Key Topic

Green Development towards Carbon Peak & Carbon Neutrality

Global climate change, mainly characterized by global warming, has become an imminent crisis and tough challenge facing the human race in the 21st century, and reducing carbon emissions to cope with climate change has become a global consensus. In 2020, China made a pledge to the international community that it would strive to peak its carbon dioxide emissions by 2030 and achieve carbon neutrality by 2060. The *Working Guidance for Carbon Dioxide Peaking and Carbon Neutrality in Full and Faithful Implementation of the New Development Philosophy* released by the Chinese government made it clear that a clean, low-carbon, safe and efficient energy system should be built at a faster pace. Cleaner and more efficient energy production and consumption is an irreversible trend with a faster shift to green energy.

As the largest oil and gas supplier in China, CNPC has been committed to pursuing green development, supplying reliable energy to fuel our customers' growth and power people's happy life. We will continue to step up efforts in clean energy production and supply, energy conservation and emissions reduction, and aim to become a "leader" in energy efficiency and achieve the goal of carbon peak & carbon neutrality while ensuring energy security of our country.

Top-level Design for Green Development

CNPC has included low-carbon and green development into its corporate strategies, mapped out a three-step approach of "clean alternative, strategic replacement and green development" , and set out the timetable and roadmap for carbon peak and carbon neutrality. We aim to peak carbon dioxide emissions by 2025, supply more zero-carbon energy than fossil energy consumed by 2035, strive for near-zero emissions by 2050 and achieve carbon neutrality by 2060.

Focusing on the shift to the low-carbon and green development model, the Company has restructured its business operations and reformed its organizational structure. In management, the Company has formed a leading group for new energies and new materials business to oversee the Company's development strategy and planning in new energies. In the reform of business segments, the Oil, Gas & New Energies Business Group was established to promote the clean energy business.

CNPC's Green and Low-Carbon Development Actions

Green Business Leader Action	◆ Energy Saving and Carbon Reduction Project ◆ Methane Emissions Reduction Project ◆ Ecological Conservation Project ◆ Green Culture Project
Clean and Low-Carbon Energy Contributor Action	◆ "Natural Gas+" Clean Energy Development Project ◆ "Hydrogen+" Zero-Carbon Fuel Supply Chain Upgrade Project ◆ Modern Integrated Energy Service System Restructuring Project
Circular Carbon Economy Pioneer Action	◆ Deep Electrification Reform Project ◆ CCUS Industrial Chain Construction Project ◆ Zero-Carbon Production and Operation Reengineering Project

Adjusting business structure to increase the supply of clean energy

As a bridge fuel from fossil energy to clean energy, natural gas is becoming an important solution to China's energy transformation towards the "3060" goal. In recent years, the Company has made great efforts to ensure supply and adjust business structure in line with the principle of Carbon Reduction, Carbon Utilization, Carbon Substitution and Carbon Sequestration, seeking for sustained clean energy supply and driving the growth in natural gas production.

In 2020, the Company's domestic natural gas production accounted for more than 50% of the oil and gas mix for the first time, and the domestic natural gas output reached 137.8 bcm in 2021, accounting for 51.6%. The Company aims to increase the proportion of natural gas to about 55% by 2025.

Actively exploring new energies business to create a low-carbon energy ecosystem

In addition to boosting its natural gas output, the Company expands actively the new energies business as a green growth engine to foster a low-carbon energy ecosphere where fossil fuels and new energies are developed in a coordinated way, with oil and gas as the mainstay.

In 2021, the Company continued to press ahead with its green development blueprint in six new energies demonstration bases and five key projects, and breakthroughs were achieved in geothermal, wind and solar power generation, hydrogen refueling stations etc. Throughout the year, 39 new energy projects were put into operation, adding 3.50 million TCE to the Company's new energy capacity and increasing the total new energy capacity to seven million TCE. The Company received a 1.2 million-kilowatt quota for wind and solar power generation and added 0.24 million kilowatts to the existing installed wind and solar capacity; the geothermal heating area increased by 9.6 million square meters; 1,500 t/a high purity hydrogen capacity became operational and 8 hydrogen refueling stations (integrated service stations) were completed, including four hydrogen refueling stations (integrated service stations), e.g. the Taizicheng station in Chongli District, Zhangjiakou, to support about 1,000 hydrogen fuel cell vehicles serving the Beijing Winter Olympic Games.

Photo Story

The technicians were connecting the cable for photovoltaic power generation panels in the photovoltaic demonstration project in Yumen Oilfield. In December, 2021, a 200,000 KW photovoltaic power plant in Yumen Oilfield was connected to the grid. When operating at full capacity, the photovoltaic power plant will generate approx. 400 million kWh per year, equivalent to saving 110,000 TCE and reducing sulfur dioxide and carbon dioxide emissions by 97 tons and 280,000 tons respectively.

Located in Chongli, Hebei province, a competition site for the 2022 Winter Olympics, the hydrogen refueling station at the Taizicheng service center is the Company's first hydrogen refueling demonstration station with a designed hydrogen storage capacity of 1,000 kg. The station delivered hydrogen to serve transportation vehicles in the core area of Zhangjiakou competition zone during the Olympic Games.

Pushing ahead with technological innovation to facilitate green and low-carbon development

Putting great emphasis on science and technology, the Company has integrated innovation into its industrial chain and made headway in implementing key national science and technology projects and building a Digital CNPC, with new achievements in energy conservation, energy consumption reduction, new energies and CCS/CCUS etc.

In August 2021, the Company's two proprietary ethane-to-ethylene projects were put into operation and recognized as national green and low-carbon development demonstration projects for world-leading energy consumption and carbon dioxide emission.

CCS/CCUS in Low-Carbon Development

The Company has stepped up efforts in R&D and commercialization in CCUS to take carbon capture and utilization to the next level, and help to reach the carbon peak & carbon neutrality goals.

Jilin Oilfield continued to improve its capabilities for enhanced oil recovery with carbon capture, utilization and storage (CCUS-EOR) and completed China's first full-process CCUS-EOR demonstration project. The project includes five demonstration areas for carbon dioxide flooding and storage, covering 11.83 million tons of geological reserves and over two million tons of carbon dioxide in 88 injection well groups in total, providing an annual storage capacity of 350,000 tons. The first low-cost carbon dioxide recycling and injection station in China was completed to reinject 200,000 cubic meters of carbon dioxide per day, injecting all the associated gas and reaching zero emission of carbon dioxide.

In the CCS/CCUS demonstration project of Changqing Oilfield in Dingbian, Shaanxi Province, a 100,000-ton injection station for comprehensive testing has been completed to provide a holistic technical approach to carbon capture, oil displacement and storage.

Tarim Oilfield leveraged CCUS-EOR to optimize its energy consumption structure and used carbon dioxide flooding to enhance oil recovery and achieve carbon emission reduction. The first carbon dioxide flooding project in the Donghe 6 block showed initial success.

Jilin Oilfield CCUS-EOR Full-Process Demonstration Project

Strengthening exchange and cooperation towards green development goals

In 2021, the Company took the lead in setting up China Oil and Gas Methane Alliance to provide a high-quality and open platform for information sharing and collaboration on improved control of methane emissions.

The Company continued to strengthen its involvement in the Oil & Gas Climate Initiative (OGCI). The Company and other OGCI member companies signed the OGCI's Strategy Refresh Document, pledging to achieve carbon neutrality (net-zero emissions) in operations under their control within the time frame specified in the *Paris Agreement* and speed up efforts to accomplish the temperature control target; the Company worked with Saudi Aramco in leading the research on emission reduction technologies in key areas of transportation.

Participating in carbon trading and using market mechanisms to reduce carbon emissions

The Company issued Measures on Carbon Trading Management and Measures on the Management of Voluntary Greenhouse Gas Emission Reduction Projects and worked to build a management system for trading of carbon emission rights to regulate trading activities, oversee carbon allowance compliance in member companies, and encourage member companies to launch their own voluntary emission reduction projects. In 2021, the Company ensured full compliance with its annual carbon allowance.

The Company also played an active role in building China's carbon trading market. On July 16, the Company participated in the first-day trading of the Shanghai Environment and Energy Exchange, and became one of the 10 companies receiving the National Carbon Market First-day Trading Certificate, which was highly recognized by the Ministry of Ecology and Environment.

Developing forestry carbon sinks to promote harmony with nature

The Company has been advancing toward its carbon neutrality goal by expanding forestry carbon sinks through voluntary tree planting, cooperation programs with localities and centralized forestation. In 2021, the Company's participation in the voluntary tree planting reached 414,000 person-times, planting 1,994,500 trees and increasing the existing afforestation area to a total of 289.4 million square meters; the Company also participated in or provided funds for local forestation programs covering 791.32 hectares with 1,631,800 trees. The Company's first carbon-neutral forest, Ma'anshan Carbon-Neutral Forest – Phase 2 in Daqing Oilfield, was completed, covering an area of 510 mu. Remarkable progress was made in planting carbon sink forests in Xinjiang Oilfield and Jiyuan (Changqing Oilfield).

In the future, CNPC will endeavor to build it into a green enterprise, push ahead with the shift from an oil and gas supplier to an integrated energy service provider and make greater contributions to achieving the strategic goal of carbon peak by 2030 and carbon neutrality by 2060.

Photo Story

On July 6, 2021, the first 66,000 tons of carbon-neutral liquefied natural gas (LNG) supplied by Shell Eastern Trading to PetroChina International unloaded at Dalian Port. The LNG cargo is able to meet the demand of 3.6 million households for a month, if based on the average gas consumption of a 3-person urban household. This marks the world's first carbon-neutral LNG transaction under a long-term contract.