced oil displacement efficiency and 6.5% higher thin oil production than the previous year.

Development of Ultra-low Permeability Reservoirs

In 2012, Changqing Oilfield produced 7 million tons of crude oil from ultra-low permeability reservoirs which accounted for nearly one-third of its total crude production. At Jilin Oilfield, with ultra-low permeability formations becoming major pay zones, the Daqingzijing Block was selected to be a demonstration project where maturing well reviews and horizontal drilling were deployed, identifying significant reserves. Meanwhile, SRV-based horizontal fracturing was successfully used in the Qianbei-Putaohua Block, leading to an obvious increase in the production rate.

Heavy Oil Production

A range of heavy oil development projects were carried out at Xinjiang, Liaohe and Tuha oilfields, with progress achieved in technological R&D and production capacity building. Fengcheng Oilfield, located at the northwestern edge of the Junggar Basin, has the largest uncompartmentalized heavy oil reservoir in China. SAGD and pilot fireflood have been conducted there since 2005, resulting in a number of innovative technologies such as electric ignition, air injection and fireflood yield monitoring, as well as some matching techniques. In 2012, Fengcheng Oilfield achieved capacity growth amounting to 1.63 million tons. Fireflood was also successfully used at Liaohe Oilfield, tripling its heavy oil production compared with the conventional approach. In particular, seven well groups under a pilot fireflood test saw a surge in daily yield from 16 tons to more than 100 tons.

Pilot Development

We launched a number of research programs and pilot tests to enhance development efficiency in high water cut, low permeability and heavy oil reservoirs. In 2012, EOR methods for mature fields were studied and tested at Daqing, Xinjiang and Liaohe oilfields, gaining satisfactory results. Polymer flooding test in Qidong-1 Block of Xinjiang Oilfield resulted in 12% growth in recovery efficiency, making it ready for commercial application.

ASP flooding methods were tested at Daqing Oilfield. In particular, strong-base ASP flooding showed a 19% increase in its recovery factor while weak-base ASP flooding showed a 24% increase in its recovery factor, providing an important replacement technology to maintain stable production at
Changyuan Oilfield. Meanwhile, polymer-surfactant flooding methods were tested at Jin-16 Block of Liaohe Oilfield, raising the daily output 2.7 times and reducing the total water cut by 7.2%, marking the successful utilization of a non-alkaline flooding system in developing fields with a high water-cut and a high recovery percent of reserves.

Natural Gas

In 2012, our domestic natural gas production reached 79.86 billion cubic meters, up 5.6% year-on-year. Changqing produced 29 billion cubic meters of natural gas. In particular, Sulige Gas Field achieved a daily output of 49.7 million cubic meters, with an annual production of up to 21 billion cubic meters. Tarim Oilfield produced 19.3 billion cubic meters of natural gas, ensuring a reliable source of supply for the West-East Gas Pipelines. Southwest Oil and Gas Field took measures to boost the production capacity of new blocks, yielding 13.2 billion cubic meters throughout the year.

Phase III Project of Changling Gas Field

As part of the Jilin Oilfield, Changling Gas Field is the first CNPC operated high-CO₂ gas field in China. The gas field has been developed in three phases. The first and second phase projects became operational in 2009 and 2010 respectively. In October 2012, the third phase project, mainly including gathering systems, processing installations, auxiliary facilities, and public utilities, was put into operation. Consequently, Changling Gas Field is capable of processing 2 billion cubic meters of natural gas on a yearly basis to support natural gas consumption in Jilin.

Exploration and Development of Unconventional Oil and Gas

CNPC attaches great importance to the exploration and development of CBM, shale gas, tight gas and other unconventional hydrocarbon resources. We continue to push ahead with the construction of CBM industrial bases, speed up shale gas demonstration projects, and promote the development of tight sandstone gas.

CBM

Our CBM production capacity continued to grow in Qinshui Basin and the eastern edge of Ordos Basin. In 2012, we newly proved 78.8 billion cubic meters of CBM in place, built an additional 1.35 billion cubic meters of production capacity, and supplied 600 million cubic meters of commercial CBM, an increase of 42.9% year-on-year.

Important progress was made in building CBM production capacity. A 0.9bcm/a project went on stream in Zhengzhou Block of Qinshui Basin. Mass CBM reserves were identified in the Baode Block, with the thickness of major coal seams larger than 11 meters.

Shale Gas

In 2012, we continued our efforts in the R&D and application of new technologies for shale gas exploration and development, and achieved breakthroughs in resource evaluation and SRV-based horizontal fracturing, facilitating the building of two shale gas demonstration zones at Weiyuan-Changning in Sichuan and Zhaotong in Yunnan respectively.

Throughout the year, nine vertical wells and two horizontal wells were drilled, with fracturing operations being conducted in seven of them, yielding 17.25 million cubic meters of commercial shale gas. Several wells at the Weiyuan-Changning Block obtained high yields. In particular, Well Ning 201-H1 produced at a daily rate of 150,000 cubic meters, showing the promising prospects of this block.
Joint Exploration and Development in China

As authorized by the Chinese government, CNPC works with international partners to explore and develop oil and gas resources in China. Most of the joint projects concern 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 2012, we had 35 joint exploration and development projects in operation, including 15 conventional crude oil projects, 10 conventional gas projects and 10 CBM projects. In addition, two joint evaluation agreements are currently in effect. These projects produced 4.11 million tons of crude oil and 4.22 billion cubic meters of natural gas, which totaled 7.47 million tons of oil equivalent, up 6.3% year-on-year.

Executive Summary of Major Projects

Changbei Natural Gas Project
Changbei Block is located in the Ordos Basin, covering an area of 1,691 square kilometers. Shell Group is our partner and the operator of the project. In 2012, the project was running smoothly, producing 3.55 billion cubic meters of natural gas from 33 horizontal wells, of which 20 wells had a daily flow rate above 1 million cubic meters during the initial stage.

Zhaodong Oilfield Project
Zhaodong Block is located in the tidal and shallow water zone of the Bohai Bay Basin, covering an area of 77 square kilometers. Australia’s Roc Oil (Bohai) is our partner and the operator of the project. In 2012, the block produced 1.04 million tons of crude oil, with the annual output exceeding 1 million tons for the ninth consecutive year. Since its start, the project has produced more than 10 million tons of crude oil and 77 million cubic meters of natural gas.

South Sulige Natural Gas Project
South Sulige Block is located in the Ordos Basin, covering an area of 2,392 square kilometers. Total is our partner in the project and CNPC is the operator. In 2012, favorable results were achieved in the preparation for development, as evidenced by satisfactory per-well output obtained during the production test.

Jinqiu Natural Gas Project
Jinqiu Block covers an area of 4,068 square kilometers in the Sichuan Basin. Shell Group is our partner and the operator of the project. In 2012, 14 wells were drilled and 11 were completed at this block, showing favorable potential for tight gas development.

Fushun-Yongchuan Shale Gas Project
Fushun-Yongchuan Block covers an area of 3,500 square kilometers in the Sichuan Basin. Shell Group is our partner and the operator of the project. In 2012, commercial shale gas flows were obtained from four horizontal wells at the block, showing a promising resource potential. In particular, Well Yang 201-H2, completed at a depth of 4,544m, produced at a daily rate of 430,000 cubic meters at the initial stage of production test, making it China’s most productive shale gas well.
Natural Gas and Pipelines

In 2012, our natural gas operations and sales revenues continued to grow. The trunk and eight branches of the Second West-East Gas Pipeline became operational and a diversified-source, well distributed and centralized controlled nationwide pipeline network has taken shape, further enhancing our market deliverability. We sold 97.3 billion cubic meters of natural gas in 2012.

By the end of 2012, we operated 66,801 kilometers of pipeline in China, including 16,369 kilometers for crude oil, 40,995 kilometers for natural gas, and 9,437 kilometers for refined products, about 67%, 77%, and 48% of China’s total respectively.

Operation and Control

In 2012, based on the principle of “operating in a stable, balanced, efficient and controlled manner”, our pipeline operations were further optimized through centralized management, coordinated resource configuration and balanced allocation. PetroChina Southwest Pipeline Company was established to take charge of pipeline operation and pipeline gas and refined product distribution in Southwest China.

Collective measures were taken to ensure stable gas supply to the domestic market, especially in key regions and during peak seasons, including boosting gas production in major gas fields, importing more pipeline gas, and increasing LNG purchases.

Underground Gas Storages

In 2012, we extracted more gas from our underground gas storages in Dagang, Huabei and Jintan to meet the needs of seasonal/daily peak shaving.

The main underground facilities of the Shuang-6 gas storage were completed at Liaohe Oilfield. The gas storage is expected to be completed in 2013 and will deliver natural gas to the Qinhuangdao-Shenyang pipeline and the Dalian-Shenyang pipeline during the peak period. Xiangguosi gas storage is ready for gas injection and is expected to become operational by the end of 2013.

Storage and Transportation Facilities

In 2012, we commenced the construction of the Third West-East Gas Pipeline and the Jinzhou-Zhengzhou Refined Product Pipeline. A number of pipeline projects were completed and became operational, including the Second West-East Gas Pipeline, Shandong Gas Pipeline Network, Changqing-Hohhot Crude Pipeline, Dushanzi-Urumqi Crude Pipeline, Rizhao-Dongming Crude Pipeline, and Fengcheng Heavy Oil Pipeline in Xinjiang.

The Second West-East Gas Pipeline

The Second West-East Gas Pipeline, comprising one trunk and eight branches in a total length of 8,704 kilometers, runs from Horgos in Xinjiang—where it joins the Central Asia-China Gas Pipeline—to Shanghai in East China and Guangzhou and Hong Kong in South China. The project was divided into two parts, i.e. the 2,461km-long western section from Horgos to Zhongwei which became operational in December 2009, and the 2,517km-long eastern section from Zhongwei to Guangzhou which went on stream in June 2011.

The pipeline was fully operational at the end of 2012, connecting with more than 20 inland and cross-border pipelines to form a 40,000km-long pipeline network with gas supply covering 28 provinces, municipalities and autonomous regions, as well as Hong Kong SAR.

The Third West-East Gas Pipeline

The Third West-East Gas Pipeline, including one trunk and eight branches, will run from Horgos in Xinjiang to Fuzhou in Fujian via Zhongwei in Ningxia, with a total length of 7,378 kilometers. As part of the project, three gas storages and one LNG station will be built. The 5,220km-long trunk line has a designed pipe diameter of 1,016-1,219 mm, pipe pressure of 10-12 MPa and an annual delivery capacity of 30 billion cubic meters.

Launched in October 2012, the project is divided into three parts, i.e. the western section from Horgos to Zhongwei, the central section from Zhongwei to Ji’an in Jiangxi and the eastern section from Ji’an to Fuzhou. The three sections are expected to be operational at the end of 2013, by 2015 and 2014 respectively.
Established by the Pipeline Systems Division of ASME in 2005, the "Global Pipeline Award" is presented annually to the organization that has been responsible for the most outstanding innovations and technological advances in the field of pipeline engineering for that year. At the International Pipeline Conference 2012, PetroChina Pipeline Company won the GPA for the "Application of Inline Inspection Technology and Feature Assessment for Spiral Weld Defects in Pipeline Integrity Management", making PetroChina the first GPA winner from Asia’s pipeline transportation sector.

"Application of Inline Inspection Technology and Feature Assessment for Spiral Weld Defects in Pipeline Integrity Management" provides an innovative approach to detect and characterize spiral weld flaws such as lack of fusion and incomplete welds, and enables the assessment of the size and impact of weld defects. Successfully used in a number of pipelines including the Tieling-Qinhuangdao Pipeline and the Qinhuangdao-Beijing Pipeline for the inspection and assessment of spiral weld defects, the technology will be introduced into the integrity management system of new pipelines.
Natural gas Utilization and Marketing

In 2012, we maintained strong momentum in natural gas market development. The eastern section of the Second West-East Gas Pipeline and the Shandong Natural Gas Pipeline Network started to deliver natural gas to 33 new users. The Company expanded its gas distribution reach to Guangxi and Hong Kong, with its pipeline network covering 29 provinces, municipalities and autonomous regions. Throughout the year, we sold 97.3 billion cubic meters of natural gas, an increase of 17.7% year-on-year.

Our natural gas utilization business was managed in a more professional and regulated manner with a focus on market coverage and growth efficiency. The Company enjoyed a rising share of the urban gas market and the CNG market, seeing a shift in market development from extensive management to economies of scale. Urban gas distribution networks were constructed and operated through cooperation with local enterprises to receive natural gas supplied by trunk pipelines. The urban gas distribution network projects in Yunnan, Hunan, Guangdong, Liaoning and Tianjin were well underway.

Liquefied Natural Gas (LNG)

In 2012, the LNG terminals in Jiangsu and Dalian maintained steady operation, playing an effective role in peak shaving and providing emergency supplies. Significant progress was made in expanding the LNG market and substantial advancement was made in the “substitution of natural gas for oil” program.

LNG projects

Jiangsu LNG Project

The project includes a dedicated dock, receiving terminals and a sea-crossing pipeline for unloading, storage and regasification of imported LNG which will then be supplied to the Yangtze River Delta and the neighboring areas through pipelines and LNG tank trucks. Phase-I has an annual receiving capacity of 3.5 million tons and an annual gas delivery capacity of 4.8 billion cubic meters. Since becoming commercially operational in November 2011, the phase-I project has unloaded 3.5 million tons of LNG and delivered 4.86 billion cubic meters of natural gas, playing an important role in supporting energy supply in the Yangtze River Delta region.

Dalian LNG Project

Phase-I of the project has an annual receiving capacity of 3 million tons and a gas delivery capacity of 4.2 billion cubic meters per year. The LNG terminal is connected to the Northeast Natural Gas Pipeline Network to deliver natural gas to users in Northeast China. Becoming operational in December 2011, the phase-I project unloaded 1.5 million tons of LNG and delivered 1.93 billion cubic meters of natural gas in 2012.

LNG Marketing

To support the “substitution of natural gas for oil” program, we have taken a series of initiatives to expand the LNG customer base and push forward a number of LNG plant projects in Shandong, Shaanxi and Hubei provinces. In particular, the Ansai project in Shaanxi is in operation as China’s largest natural gas liquefaction plant. Meanwhile, we work in partnership with local enterprises in Beijing, Jilin and Chongqing to promote the use of LNG as a fuel for cars and vessels. In addition, we have made remarkable progress in the building of LNG filling stations.
Refining and Chemicals

In 2012, in response to market changes and in line with the growth efficiency principle, we continued to lead in the yields of light oil, ethylene and diene by optimizing resource allocation and our product portfolio, enhancing production management and maintaining balanced and steady operations.

In China, we processed 147.16 million tons of crude oil and produced 96.38 million tons of refined products, up 1.6% and 3.6% year-on-year respectively. Refining technologies were further improved to upgrade the quality of our oil products. As a result, there was a significant year-on-year increase in the output of high-grade gasoline and jet fuel, taking our product offerings to the next level.

We also stepped up marketing efforts for chemicals. The stock level was reduced through optimizing production plans, expanding exports and promoting specialty products. The amount of major marketable chemicals reached 22.64 million tons, up 8.6% year-on-year. In particular, ethylene output was 3.69 million tons.

Construction of Large Refining Bases

In 2012, our major refining and chemical projects were pushed forward steadily with an improved structure and distribution. The 10Mt/a refining +1Mt/a ethylene project at Fushun Petrochemical, the 5Mt/a refinery expansion and upgrading project at Hohhot Petrochemical and the 1.2Mt/a ethylene expansion and upgrading project at Daqing Petrochemical went on stream as scheduled. A number of petrochemical projects also became operational, including the 300kt/a polypropylene plant (Phase-II) at Daqing Refinery, the 400kt/a ABS plant (Phase-I) and 320kt/a styrene plant at Jilin Petrochemical, the diesel hydrogenation unit and delayed coking unit at Karamay Petrochemical, the continuous reforming unit at Liaohe Petrochemical and the delayed coking unit at Jinzhou Petrochemical. In addition, construction started at the Guangdong petrochemical project, a Sino-Venezuelan joint venture. The integrated refining/petrochemical complex at Sichuan Petrochemical was basically completed. The sour crude oil processing plant at Guangxi Petrochemical, the 10Mt/a refining plant at Huabei Petrochemical and a number of high-grade gasoline projects, including one at Jinxin Petrochemical, were well underway.

Guangdong Petrochemical’s 20Mt/a Heavy Oil Processing Project

The project is a joint venture between CNPC and PDVSA of Venezuela. Managed and operated under a shareholding system, the project represents the first downstream project under the integrated energy cooperation agreement between China and Venezuela.

Launched in April 2012, the project is expected to be fully operational by the end of 2014. CNPC’s proprietary delayed coking technology will be used to process extra heavy oil from Venezuela. The produced gasoline, diesel fuel and jet fuel products will be in compliance with the Euro IV emission standards, or even the Euro V standards. After its completion, there will be an integrated refining/petrochemical complex in East Guangdong to form a complete petrochemical business chain.
Fushun Petrochemical’s 10Mt/a Refining+1Mt/a Ethylene Project

The project comprises eight production units and auxiliary utilities, including an 8Mt/a atmospheric/vacuum distillation unit, a 2.4Mt/a coker and a 2Mt/a hydrocracking unit. The 8Mt/a atmospheric/vacuum distillation unit and the 2.4Mt/a coker were put into operation in 2008 and 2009 respectively. In August 2012, the 2Mt/a hydrocracking unit went on stream, ensuring a steady feedstock of supplies to the 1Mt/a ethylene plant. The 1Mt/a ethylene plant comprises eight units, including a new 800kt/a ethylene unit, which were completed and became operational in October 2012.

After the completion of the entire project, Fushun Petrochemical will be capable of processing 11.7 million tons of crude and producing 940,000 tons of ethylene every year. In addition, four feedstock bases are taking shape for the production of paraffin, lubricant base oils, alkyl benzene and synthetic resins.

Sichuan Petrochemical’s Integrated Refining/Petrochemical Project

The project comprises a 10Mt/a atmospheric/vacuum distillation unit, a 3Mt/a residue hydrodesulfurization unit, a 2.2Mt/a wax oil hydrocracking unit, a 3.5Mt/a diesel hydrotreating unit, a 2.5Mt/a heavy oil catalytic cracking unit, a 600kt/a gas fractionation unit, a 170kt/a MTBE unit, an integrated 2Mt/a continuous reforming + 60kt/a PX unit, a 65kt/a butene unit and a 300kt/a polypropylene unit. The planned capacity includes processing 10 million tons of crude and producing 800,000 tons of ethylene every year. Launched in 2009, the project was largely completed in 2012 and will go on stream in 2013.

Hohhot Petrochemical’s 5Mt/a Refinery Expansion Project

The project comprises 10 refining units, including a new 5Mt/a atmospheric/vacuum distillation unit and a 2.8Mt/a fluid catalytic cracking unit, and a 150kt/a polypropylene unit. Launched in August 2010 and becoming operational in October 2012, the project mainly processes crude oil from Changqing Oilfield, Erlian Oilfield and Tamsag Oilfield, capable of supplying 1.7 million tons of gasoline, 2.1 million tons of diesel fuel, 200,000 tons of jet fuel and 150,000 tons of polypropylene to Inner Mongolia and Shanxi every year.

Daqing Petrochemical’s 1.2Mt/a Ethylene Expansion/Upgrading Project

As China’s first commercialized project using the proprietary ethylene production method, the project comprises nine production units, including a new 600kt/a ethylene unit, a 500kt/a pyrolysis gasoline hydrogenation unit, a 300kt/a full-density polyethylene unit, an 80kt/a butadiene rubber unit, and auxiliary utilities in addition to the existing 600kt/a ethylene unit. Launched in 2009, the project was put into operation in October 2012, increasing Daqing Petrochemical’s ethylene capacity to 1.2 million tons per year.

Aksu Fertilizer Project

As the largest natural gas deep processing project in southern Xinjiang, the Aksu Fertilizer Plant comprises a 450kt/a synthetic ammonia unit, an 800kt/a urea unit and auxiliary facilities. Breaking ground in October 2012, the project is expected to be completed in 2015 to provide synthetic ammonia and urea products to surrounding areas.

Daqing Refinery’s 300kt/a Polypropylene Project (Phase-II)

The project comprises the main polypropylene unit, the propylene storage tanks, public utilities and auxiliary facilities. Launched in June 2012, the project became operational in August 2012, doubling Daqing Refinery’s annual polypropylene capacity from 300,000 tons to 600,000 tons, with a product portfolio of 68 homopolymer and random copolymer grades.

Upgrading of Refined Products and New Product Development

We continued to optimize the product portfolio, resulting in a significant increase in the production of high-grade gasoline and jet fuel, and steady progress in quality improvement. In 2012, high-grade gasoline accounted for 92.3% of the Company’s total gasoline production, up 4% year-on-year. Production of 97# gasoline and jet fuel increased by 34% and 30.3% year-on-year respectively. Jinzhou, Huabei and Liaoyang Petrochemicals produced 1.32 million tons of Beijing V oil products in total, meeting the demands of regional markets.

In 2012, CNPC launched more than 80 new petrochemical products with a total output of 870,000 tons. The percentage share of brand products rose by 4.3%. In particular, PE100/PE 80 pipe, PPR pipe, pipes for underfloor heating and bimodal homopolymerized HP550J are highly recognized by the market. Eco-friendly styrene-butadiene rubber from Lanzhou Petrochemical has become a good choice for major tire manufacturers such as Bridgestone, Goodyear and Michelin. Our proprietary liquid rubber was successfully used in the Chang’e II Lunar Exploration Program and the Tiangong-I target aircraft.
Marketing and Sales

In 2012, our marketing initiatives were targeted to optimize product offerings and bolster our retailing business. New progress was made in sales of refined products, enabling a fast response to market changes.

Refined Products

We sold 116.62 million tons of refined products in 2012, up 1.4% year-on-year. In particular, retail sales were 87.73 million tons, up 1.4% year-on-year. While gasoline sales went up 11.8% and 97# gasoline sales surged by 27.5%. The operating efficiency of our service stations further improved, resulting in an increase in average daily sales per individual station by 0.5% over the previous year. And 90.6% of refined products were sold through retail outlets.

Marketing Network

The Company’s marketing network continued to expand. In 2012, 707 new service stations were opened to add 4.95 million tons to the existing retailing capacity. 18 new oil depots were built, increasing our current storage capacity by 840,000 cubic meters. As of the end of 2012, we had 19,840 service stations in operation across the country.

With a view to improving the management of service station construction, Construction Standards for Oil Depots and Service Stations (2010) were amended to include the standards for gas filling stations and expressway gas stations.

Our fuel card business continued to grow. In 2012, 14 million Kunlun fuel cards were sold, bringing the total number of cards issued to 33 million. The cards have played an important role in broadening our customer base and expanding our market reach.

Non-oil Services

In 2012, our non-oil services maintained strong momentum in expanding our business scale and improving profitability. Full-year revenues and profits grew 25% and 30% year-on-year respectively. The business mix of fuel products and non-oil services took shape. By the end of the year, we had 13,000 uSmile convenience stores in operation.

Lube Oil

Faced with strong competition in the domestic lube oil market, we adopt a flexible marketing approach and continue to optimize product formulas and product lines, resulting in steady improvements in both product quality and profitability. In 2012, we sold 2.23 million tons of lube oil and achieved sales growth of 3% for top grade lube and 6.7% for packaged lube over 2011.

Specialty Asphalt Products at Liaohe Petrochemical

Liaohe Petrochemical is China’s largest heavy oil processing base. Using low-pour-point heavy oil and ultra-heavy oil as feedstock, the company’s colored asphalt, flame-retardant asphalt and asphalt for steel bridge decks are warmly received in the market. These asphalt products have been successfully used in the construction of 18 airports and 12 hydraulic engineering and expressway projects across the country.

In 2012, Liaohe Petrochemical’s hydraulic engineering asphalt products were used for seepage control in the dams of Hohhot Pumped Storage Power Station, marking the world’s first use of specialty asphalt for seepage control in high-latitude, alpine regions and enabling effective seepage control within a wide temperature range from 70 degrees Celsius to minus 40 degrees Celsius. Liaohe Petrochemical is now working on other specialty asphalts including rubberized asphalt and asphalt products for high-speed rail and bridge deck applications to meet the diverse needs of the market.

Miscellaneous Refined Products

In 2012, we continued to expand the marketing network for miscellaneous refined products, resulting in an 11% increase in product sales over the previous year. In particular, a differentiated marketing approach was introduced to create a high value-for-money portfolio. Full-year asphalt sales reached 6.28 million tons, continuing to lead in the domestic market with its market share increasing 0.13% year-on-year.
**Overseas Oil and Gas Operations**

Despite challenges from the changing external environment, we maintained safe and smooth operation of our overseas oil and gas business by continuing to enhance our risk prevention and control capability. Production and operation were optimally arranged and generally under control across the five oil and gas cooperation regions in Central Asia-Russia, Africa, the Americas, the Middle East, and Asia-Pacific. With a further consolidated scale of international operations and an improved business layout, we fulfilled all the production and operation objectives of the year.

**Exploration and Development**

We made important achievements in overseas oil and gas exploration, including breakthroughs at new blocks in Chad and Niger, continued progressive exploration at mature blocks in Kazakhstan, Sudan and Ecuador, significant natural gas discovery in Turkmenistan, and progress in unconventional hydrocarbon exploration in Australia.

In Chad, we discovered the oil-rich Lanea block in the Bongor Basin and made important progress in lithologic reservoir exploration in Raphia region. In Niger, our progressive exploration in the Bilma and Agadem blocks resulted in new discoveries. In Kazakhstan, CNPC-International Aktobe’s exploration activities in the peripheral Hope Oilfield enlarged the oil-bearing area of the field, and PetroKazakhstan obtained commercial discoveries from a number of exploration wells. New recoverable reserves were identified in Ecuador and Sudan’s Block 4 and 6 through enhanced progressive exploration in new strata sequences. Our progress in gas exploration on the Right Bank of Amu Darya in Turkmenistan included major discoveries from risk exploration in Ji Sal mountain front in the eastern area, and high-yield oil and gas flows from well Shi-21 and several other wells in the central area.

**Production**

In 2012, we optimized production planning, strengthened integrated E&P efforts and promoted the use of proven technologies such as waterflood and horizontal drilling to further exploit mature fields and enhance recovery efficiency. Throughout the year, we produced 104.28 million tons of oil equivalent, of which CNPC’s share was 52.43 million tons. The total production included 89.78 million tons of crude oil and 18.2 billion cubic meters of natural gas, with CNPC’s share being 41.55 million tons and 13.66 billion cubic meters respectively.
In Central Asia and Latin America, fine reservoir description, studies on residual oil distribution law, horizontal drilling and other proven techniques were promoted, with satisfactory results. In Kazakhstan, CNPCI Aktobe and PetroKazakhstan maintained stable production by inaugurating new wells and enhancing the integration of exploration and development, and the Mangystau project registered a record high oil output by drilling more horizontal wells. In Venezuela, our MPE3 project maintained a production rate of 115,000 barrels per day by speeding up the commissioning of new wells. Our Andes project in Ecuador stabilized oil production by stimulating mature wells and applying horizontal well completion for faster commissioning of new wells, setting an example for the potential release of mature fields with ultra-high water cut in the country. In Peru, we exceeded the annual production objectives of the Block 6/7 project by taking stimulation measures, rejuvenating long idle wells, and optimizing bailing wells.

We worked with our partners and made excellent progress in all our joint projects in Iraq. In June 2012, the 5Mt/a production capacity building project was put into operation and produced oil ahead of the contract schedule in our joint Halfaya project with Total. The joint project with BP in Rumaila maintained a rapid increase in oil output thanks to enhanced reservoir study and stimulation measures. At present, the average daily output of Rumaila accounts for 44% of Iraq’s daily total. The Al-Ahdab project maintained smooth operation since its inauguration, with the capacity to produce and process 6 million tons of oil and 800 million cubic meters of natural gas annually. The rapid increase in production at Al-Ahdab met the oil needs of the power plant and refinery in Baghdad. In addition, high-standard waste mud treatment technology was introduced to the project, which can extract more than 99% of the oil from oil sludge. The treated effluent, meeting Iraq National Class I-B, can be used for irrigation and fish cultivation. This treatment technology is highly recognized by the Iraqi government, which requires it to be used in other projects.

In 2012, our gas project on the right bank of Amu Darya in Turkmenistan delivered 5.5 billion cubic meters of commercial gas to the Central Asia-China Gas Pipeline. Since the Phase-I project became operational in 2009, no accidents have been reported and the lost time injury frequency rate (LTIFR) was zero for 95.75 million person-hours.

In Afghanistan, the phase-I 250kt/a production capacity building project was put into operation at Angot Oilfield as part of our AD project.

In Canada, steam-assisted gravity drainage (SAGD) technology was successfully used at our first well in the MacKay River oil sand project. This was a good start for us in drilling shallow horizontal wells in the development of unconventional oilfields and ultra-heavy oil resources overseas.

Pipeline Construction and Operation

2012 saw the smooth operation and extension of our overseas pipelines. We operated 10,494 kilometers of overseas oil/gas pipelines, including 6,672 kilometers of oil pipelines and 3,822 kilometers of gas pipelines, which transported 20.56 million tons of crude and 26.1 billion cubic meters of natural gas throughout the year.

With No.7 and No.2 compressor stations being operational, the Central Asia-China Gas Pipeline had its deliverability boosted to 30bcm per year. By the end of 2012, the pipeline had transported more than 44 billion cubic meters of natural gas. Construction of its Line C has already commenced, which will run in parallel to Line A and Line B. Completion of Line C will further boost the pipeline’s deliverability to 55bcm per year.

Construction of the Myanmar-China Oil and Gas Pipelines was well underway. Control works including the span over the Myitnge River, directional drilling crossing of the Irrawaddy River, and crossing of the Shweli River were completed, bringing an end to the main works of the northern section in Myanmar. Care for the environment was prioritized during the construction of the pipelines. A third party was engaged through international bid invitation to evaluate the environmental impact at the feasibility study stage. Construction did not commence until the evaluation was accepted by the Myanmar government and our project partners. During the construction, environmental supervisors were given full play to ensure effective environmental supervision and management. Whenever a section of the pipelines was installed, the landscape was immediately restored so that farming could be resumed in the next year. The project has experienced no accidents, pollution, or casualties since its commencement.

Oil and gas process center at Halfaya Oilfield in Iraq
Ten Years of Operation in Indonesia

2012 marks the tenth year of CNPC’s oil and gas operations in Indonesia. Over the past decade, our holding company PetroChina International (Indonesia) has achieved remarkable results in crude exploration, oil and gas development and production, HSE management, and communication with local communities.

We acquired all of Devon Energy’s assets and activities in Indonesia’s six blocks in 2002 and operated eight E&P projects in the country in 2012. In the past 10 years, by applying CNPC’s unique reservoir management expertise and optimal solutions for overall development based on residual oil distribution study, separate layer production and water injection, and progressive development, we achieved an average annual production growth rate of 15.7%. In 2012, PetroChina International (Indonesia) became the seventh-largest oil company in Indonesia, with its oil output more than 2.38 times that in 2002. PetroChina International (Indonesia) runs its projects strictly in accordance with the international HSE standards and management system, and has seen 2,807 consecutive accident-free days, as well as 3,891 pollution-free and injury-free days. Moreover, 99.2% of its employees are locally hired, in addition to more than 20 international employees from 10 countries such as United States, Canada and Italy, who work in an atmosphere of respect, equality, mutual trust and cooperation, regardless of nationality, ethnicity or religion.

In the past decade, our projects in Indonesia has provided more than 3,300 direct and nearly 5,000 indirect job opportunities for local people, and contributed more than USD 7 billion to the Indonesian Government in terms of entitlements and tax payments. The company’s donations to education and infrastructural construction, and other public welfare initiatives have helped improve the education and medical conditions in neighbouring communities and facilitated local socio-economic development. For these efforts, PetroChina International (Indonesia) has won the respect and recognition of local people and the government. In October 2012, the company was awarded the ‘Ten Years’ Excellent Operation Prize’ by the state upstream oil and gas regulator BPMIGAS.

Refining and Chemicals

Our overseas refineries ran smoothly and processed 44.29 million tons of crude, 27.3% more than in 2011. Despite short oil supply, our Khartoum Refinery kept its units running safely. PetroKazakhstan’s Shymkent Refinery was smoothly overhauled and fulfilled the annual objective of oil processing. Chad’s N'Djamena JV Refinery and Niger’s Zinder JV Refinery maintained smooth operation in a long cycle, thanks to optimized production plans. Our JV refineries in Singapore and Osaka, Japan, also saw smooth operations.

2012 witnessed the first full year of the operation of our upstream-downstream integrated projects in Chad and Niger, which achieved excellent performance in oilfield production, pipeline operation, and crude refining. The N'Djamena JV Refinery in Chad and Zinder JV Refinery in Niger smoothly fulfilled their operating objectives, and produced diesel, gasoline, and LPG products meeting local market demand. The refineries attached great importance to local hiring and provided training courses to share technologies and experience with local employees. N'Djamena Refinery recruited more than 120 local employees to work in major production posts. Since its startup in 2011, the refinery has launched training programs on the English language, refining and chemical knowledge, management, and HSE. Local employees have mastered refining and chemical know-how with the help of Chinese employees as their personal coaches. To help cultivate future talents for the development of Chad’s...
refining industry, the refinery reconstructed its temporary premises into a campus for the petrochemical department of a local petroleum college, and provides interim and training opportunities to students majoring in refining and chemicals. The campus includes two academic buildings, where 100 students can receive lectures at the same time. According to Mr. Makaye Hassane Taissa, Chad’s ex-Education Minister, the opening of the petrochemical department at the refinery will provide the students with a better and more practical educational environment and some of the students may start their career at this refinery.

Excellent Operation in Oman

CNPC has been engaged in oil and gas operations in Oman since 2002. By carefully organizing and managing production activities and promoting waterflood and horizontal drilling, we have achieved a satisfactory operating performance. The daily output of the contracted oilfield increased from 4,500 barrels to 40,000 barrels, thanks to a 100% success rate in horizontal well drilling by adopting tailored wellbore configuration and casing assemblies, as well as the open-hole completion method. In addition to maintaining the high-level operation of the oilfield, we have established a sound relationship with local communities by donating to education and community development. This is why CNPC International (Oman) was recognized as the “Oil Producer of the Year 2011-2012” by the Ministry of Oil and Gas (MOG), Oman Society for Petroleum Services (OPAL) and Petroleum Development Oman (PDO) in September 2012.

International Trade

In 2012, our international trade maintained rapid growth with expanding business scale. Major gains were obtained from trading in crude oil, refined products, natural gas and petrochemicals through imports and exports, consigned processing and oil refining, blending, storage, transportation, wholesaling, and retailing, as well as transactions in oil futures. Throughout the year, we posted a trade volume of 305 million tons, up 22% year-on-year, worth USD 239.4 billion.

We are more able to control and globally deploy crude resources as a result of improved know-how in trading and sufficient utilization of storage facilities. In addition, we further optimized our crude purchasing plans to minimize the cost of materials for domestic refineries.

Our refined products business enjoys improved operations on an extended trading value chain that is based on a global network and facilities. In addition to maintaining our market share in Southeast Asia and Northeast Asia, we expanded our market share in Vietnam, India and Australia, and entered the market in Saudi Arabia, Pakistan, Yemen, Nigeria and Mozambique.

We made more efforts to tap overseas resources and markets to supply materials to domestic refineries and sales companies. We made progress in natural gas business and extended LNG supply channels. Working with China Light & Power, Castle Peak Power, and other partners, we ensured the smooth inauguration of the Hong Kong gas supply project.

We continue building and operating oil and gas operation centers which integrate trading, processing, transportation and storage. In 2012, the Asian center enjoyed increasing regional competitiveness and an enhanced reputation, as well as improved operations. The European center maintains sound growth by integrating and optimizing business operation plans and improving the trading team. We also accelerated the construction of the American center and expanded our trading scale in the region by cooperating with Total.
Our oilfield services, engineering & construction, and equipment manufacturing sectors continued to optimize their teams and equipment and have been more capable of providing services and supporting the growth of our oil and gas business and the construction of major projects. In 2012, we had 1,155 crews in 63 countries and regions around the world, providing technical services in geophysical prospecting, well drilling, well logging and mud logging, as well as engineering and construction services for oil/gas field production capacity building projects, large refining and chemical installations, and pipelines and storage facilities. Our petroleum equipment and materials were exported to 78 countries and regions through a marketing network covering all major oil producing states around the world.

**Oilfield Services**

In 2012, we saw increased workload and operation efficiency in all aspects of oilfield services. This was realized through improved management, cost control, risk prevention, enhanced production organization, and optimized resource allocation.

**Geophysical Prospecting**

In 2012, CNPC deployed 209 seismic crew-times (100 2D and 109 3D), nine VSP crew-times, and 34 non-seismic (gravity and magnetic survey, electric survey and geochemical prospecting) crew-times. We acquired data on 96,739 kilometers of 2D lines, up 3.7% year-on-year. Our 3D seismic workload increased to 57,682 square kilometers, a rise of 57.3% year-on-year, thanks to the remarkable growth of our overseas business.

In a 3D seismic project in the Tarim Basin, BGP’s digital seismic crews registered the highest number of shots on a single and average day among the 3D seismic projects in the basin by using efficient acquisition technology with vibroseises. This points to a promising future for the application of wide-azimuth high-density prospecting technologies. Improved quality data was acquired from the Yingzhong 3D seismic project in the Qaidam Basin, with helicopter support for field works, as well as the arrangement of acquisition points based on precise remote sensing data obtained from aerial photography taken by unmanned aerial vehicles.

Our share of the high-end international geophysical prospecting market increased in 2012. We won 3D seismic contracts for a United Energy project in Pakistan, Total’s projects in Uganda and Indonesia, and the Block Junin-4 project in Venezuela. Our S69, S70 and S71 large-scale 3D seismic data acquisition projects in Saudi Arabia saw improvements in the dynamic sliding scanning of vibroseises, ISS data separation, and suppression processing of adjacent shots. By employing a pile mark-free navigation system, low-frequency scanning, and DS3 acquisition technologies, our 3D seismic project for Oman’s PDO registered the highest number of 20,651 shots in a single day and 19,000 shots on an average day. Moreover, the project team has maintained safe operations for 10 million working hours, a result recognized by PDO.

**Geophysical prospecting operations**

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<th>2010</th>
<th>2011</th>
<th>2012</th>
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<tbody>
<tr>
<td>Seismic crews in operation</td>
<td>170</td>
<td>169</td>
<td>168</td>
</tr>
<tr>
<td>Domestic</td>
<td>105</td>
<td>98</td>
<td>102</td>
</tr>
<tr>
<td>Overseas</td>
<td>65</td>
<td>71</td>
<td>66</td>
</tr>
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<tr>
<th></th>
<th>2010</th>
<th>2011</th>
<th>2012</th>
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<tbody>
<tr>
<td>2D seismic data acquired (kilometers)</td>
<td>81,130</td>
<td>93,306</td>
<td>96,739</td>
</tr>
<tr>
<td>Domestic</td>
<td>32,959</td>
<td>35,618</td>
<td>41,391</td>
</tr>
<tr>
<td>Overseas</td>
<td>48,171</td>
<td>57,688</td>
<td>55,348</td>
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<tr>
<th></th>
<th>2010</th>
<th>2011</th>
<th>2012</th>
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<tbody>
<tr>
<td>3D seismic data acquired (square kilometers)</td>
<td>54,338</td>
<td>36,678</td>
<td>57,682</td>
</tr>
<tr>
<td>Domestic</td>
<td>15,671</td>
<td>14,619</td>
<td>17,900</td>
</tr>
<tr>
<td>Overseas</td>
<td>38,667</td>
<td>22,059</td>
<td>39,782</td>
</tr>
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</table>
Our deep sea prospecting business maintained fast growth. Seismic data obtained in 2012 included 30,481 kilometers of 2D lines and 12,834 square kilometers of 3D and 4D profiles. Our Pioneer fleet successfully operated Total’s 4D high-resolution acquisition project, realizing 4D towing acquisition in the deep sea for the first time. BGP Surveyor and BGP Explorer fleets operated a deep-sea towing project in Qatar, demonstrating improved dual-vessel operation in areas with densely distributed platforms. In addition, we successfully launched a multi-user 2D deepwater project in Madagascar, creating a new business mode of geophysical prospecting services.

In 2012, new CPU and GPU editions of our independently developed GeoEast-Lightning pre-stack migration processing software were issued, which are more efficient and precise than their international rivals in the imaging of sophisticated textures, deep strata and subsalt structures. The major functions of GeoEast integrated processing and interpretation software continued to improve. The G3i seismograph has been successfully applied in seven domestic projects. With 28 new software function modules, GeoMountain V2.0 became a mountainous exploration software system featuring an integrated platform of acquisition, processing and interpretation, multi-channel data flow execution control, pre-stack depth migration, fracture prediction and micro-seismic monitoring. Wide-azimuth and high-density seismic data acquisition technology saw remarkable application results in complex mountains, contributing to more precise migration imaging in foreland thrust-folds in Kuqa, Yingxiongling, etc.

**Well Drilling**

2012 saw the wider application of horizontal drilling, underbalanced drilling, snubbing, reservoir stimulation, and other new techniques, and an increased drilling speed in key regions. This was an important support for the increase of our oil and gas production. Overseas high-end market development led to a great increase in the number of new contracts and our operating revenue. Cooperation with international oil companies and industrial players was deepened. Our JV with Shell, Sirius Well Manufacturing Service became operational.

In 2012, our 1,019 drilling rigs spudded 13,272 wells and completed 13,153 wells, with a total footage of 27.2 million meters, 0.79% more than in 2011. The drilling speed was further increased, with the average penetration rate increasing by 4.64% despite the average along-hole depth increasing by 85 meters year-on-year. In particular, the average drilling cycle of wells deeper than 4,000 meters was reduced by 10.4% year-on-year, and the average drilling cycle at Kuqa Mountain Front of the Tarim Basin decreased by more than 20%.

In 2012, we drilled and completed 1,701 horizontal wells, 31.3% more than in 2011, including 1,351 wells at home and 350 wells abroad. We have put into production a total of 350 horizontal wells at Sulige Gas Field since the start of its development, accounting for just 6% of the total producing wells, but contributing 30% to the field’s total gas output.

### Drilling operations

<table>
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<tr>
<th></th>
<th>2010</th>
<th>2011</th>
<th>2012</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drilling rigs in operation</td>
<td>1,000</td>
<td>1,099</td>
<td>1,019</td>
</tr>
<tr>
<td>Domestic</td>
<td>835</td>
<td>833</td>
<td>827</td>
</tr>
<tr>
<td>Overseas</td>
<td>165</td>
<td>176</td>
<td>192</td>
</tr>
<tr>
<td>Wells drilled</td>
<td>13,043</td>
<td>13,706</td>
<td>13,153</td>
</tr>
<tr>
<td>Domestic</td>
<td>11,919</td>
<td>12,509</td>
<td>11,894</td>
</tr>
<tr>
<td>Overseas</td>
<td>1,124</td>
<td>1,197</td>
<td>1,259</td>
</tr>
<tr>
<td>Footage drilled (million meters)</td>
<td>25.20</td>
<td>26.98</td>
<td>27.20</td>
</tr>
<tr>
<td>Domestic</td>
<td>22.97</td>
<td>24.39</td>
<td>24.30</td>
</tr>
<tr>
<td>Overseas</td>
<td>2.23</td>
<td>2.59</td>
<td>2.90</td>
</tr>
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</table>
With the increasing scale of its application, underbalanced drilling is playing a more significant role in reservoir protection and boosting per-well production. In 2012, we completed 502 underbalanced wells, an increase of 43.4% year-on-year. By using underbalanced drilling technology, Chuanqing Drilling Engineering Company obtained favorable oil and gas shows in well Penglai-101 and other wells in central Sichuan Province. Daqing Drilling Engineering Company increased its average production per individual well by 27.5% through the widespread application of micro-foam underbalanced drilling, and has developed a low-cost technical package for reservoir protection.

With the active expansion of the overseas drilling market, we won drilling contracts in Venezuela, Algeria, Kazakhstan, Uzbekistan, Iraq and Australia. Great Wall Drilling Company (GWDC) signed a comprehensive service contract for 80 geothermal wells in Kenya. An integrated upstream and downstream service mode for geothermal resource development took shape in the country. High-yield gas flows were obtained from the well WAEX-1 and well WA-2A drilled by Xibu Drilling Engineering Company as part of the Aral Sea project in Uzbekistan. This was an important exploration discovery in the Aral Sea Basin.

We attach importance to the R&D and promotion of drilling technologies. In 2012, our independently developed new technologies and processes saw excellent application. A continuous gas circulation system developed by Chuanqing Drilling Engineering Company saw success in its first field drilling test. The system can extend the application of gas drilling in water-producing formations and address the challenge of formation water production. A precise PCD system CQMPD-I developed by the company was used in drilling four wells at Jidong Nanpu Oilfield. It reduced the drilling cycle by 10 days and increased the penetration rate by more than one time compared with the average at adjacent wells. A complete industrial chain has been formed for the GW-AMO full-white-oil-based drilling fluid system and its matching technologies developed by GWDC. The XZ-AVDS automatic vertical drilling system independently developed by Xibu Drilling Engineering Company has been successfully used in drilling eight wells in the Xinjiang and Tarim oilfields, with an average penetration rate two to three times higher than adjacent wells.

Well Logging and Mud Logging

In 2012, CNPC deployed 721 well logging crews to provide well logging and testing operations and services to users at home and abroad. These crews completed 99,353 instances of well logging and perforation and 11,674 instances of mud logging, up 12% and 4.5% year-on-year, respectively.

By promoting wireline logging with the bypass nub out of casing in horizontal wells, logging while drilling (LWD), through-bit logging, and tractor logging, the operational efficiency per individual well improved by an average of nearly 20%. New progress was made in multi-stage perforation technologies. Currently, we can perform perforation ignition for 20 stages. This can support the separate-layer fracturing and stimulation of horizontal wells.

Open-hole Logging in Canada by ElLog logging unit
The EILog logging unit independently developed by CNPC has been gradually improved and was first used in complete open-hole logging in Canada. Forty sets of our Huiyan-2000 Well Logging System have been put into application. The system enables high-speed data over cable at a rate of 2Mbps. Its multi-pole array acoustic loggers (MPAL) and eight-arm electric imaging loggers can deliver clear images in field tests. Our remote detection acoustic transmission imaging logging system was applied in the Tarim Basin, where it contributed to a geological discovery by identifying fracture-cave reservoirs.

We continue to improve our Formation Evaluation LWD (FELWD) system, with the three-parameter LWD system already in widespread use, and tests completed for dual-induction, neutron, high-temperature and pressure gamma and induction, and mud resistivity LWD. The LEAP-800 well logging system has been successfully applied for 200 well-times, and its stability and reliability have been greatly improved. CIFLOG-GeoMatrix integrated well logging and interpretation software went online and was rolled out in China.

Overseas, we consolidated our traditional service market by renewing well logging, mud logging, and testing operation contracts with the Halfaya and Al-Ahdab projects in Iraq, as well as the well logging and mud logging contract with Uzbekistan’s Silk Road Company. In addition, we won contracts for offshore mud logging in Venezuela, BAPEx well logging in Bangladesh, and a well logging and perforation service in Mongolia, further extending our service object and business scope.

Downhole Operations

In 2012, CNPC had 2,023 downhole operation crews providing services including fracturing and acidizing, formation test, well intervention, workover and sidetrack drilling. We completed 149,262 downhole operations throughout the year, and conducted formation tests in 7,402 layers, up 4.6% and 6.5% year-on-year, respectively.

We continued to roll out snubbing operations. In 2012, our 96 crews applied snubbing 3,096 well-times, up 35% year-on-year. Paraffin plugging with a total depth of 2,105 meters was removed from tubings under a 95 MPa wellhead pressure, the highest in China’s snubbing operations, in well Wushen-1 at Tarim Oilfield. Snubbing was proved effective in energy conservation and emission reduction. In fact, it has enabled us to reduce wastewater discharge by 2.04 million cubic meters and cut transportation by 136,000 tanker-times throughout the year.

In 2012, multi-stage fracturing was applied to stimulate 775 horizontal wells, a 54% increase year-on-year. By the end of 2012, 57% of our total horizontal wells in China were multi-stage fractured. By using our independently developed open-hole staged fracturing tool, up to 21 stages were fractured in well Dabei-G-Ping-2 in the Tarim Basin. GWDC conducted multi-crack fracturing in open-hole-completed intervals of well Su-53-74-29H, resulting in 18 cracks at six stages, and a great increase in the average daily output. Ten-stage fracturing conducted by Chuanqing Drilling Engineering Company at well Ning-201-H1 in Changning shale gas block delivered gas at a daily rate of 132,000 cubic meters, 12 times as much as any adjacent vertical well.
Engineering and Construction

Oriented toward the implementation of key projects, CNPC’s engineering and construction business maintained sound development through workforce coordination, construction organization, and quality supervision. As a more experienced contractor of large-scale projects, we made progress in high-end market development at home and abroad, with enhanced EPC and PMC capabilities. In 2012, our EPC contracting, design and PMC business accounted for more than 70% of newly signed contracts. CPECC, China Huanqiu Contracting & Engineering Corp., and CPPB have been consecutively listed in the “Top 225 International Contractors” by Engineering News Record (ENR) for many years.

Oil and Gas Field Surface Engineering

We maintained our position as the domestic leader in the construction of onshore oil and gas fields. We have surface engineering technology packages for conventional fields, as well as for fields featuring high water cut, low permeability, ultra heavy oil and high condensate content, high pressure, high yield, and high sulfur content. We have the capacity to build surface works to accommodate facilities with 20Mt/a oil production capacity and 10bcm/a gas production capacity.

In 2012, the Phase-III project of Changling Gas Field became operational and progress was made in the surface construction of Hetian River Gas Field at Xinjiang Oilfield. The surface system of Sulige Gas Field was further improved to gather, transport and process 23 billion cubic meters of natural gas a year. In Iraq, the phase-I surface project of Halfaya Oilfield was put into production, and the phase-II productivity building project of Al-Ahdab Oilfield and the phase-II surface project of Halfaya Oilfield were about to be completed. In Turkmenistan, construction of the gathering and transport system at Metejan Gas Field, as well as the Gaikynysh Natural Gas Processing Plant and matching works, was well underway.

CPE and CPPB launched a Tanzanian project, which includes two natural gas processing plants (2bcm/a and 1.5bcm/a respectively) and 542km-long gas pipeline linking the plants and Dar-es-Salaam.

Construction of Refining and Chemical Facilities

In 2012, we ensured smooth progress at major projects. Fushun Petrochemical’s 800kt/a ethylene unit, Hohhot Petrochemical’s 5Mt/a refining capacity expansion project, Daqing Petrochemical’s 1.2Mt/a ethylene upgrade and expansion project, Daqing Refinery’s 300kt/a PP unit (phase-II), Liaohe Petrochemical’s 600kt/a continuous reforming unit, Jinzhou Petrochemical’s 1.6Mt/a delayed coking unit, and Karamay Petrochemical’s 1Mt/a delayed coking unit became operational. Sichuan Petrochemical’s integrated refining and chemical project was generally completed. In the construction of Daqing Petrochemical’s ethylene unit, China Huanqiu registered a 99.6% first-run yield in welding and 100% acceptance of unit construction, indicating a breakthrough in the package of technologies for the industrialization of ethylene units in China.

China Construction Engineering Luban Prize (Overseas Projects) Goes to CNPC

The biannual China Construction Engineering Luban Prize (Overseas Projects) was launched by China Construction Industry Association in 2009. Its objective is to improve the construction quality of overseas works, as well as the competitiveness and reputation of Chinese construction enterprises. In January 2013, CPECC was awarded the 2012 prize for its capacity upgrading work at Sudan’s Block 3/7. This was CPECC’s third consecutive winning of the prize since its launch, following the EPC-contracted capacity expansion project of Khartoum Refinery in Sudan in 2009 and the phase-I project of the Third Zhanazhol Oil & Gas Processing Plant in Kazakhstan in 2011.
The coal-based fertilizer plant in Ninh Binh, Vietnam, which was independently designed, procured, constructed, and launched by China Huanqiu, as the EPC contractor, became operational. Registering 19 million safe working-hours during construction, the project was recognized as a model among foreign-funded construction projects in the country.

Pipeline and Storage Tank Construction
As the domestic leader in building onshore long-distance oil and gas pipelines and the world leader in construction technologies in this field, we have the annual capacity to build 6,700-9,700 kilometers of pipeline with a diameter larger than 711 mm. In addition, we have the technological capacity to design and construct 150,000 cubic meters of crude tanks and 10,000 cubic meters of gas tanks, and we are capable of designing and building 26 million cubic meters of crude tanks and 16 million cubic meters of refined product tanks annually.

In 2012, we installed more than 8,000 kilometers of long-distance pipelines, and completed two crude storage bases and one LNG project. The trunk and branches of the Second West-East Gas Pipeline were completed and became operational. The Dushanzi-Urumqi Crude Pipeline, Changqing-Hohhot Crude Pipeline, and Zhongwei-Guiyang Branch (Zhongwei-Chengdu Section) were completed as scheduled. The Lanzhou-Chengdu Crude Pipeline, Rizhao-Dongming Crude Pipeline, and Nanning-Liuzhou Refined Products Pipeline were basically completed. Construction of the Third West-East Gas Pipeline and the Jinhzhou-Zhengzhou Refined Products Pipeline commenced.

Construction of the Myanmar-China Oil and Gas Pipelines, Line C of the Central Asia-China Gas Pipeline, and the oil and gas export pipeline in Halfaya proceeded smoothly. The 75Mt/a Abu Dhabi Crude Pipeline built by CPPB and CPECC was put into operation successfully, which includes a 405.36km-long onshore section and a 18.86km-long subsea section. In addition, CPPB began to build the Myanmar-Thailand Gas Pipeline.

The State Petroleum Storage Base in Lanzhou, which was EPC-contracted by CPECC, and the Lanzhou Crude Storage Base for Production and Operation and the peak shaving LNG station at Ansai, which were EPC-contracted by China Huanqiu, were completed and put into operation. Construction of Hutubi gas storage base of Xinjiang Oilfield, Tangshan LNG terminal, Ta’ian LNG terminal, and a 5mcm/d LNG plant in Hubei Province saw smooth progress.

Offshore Engineering
We have the capacity to provide integrated and comprehensive support for offshore production. Our services include well drilling, well completion, well cementing, production test, downhole operations, design and construction of marine engineering, and vessel services.

In 2012, we conduct drilling operations in the Bohai Sea, Yellow Sea, South China Sea, and Persian Gulf. At well group CB22FB in Chengbei Block of Shengli Oilfield, CPOE 6 rig registered an average penetration rate of 50.37m/h, 56% faster than in previous well groups with a similar along-hole depth. The Northern Yellow Sea Project and well Chengbei-326 witnessed excellent large-scale fracturing operations thanks to our unique techniques in reservoir stimulation and coiled tubing, where 340 and 300 cubic meters of fluid was involved respectively.

To install the Shenzhen-Hong Kong subsea pipeline as part of the Second West-East Gas Pipeline, our proprietary technologies including sand blasting and spraying techniques, quick patching, and nondestructive testing for seabed pipeline installation addressed the technical challenges of pipeline welding, delivering a 99.2% first-run yield in welding and 100% acceptance of corrosion-proof patching. Construction of the matching facilities for our Qingdao offshore engineering base is underway. The Tangshan production support base was put into trial operation, with improved capacity in ship service and shore-based support.

In 2012, CNPC had 40 large-scale offshore equipment units, including nine mobile drilling platforms, one modular drilling and workover rig, five production test platforms, and a variety of 25 vessels. In 2012, our 23 vessels provided transportation service for 6,700 days.
Petroleum Equipment Manufacturing

In 2012, our petroleum equipment manufacturing sector experienced restructuring, transformation and upgrading. In addition to strengthening technical innovation and management, we speeded up the construction of large-scale equipment manufacturing bases. In addition, we continued to enhance business integration and product competitiveness, actively expanded the market, and provided the best possible service and support to our core businesses.

2012 saw the inauguration of Baoji Petroleum Steel Pipe Company’s petroleum pipe plant in Xi’an City and Bohai Petroleum Equipment Manufacturing Company’s steel pipe plant in Xinjiang, increasing our manufacturing capacity by 300kt/a for petroleum pipes and 220kt/a for steel pipes. Bohai Petroleum Equipment Manufacturing Company became the first accredited state-level corporate technical center in the steel deep processing sector of the petroleum industry.

In 2012, we had a more complete portfolio of drilling rig products. Our independently developed 8,000m AC VFD (variable frequency drive) electric drilling rigs were deployed in the Tarim Basin. ZJ90/6750DB-S, a four-single stand-based 9,000m high-efficiency drilling rig with our independent intellectual property rights, began operating in the mountain front areas in the Tarim Basin. The rig is believed to greatly increase the drilling speed and efficiency.

We made progress in the R&D of high-steel-grade pipelines. The first submerged arc welded steel pipe of X80 steel grade, 1,422 mm in diameter and 21.4 mm in wall thickness was made on a trial basis in China. The pipe will meet the domestic market demand for large-diameter steel pipes that can withstand high pressure. A pre-welded and precisely submerged arc welded steel pipe of X70 steel grade, 1,219 mm in diameter and 15.01 mm in wall thickness, was produced. High-tensile coiled tubing of CT90 steel grade, 38.1 mm in diameter and 3.18 mm in wall thickness, saw successful application in Jilin Oilfield.

Our power units boast improved reliability and stability. The highly-reliable diesel engine BL12V190ZL1-2 and the high-speed and heavy-duty reciprocating piston compressor 6CFC were developed. As China’s most powerful gas compressor of its type, 6CFC is promising in terms of pressurized gas gathering and transportation and operation of gas storages.

With respect to offshore engineering outfits, the CP-300 jack-up rig with our independent intellectual property rights was commissioned, tested, and delivered to customer. The CP-400 jack-up rig, with more advanced design parameters, and already approved by CCS, ABS and DNV, was being designed and built. We also developed equipment products, such as offshore thermal recovery wellheads, thermal insulation pipes for offshore applications and seabed oil and gas transportation pipes that delivered specification-compliant performance.

In 2012, our petroleum equipment and materials were exported to 78 countries and regions, through an international marketing network with offices in 51 countries and regions providing complete functions of storage, consignment sales, repair and service, product leasehold, assembly, and integration. The exported products were of more than 70 types covering the whole industrial chain, including drilling rigs, workover rigs, offshore drilling rigs, long-distance line pipes, refining and chemical production equipment, power engines, well completion tools, bits, and mud pumps.