

2 Responsible Operation



We are always committed to the principle of “people-centered, quality foremost, safety first, environment prioritized” to achieve “zero defects, zero injuries and zero pollution”. We regard providing clean energy, minimizing environmental impact and reducing emissions as the strategic foundation for the Company’s sustainable development. The Company continues to improve the quality management of product and service, and promote safe, environmentally-friendly and resource-saving operations, in order to promote the construction of an ecological civilization and develop a resource-saving and environmentally-friendly enterprise.

SDGs

6 Clean water and sanitation

7 Affordable and clean energy

8 Decent work and economic growth

11 Sustainable cities and communities

12 Responsible consumption and production

13 Climate action

14 Life below water

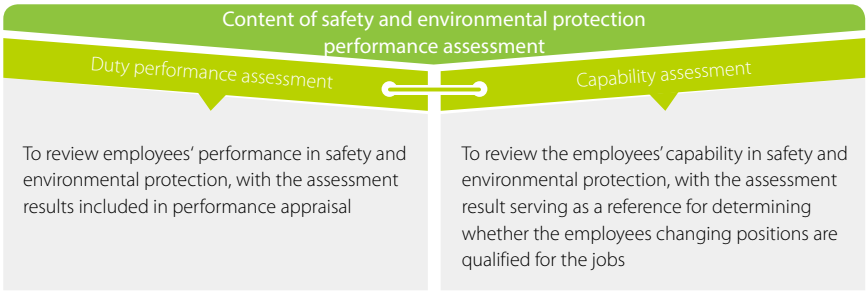
15 Life on land

Safe Operation

We actively promote the building of a long-acting safety system and comprehensively enhance our work safety management. In 2018, the Company maintained a stable improvement in safety performance.

Management System and Performance Assessment

In 2018, we enacted and amended nine regulations including *Regulations on Management of Production Safety* and *Measures for the Supervision and Management of Hazardous Chemicals*. We enhanced auditing quality of HSE management system, and put more efforts in rectifying problems found in auditing. We revised the detailed regulations on the assessment of safety performance, and strengthened performance evaluation and accountability system for accidents.



Hazard Control

We attach equal importance to both prevention and control of hazards, and build a long-acting mechanism for hazard control, so as to ensure all hazards are timely and effectively treated and enhance the fundamental safety of the Company. In 2018, we continued to conduct treatment of pipeline hazards by carrying out targeted safety inspection on key projects including the Fouth Shaanxi-Beijing Gas Pipeline and Zhongwei-Jingbian Pipeline.

Safety Risk Management

We fully strengthened management and control over safety risks in the production process, implemented a dual-prevention mechanism covering risk prevention and control and hazard identification and treatment for production safety, and established a classified risk prevention and control system, so as to eliminate safety risks and potential hazards to prevent accidents. In 2018, we formulated and released the enterprise classification standard based on safety risks, took targeted management and control measures in subsidiaries facing different types of risks, and conducted all-factor auditing and special auditing in subsidiaries concerned. We introduced new methods for safety supervision and management and formulated a working mechanism for joint supervision and management involving local governments and our subsidiaries. We pushed forward the building of a dual-prevention mechanism, and double-checked sources for major risks. In addition, the Company compiled a checklist for management and control responsibility of company-level major safety risks, and formulated and implemented risk prevention and control mechanism with the aim to effectively prevent and control all types of safety risks.

Supply Chain Safety

We included suppliers and contractors into our safety management, and had an all-process management on their access, selection, training, use and evaluation, so as to prevent and reduce accidents caused by suppliers and contractors.

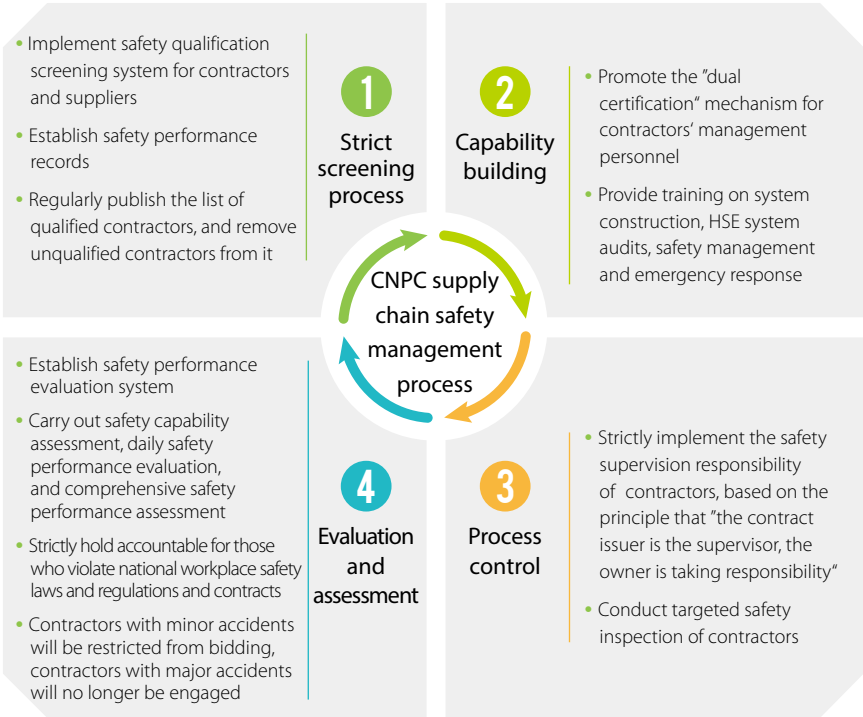
Hazard treatment mechanism



We strengthened supervision and management of contractors, and continuously reduced safety risks in our operations

- We made it compulsory for external constructors to be trained and certificated
- We strengthened access control on the construction site
- We strengthened around-the-clock supervision during construction
- We reinforced accountability system for accidents caused by contractors
- We improved the blacklist system for contractors

CNPC Supply Chain Safety Management Process



Hazardous Chemicals Management

We exercised full process management on hazardous chemicals covering production, storage and transportation. In 2018, we carried out targeted inspection on progress made in comprehensive safety management of hazardous chemicals in key subsidiaries including Daqing Petrochemical and Fushun Petrochemical.

Emergency Management

We make unremitting efforts to improve our emergency management system. In 2018, the version 2.0 of our emergency management system was launched, enabling the support system for the Company's emergency platform to leapfrog from the stage of platform building to the stage of deep integration and application, and further enhancing our comprehensive emergency response capabilities.

Overseas Security Management

Personnel safety has always been an overriding priority in our operations. We constantly reinforced the operation of social security management system, fully strengthened social security risk prevention and control, and continuously enhanced emergency response capabilities. In 2018, we fully strengthened systematic management, implemented management on a regular basis, and braced ourselves for changes in local security situations in major countries. There were no fatalities in our overseas projects concerning social security.

Overseas Security Risk Management

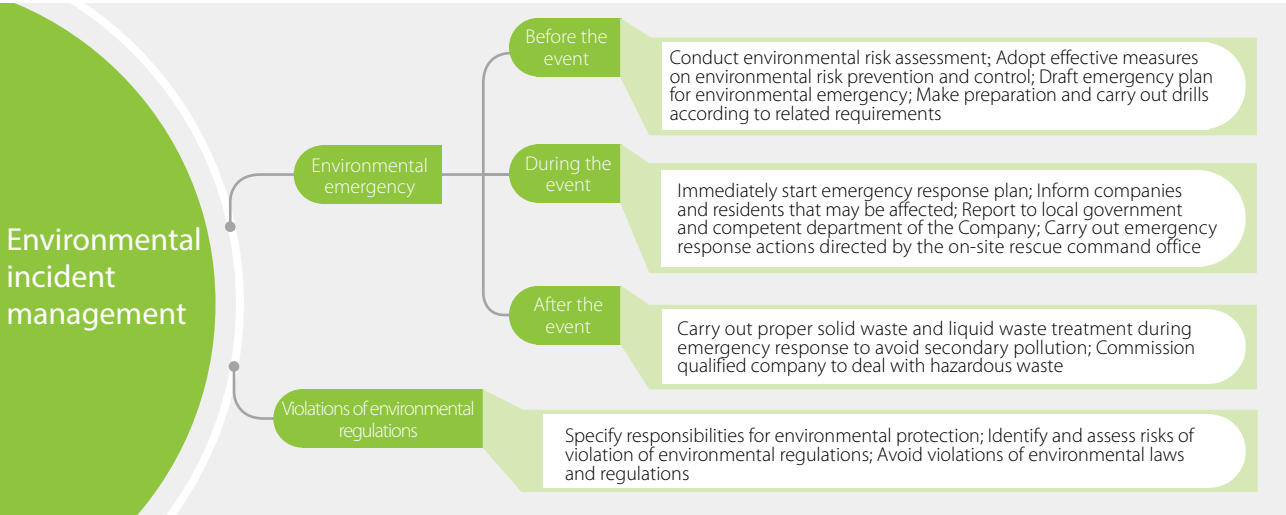
Risk level	Management measures
Extremely high risk	CNPC sets out clear and unified security management requirements and implements intensified security management policies
High risk	Before project implementation: carry out security risk assessment and formulate an effective security program. The project shall not be implemented until it is reviewed and approved by the Company. During project implementation: keep improving the security program and revising the emergency response plan according to changes in local security situations, and organize drills to ensure personnel safety
Medium risk	Carry out risk assessment, formulate an emergency response plan and implement security measures before project implementation
Low risk	Implement necessary security measures

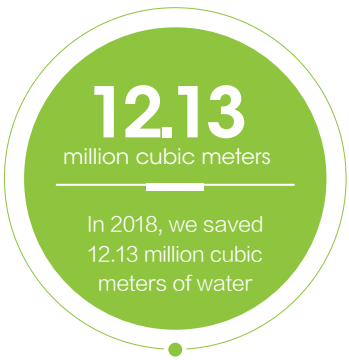
Environmental Protection

We take the initiative to evaluate the environmental impact of our management and activities, and make efforts to reduce adverse effects on the environment and climate. By improving the resource utilization efficiency, implementing the Clean Air Act, and promoting energy conservation and emission reduction, we strive to achieve environmentally-friendly and resource-saving operations and vigorously advocate ecological civilization, in order to achieve harmonious development with the environment.

Strengthening Risk Prevention and Control

We carried out environmental risk identification and assessment, and implemented a risk prevention and control management model focusing on environmental forecasting, pre-warning and monitoring. We began the environmental risk management at an earlier stage, and established a sound risk management mechanism featuring "management in tiers, prevention and control by levels", in order to ensure overall control over environmental risks. In 2018, the Company fully conducted hazard management by levels and classified supervision of subsidiaries, and carried out strict management of operation permits. No major environmental accidents were reported and all major pollutants reduction targets were achieved.





Sustainable Use of Resources

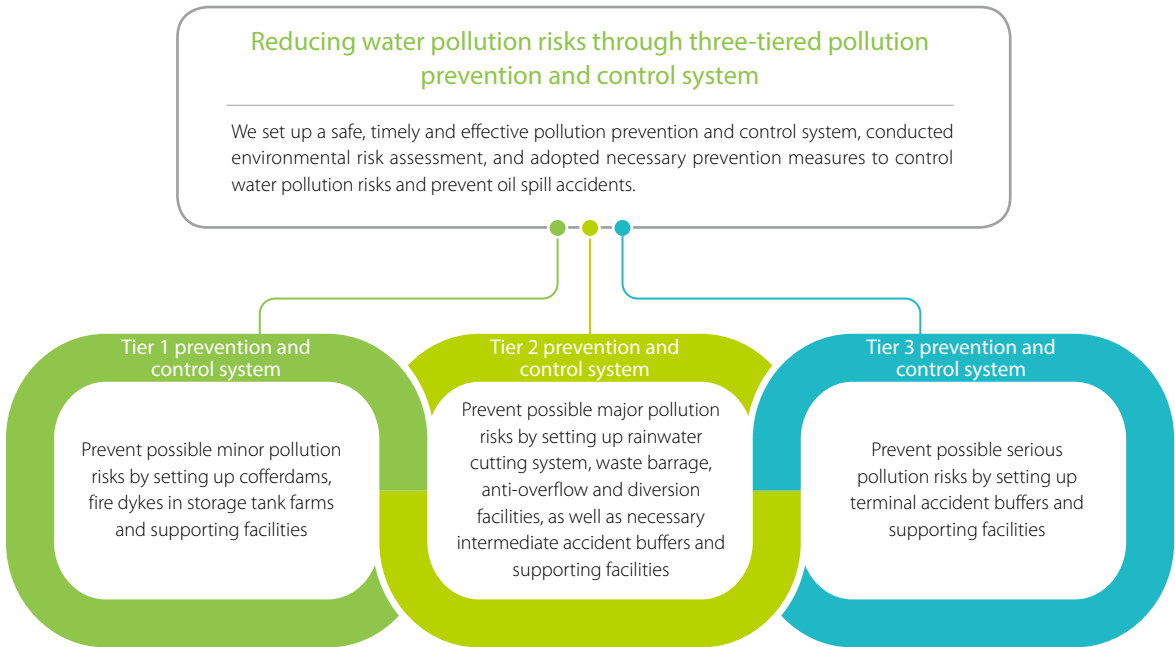
We attach great importance to the protection and rational utilization of resources. We strengthen the protection of water, conservation of freshwater and rational use of land, and strive to improve energy and material utilization efficiency to minimize resource consumption.

Water Resources

We endeavor to improve water utilization efficiency and realize sustainable use of water throughout various links in our production and operation activities. Through strengthening water utilization process management, adopting technologies for water-saving and wastewater treatment and recycling, and integrating water-saving indicators into performance evaluation and other measures, we worked to reduce the use of fresh water. In 2018, we saved 12.13 million cubic meters of water.

Eco-environmental Management in Full Life Cycle throughout the Industry Chain

Exploration and Development	Pipeline Operations	Refining and Chemicals
• In oil and gas development, equal importance was given to both water pollution prevention & control and water recycling. After the oil-water separation and filtration treatment of the recycled wastewater, oil recovery and water reinjection were both realized, preventing groundwater and surface water contamination. By the end of 2018, 100% of oil extraction wastewater in our oil and gas fields was treated, with a reinjection rate of more than 93.3%. • We carried out water system maintenance and revamping, improved the water qualification rate, optimized operation programs, upgraded wastewater discharge and treatment processes to reduce water discharge, and promoted the application of new technologies for water treatment to maximize water conservation. In 2018, the comprehensive qualification rate of the Company's oilfield wastewater reached 100%, and water discharges increased by 12.4 % year on year.	We focused on managing the impact on water resources by construction projects and the risk of leakage accidents during pipeline operations. Environmental impact assessments (involving water environment) were conducted, and water conservation and protection concepts and awareness were integrated into construction and operation activities.	We improved water consumption efficiency by promoting clean production processes, saving water at the source, and optimizing water consumption systems. We increased the concentration time of circulating water to reduce water supplement, and strengthened steam condensate water recovery to achieve water saving. In addition, we emphasized wastewater treatment and reuse to reduce wastewater discharge and improve the industrial water recycling rate; and enhanced underground pipelines to reduce groundwater leakage rate.



Land Resources

On the principle of scientific siting, efficient use, proper protection, and timely restoration and through innovation in land-saving technologies and management models, we made careful and intensive use of land during production, strictly controlled land use growth, made good use of land in various ways, proactively reclaimed land, carried out environmental treatment and recovery in mining areas, and enhanced land use efficiency. In 2018, we saved 1,253 hectares of land.

Case Study	Strengthen Pollution Control and Restoration of Soil and Ground Water
The Company conducted whole-process management and control over solid wastes such as oily sludge and drilling wastes. Drilling wastes in environmentally sensitive areas are collected on site without contacting the soil, and oil-based drilling wastes are recycled and disposed of after bio-safety treatment. Underground storage tanks at 11,315 gas stations underwent anti-seepage revamping.	

Energy

We have been striving to reduce the consumption of fossil fuels and increase energy efficiency by reducing energy intensity. We paid high attention to energy conservation at the source, and carried out energy-saving assessments of newly-built, revamped and expanded projects. We promoted the application of energy-saving technology and equipment to boost the efficiency of heating furnaces in oil and gas fields and optimize refining and chemical energy systems. We reinforced energy use management in the production process, and conducted monitoring and evaluation of energy and water-intensive devices and equipment.

Wastes and Pollutants

We strictly monitored and controlled discharges of waste and pollutants in the production process, strengthened waste management, and reduced discharges of pollutants in the air, land and water. We actively promoted collection measures and recycling technologies for drilling wastes, and clean operation technologies at our oil and gas fields, significantly reducing wastes and pollutants. In 2018, the Company realized 100% recycling and harmless treatment of drilling wastes, 100% clean operation coverage, and 100% implementation of land reclamation plans.

Waste Management

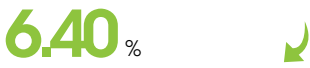
We consistently made breakthroughs in drilling waste treatment technologies, optimized hazardous waste management, and improved the efficiency of resource utilization. Chuanqing Drilling Engineering Company used microorganisms in solid drilling waste treatment, achieving a degradation rate of over 90% for the oil substances in the wastes, with the indicators of resulting leachate meeting the first-level standard of the national Integrated Wastewater Discharge Standard and the treated mixture meeting the national standards for soil quality. Compared with conventional solidification treatment, the operation time was down by 30% and cost was down by 20%.

In 2018, with our drilling waste treatment and recycling technologies, the following results were achieved:

- Application to over 7,300 wells, land use down by 726.7 hectares, waste discharge down by 4.38 million tons;
- 58,157 tons of oil-based drilling wastes were treated, and 9,400 cubic meters of oil-based drilling fluid was recycled;
- 1.5 million cubic meters of fracturing flow-back fluid was recycled;
- RMB 800 million of benefits were generated.



Compared with 2010, the proportion of natural gas consumption in our total energy consumption increased by 7.21%



while the proportion of raw coal consumption in our total energy consumption decreased by 6.40%

China Southern Petroleum Exploration and Development Corporation, a Fine Example of Green Production Areas

Hainan Fushan Oilfield Exploration and Development Co. (hereinafter referred to as Fushan Oilfield) is a subordinate company of CNPC and a fully owned subsidiary of China Southern Petroleum Exploration and Development Corporation. Fushan Oilfield practices green exploration and development as well as clean production. The company invested RMB 60 million to build CNPC's first upstream waste treatment center, realizing 100% harmless treatment and recycling of wastes. A further RMB 120 million was invested in hazard rectification for oil and gas pipelines to ensure fundamental safety. The company used IoT technologies to build a digital oilfield, realizing automatic data collection and full digital monitoring coverage for the entire production process. Efforts were also made to speed up the exploration and development of natural gas as a source of clean energy. In December 2018, the company passed the acceptance check for green production areas.

We make every effort to support China's fulfillment of its responsibilities and obligations under international conventions such as:



Conservation of Biodiversity and Natural Habitats

We are devoted to reducing the potential influence on ecological environment and biodiversity during production and operation, and take full precautions to avoid environmental impact and work hard to restore the environment to its original state in case of any adverse impact. We make an all-out effort to identify and address environmental pollution and ecological damage, and reduce the impact on the ecological environment by various means, including reducing noise and emissions. We do our utmost to reduce the occupation of cultivated land, protect water and land, and restore vegetation. Various measures are taken to restore the ecological environment in the working areas and protect biodiversity.

Ecology Before Economy

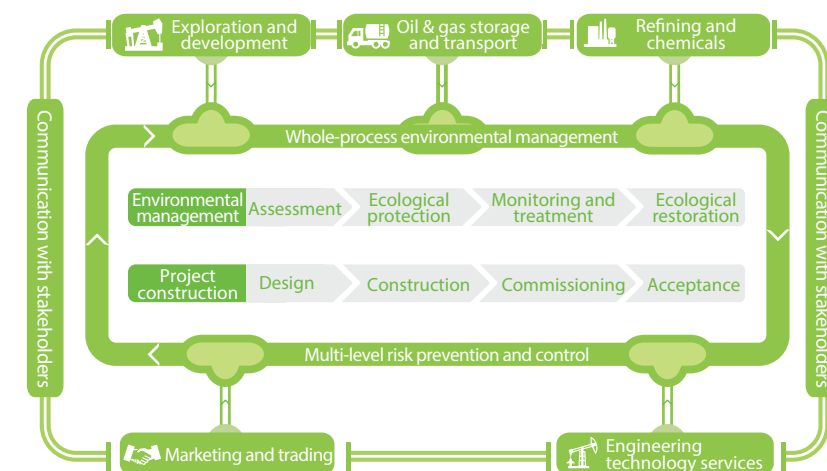
The rosy starling is a migrating bird and a protected species in China for its significant ecological, scientific and social values. In May 2018, tens of thousands of rosy starlings made home at our construction site along the Dunmazha-Nalati expressway on the National Highway 218 (G218). The company working on the site, CNPC Xinjiang Petroleum Engineering Company, suspended all their construction activities so that the birds could breed and nurture their young undisturbed. The company also spent RMB 100,000 on steel pipes and green mesh to build shelters for the birds. The wildlife protection and management office of Yili Kazak Autonomous Prefecture in Xinjiang praised this move as a shining example of putting ecology before economy.



Pulling out from Environmentally Sensitive Areas

In compliance with the country's laws and regulations concerning environmentally sensitive areas, we strictly forbid new exploration wells or production programs in wetland reserves, key zones, buffer zones as well as red-line ecological areas and land areas, and gradually withdraw from aforementioned areas in our oil and gas development.

Eco-environment Management in Full Life Circle Through the Industry Chain



CNPC's Major Measures for Ecological Protection

Ecological protection and restoration	- Carry out green mining activities - Restore the vegetation and plant sand-fixing and windbreak forests in Gobi Deserts - Promote comprehensive treatment of desertification, rocky desertification and soil erosion - Implement natural forest protection system
Ecological monitoring and assessment	Continuously monitor and assess the ecological impact of oil and gas development and pipeline construction
Ecological protection demonstration programs	- Green ecological oil and gas fields - Ecological petrochemical industrial parks - Green energy corridor along the Belt and Road - Clean energy towns - Nature reserves - Participate in local governments' afforestation activities

Climate Change

We respond to the *Paris Agreement* adopted by the 2015 United Nations Climate Change Conference, embrace the goal of limiting global warming to less than 2 degrees Celsius by the end of this century. To this end, we actively responded to climate change, devoted ourselves to low-carbon development, and shared the practice of greenhouse gas control with industry peers and all sectors of society.

Carbon Emission Management

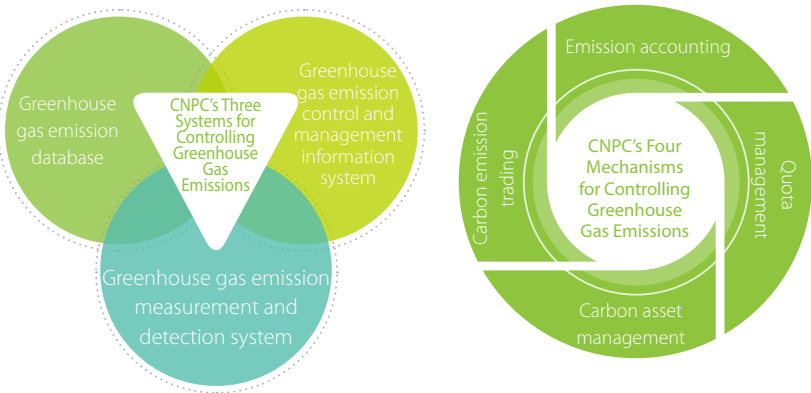
We paid close attention to greenhouse gas emissions and included combating climate change in our development plan. In 2018, following the instructions of the National Greenhouse Gas Emissions Accounting and Reporting Technical Guidelines, we improved the running of the information system for greenhouse gas accounting and reporting, coordinated the accounting of greenhouse gas emissions, and completed the greenhouse gas emission inventory for each business area, covering direct and indirect emissions such as fuel combustion emission, production process emission, fugitive emission and greenhouse gas recovery and recycling.

Curbing Methane Emissions

CNPC carried out methane emission accounting across the entire industrial chain of oil and gas production and methane emission monitoring for key areas of production. The Company's methane emission sources mainly include the flare systems, production drainage, dehydration separation, wastewater and sludge disposal, pneumatic controllers, compressors and storage tanks.

The Company strengthened its efforts to reduce leakage emission, venting emission and flare emission, and enhanced methane recovery in its major oil and gas fields. In Tarim Oilfield, 48 recycling sites were built, with a recycling capacity of 4.2 million cubic meters per day and a recovery rate of 70%.

CNPC Greenhouse Gas Emission System and Mechanism



CNPC Low Carbon Development Progress Chart



Case Study

CNPC Working with OGCI in 2018

As the only Chinese member of the Oil and Gas Climate Initiative (OGCI), CNPC is deeply involved in international cooperation to address climate change, coordinates with other OGCI members and all sectors of society on positions and initiatives in response to climate change, and carries out relevant cooperation. We actively participate in the endeavors under the OGCI framework.

OGCI's methane target: By 2025, reduce the collective average methane intensity of the aggregated upstream gas and oil operations to below 0.25%, with the ambition to achieve 0.2%.

Low Carbon Research and Standard Setting

Active participation in relevant low carbon standard setting and research under the OGCI framework:

- Low carbon strategy: Participated in the formulation of *OGCI-2040 Low Emissions Roadmap* and OGCI methane emissions control objectives, as well as in the completion of the *Study on the Potential of Agriculture, Forestry and Other Land Uses in Reducing Carbon Emission*.
- Clean utilization of natural gas: Cooperated in the verification of methane emission in the full industrial chain of oil and gas production, and monitoring of methane emission in key production processes
- CCUS technologies: Participated in CCUS commercialization policy research and developed special CCUS commercialization programs for the Middle East and China
- Standard setting: Led the development of *Carbon dioxide capture, transportation and geological storage - Quantification and verification (ISO/TR 27915)*, laying the technical foundation for the benefit evaluation of emission reduction and carbon market access of carbon dioxide sequestration projects.

Establishment of OGCI Climate Investments China

CNPC jointly established Climate Investments China with OGCI Climate Investment Fund (CI) to invest in China's domestic low carbon market, promote research, demonstration and popularization of low carbon technologies and business models in China, and explore opportunities for low carbon transition in the petroleum industry.

Exchange and Communication With Peers

Senior representatives of the Company attended the OGCI 2018 annual meeting and exchanged professional experience with peers on issues such as the role of natural gas in energy transition in developing countries, improvement of energy efficiency and strengthening of international energy cooperation.



Development of Low-carbon Energy

As an advocate and participant of the low-carbon economy, we actively develop natural gas, coal-bed methane, shale gas, biomass energy and other low-carbon energies, attach great importance to producing and supplying clean products, and work hard to achieve clean production and consumption processes (see Chapter 1: Sustainable Energy Supply for details).

Development and Application of Low-carbon Technologies

With science and technology playing a significant role in controlling greenhouse gas emissions and addressing climate change, we carried out researches on carbon emission reduction technologies such as CO₂ flooding and storage, assessment of carbon sequestration potential in salt water layers and oil reservoirs, and CO₂ capture for flue gas from the Company's power plants. Our first CCUS base for the whole process of CO₂ separation, capture and flooding was built in Jilin Oilfield. By the end of 2018, its accumulated CO₂ storage reached 1.385 million tons. *The Supporting Technology of CO₂ Flooding and Storage and Its Application* won the first prize for technological progress from the National Energy Administration.

Carbon Emission Reduction During Production

While supplying society with clean oil products, we also pay high attention to optimizing our own energy consumption structure. We also cared about carbon emissions and carbon footprint during production and operation. In Huabei Oilfield, Tarim Oilfield and other areas, we used renewable energies such as geothermal energy and solar energy to reduce carbon emissions during production.

Huabei Oilfield has formulated the *Geothermal Utilization Development Plan of Huabei Oilfield Company (2018-2025)* to facilitate the building of the green and intelligent new city of Xiong'an New Area. Relying on the advantages of mid and low-temperature geothermal resources of the oilfield, it has built a "geothermal +" economic growth pole to promote the upgrade of local clean energy consumption. In 2018, Huabei Oilfield started to construct ten geothermal heating demonstration zones in Bohai Vocational College, Hualong Production Area, Hejian and Lixian County, aiming to cover 1.84 million square meters of heating area, which could save 50,000 tons of standard coal.

Market-based Mechanism for Carbon Saving

We actively participated in carbon trading activities to achieve carbon emissions reduction through market-based mechanisms. We are the co-founder of the Tianjin Climate Exchange (TCE), the first comprehensive emissions trading institution in China. The energy saving and emissions reduction projects developed by TCE could save more than 200,000 tons of standard coal annually, equivalent to over 500,000 tons of carbon dioxide emission reduction.

Forestry Carbon Sequestration

We actively support carbon sink forest construction and forestation activities in China. We established the China Green Carbon Foundation together with the State Forestry Administration, continuously building carbon sink forests. Meanwhile, we set up the Forestation Committee to ensure continuous forestation in our production areas and living quarters. As of late 2018, green coverage in CNPC's production areas reached 293 million square meters, representing a vegetation coverage rate of 44.59%. A total of 599,900 employees voluntarily planted 2.032 million trees in 2018.

Development of carbon capture and sequestration technologies

Construction of carbon capture and sequestration demonstration projects in Junggar Basin, Ordos Basin, Songliao Basin, etc., and development of CO₂ flooding and storage, carbon sequestration potential assessment and other relevant technologies.

Products and Service

Following the quality principle of “Integrity and Excellence”, we strengthen the quality management system and improve process quality control to create brand products. In addition, we continue to promote high-quality development for the Company by consistently improving product, project and service quality.

Quality Control

In 2018, CNPC continued to enhance quality management, focusing on system standards improvement, quality supervision and inspection, and quality culture building.



Key work	Content
System standards improvement	Developed and implemented action plan for quality improvement, with clear goals, tasks and implementation approaches
Quality supervision and inspection	- Conducted full-coverage spot checks on the quality of materials purchased by key subsidiaries - Conducted QHSE checks on Panjin Compressor Station, Changsha Branch of the Third West–East Gas Pipeline, and Togtoh Compressor Station - Spot-checked 1,395 batches of procured products throughout the year - Conducted quality supervision and spot-checks on National VI Standard oil products, and received spot-checks from national and local authorities on more than 10,000 batches of products. No unqualified products were found.
Quality culture building	- Held interactive customer activities such as “Customer Experience Day” and “Open Lab Day” - Organized QC group activities engaging 150,000 people

Major measures to ensure quality of oil products in 2018

- We studied and formulated a special spot-check program for the upgrade of oil product quality to National VI Standard, in order to enhance oil product quality management and ensure the quality of oil products offered to consumers;
- Refining and chemical companies accelerated construction of oil product upgrading equipment and strengthened production process quality control of oil products;
- Marketing companies applied strict quality standards on export of oil products, and conducted oil product quality supervision and spot checks.

Product Management

We provide consumers with products according to legal provisions and industrial standards in a responsible way. While providing products, we put emphasis on the influence on consumers and guarantee product safety. Meanwhile, we actively communicate with consumers, publish product safety risk evaluation results and make great efforts to protect consumers’ legal interests.

Quality Products and Services

Providing Quality Products

By strengthening technological innovation and promoting product quality upgrading, we provided applicable solutions for our industry as well as safe, reliable, high-quality and environmentally-friendly products for our customers. All equipment for gasoline and diesel production in our refining and chemical companies were able to meet National VI Standard.

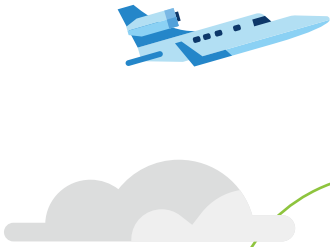
New chemical products

- FHMCRP100N and HMCRP100N, special-purpose resins for PE tubing produced by Fushun Petrochemical and Sichuan Petrochemical respectively, have passed grading certifications by the National Test Center of Polymer and Chemical Building Materials;
- LS050, special-purpose resin for PE-RT tubing produced by Lanzhou Petrochemical, has passed grading certifications by the National Test Center of Polymer and Chemical Building Materials;
- Fushun Petrochemical has achieved noticeable results in developing the dephosphorization technology for producing ESBRI502E;
- Dushanzi Petrochemical successfully produced a new NdBR product in pilot-test equipment.



Promoting Service Level

We constantly improve consumer experience and provide consumers with satisfactory and efficient services. In 2018, we launched construction of intelligent gas stations to upgrade part of existing stations to multi-energy stations that provide gasoline, natural gas and electricity.



Case Study

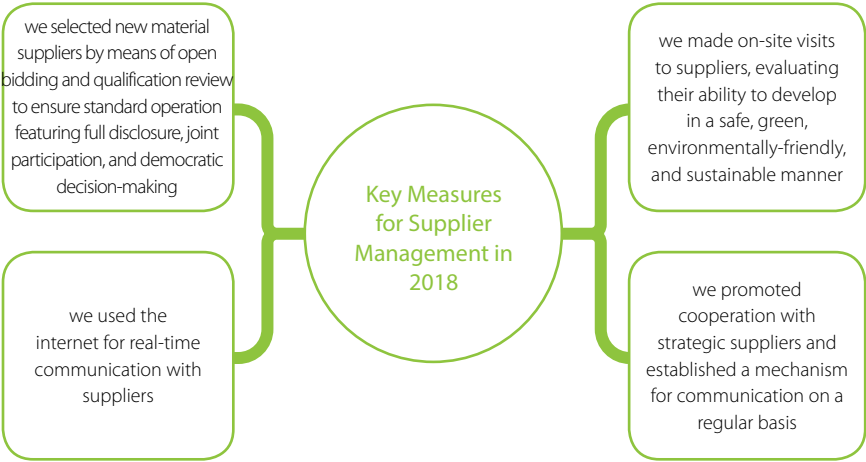
Travel with CNPC on Sichuan-Tibet Highway of G318

From April 5th to 14th, 2018, the Company launched the "Travel with CNPC" campaign again, inviting 53 drivers to have a self-drive tour on the Sichuan-Tibet section of the National Highway 318. The participants experienced the hard journey to transport oil products to Tibet, witnessed the responsibilities shouldered by CNPC as an SOE, and passed on the positive energy through the journey.

Supply Chain Management

We actively promote the sustainable development of the industrial chain. Accordingly, we work in a respectful, communicative, honest and cooperative manner to encourage our partners to jointly fulfill our social responsibilities, and provide the society with high-quality products and services.

Following the concept of "law-abidance, openness, competition, merit-based selection, and win-win results", we have built a bidding management system featuring unified management, graded responsibilities and joint supervision, and a management model characterized by separate management and operation, level and category based management, and professional implementation. We made great efforts to promote the electronic bidding platform to implement the principle of "fairness, justice and openness" and actively promoted transparent bidding and green procurement, in order to realize corporate governance by law and compliance management.



Supplier Management Principles and Philosophy

