



Safety, Environment, Quality and Energy Conservation

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

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

Operational Safety

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

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

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

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

Environmental Protection

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

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

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

Energy Efficiency

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

Soil Restoration by Using Microorganism Repair Technology

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

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

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



Wetland ecological protection at the North Azadegan project in Iran

Occupational Health

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

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

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

Quality Control

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

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

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

CNPC Won EAP Quality Award 2016

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

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

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