



## SUSTAINABLE ENERGY SUPPLY

It is CNPC's responsibility and mission to meet energy challenges and satisfy the ever increasing demand for low-carbon and clean energy. To this end, we enhance technological innovation to continuously increase our efficiency in hydrocarbon development and utilization. We boost the natural gas industry, expand new energies and new materials business, and raise the proportion of clean energy in our energy supply. With these efforts, we strive to make contributions to the construction of a diversified, clean energy supply system and the prosperity of human society.



---

Energy and Future	➤ 28
Technology and Innovation	➤ 30
Clean Energy	➤ 36
Climate Change	➤ 40
Energy Cooperation	➤ 44



## Energy and Future

### » Opportunities and Challenges

**Total energy demand keeps growing.** Technological innovation is the key to promoting energy development. There is still considerable room for reduction in the cost of efficient and clean energy technologies. With the economic development of developing countries and the promotion of advanced energy technologies, energy poverty will be gradually eliminated and energy accessibility will be improved. By 2060, global primary energy demand will increase to between 26.2 billion and 29.4 billion tons of standard coal, an increase of 37% to 54% compared with 2020.

**Lack of equal access to energy remains prominent.** At present, over 1.2 billion people worldwide still lack access to affordable modern energy, and developing countries are still using large amounts of highly polluting and high-carbon energy. Helping this group obtain equal access to clean, low-carbon and affordable energy is not only a requirement for achieving the Sustainable Development Goals (SDGs) of the United Nations, but also the key to achieving global temperature control goals.

**Response to climate change is challenging.** At the 29th United Nations Climate Change Conference, countries committed to submitting new voluntary emissions reduction contributions. However, the annual investment promised by developed countries in addressing climate change was far lower than the required USD 1.3 trillion, resulting in insufficient investment in energy transition and a slowdown in technology diffusion, hindering the global response to climate change.

**China accelerates the building of a new energy system.** Under the construction of the new energy system, energy development has entered a new stage. On the one hand, the capacity to ensure energy supply has continued to improve. Energy output will increase from 5 billion tons of standard coal in 2024 to 6 billion tons of standard coal in 2060, and the energy self-sufficiency rate will steadily rise to 95%. On the other hand, the clean development of energy consumption is accelerating. Fossil energy demand will peak around 2028, and energy-related carbon emissions will reach their peak. Non-fossil energy is growing rapidly and gradually becoming the main body of energy supply. By 2060, it is expected to exceed 5 billion tons of standard coal, accounting for 78% of primary energy.

### CNPC's green and low-carbon transition path



#### Measures

- To enhance the development and utilization of geothermal energy, solar energy, wind, hydrogen and other new energy sources, promote clean substitution of energy in production, and promote the coordinated development of new energies and oil and gas industry chain.
- To actively promote the integrated development of natural gas power generation and new energy power generation to provide clean energy products for society.
- To actively deploy technological breakthroughs and pilot demonstrations in resource replacement fields such as hydrogen energy industry chain and clean conversion and utilization of fossil energy, and strive to complement CCUS measures to actively explore the clean development and utilization of fossil energy at lower cost.
- To vigorously promote synergy in energy conservation, carbon reduction and pollution reduction, steadily promote clean alternatives to self-consuming energy, and step up cleaner production and pollution control.

## » Strategic Response

The world is undergoing a profound and rapid energy transition towards a cleaner, low-carbon, more efficient and diversified energy structure. Especially at a time of sluggish global economic growth and an intensified backlash against globalization, energy companies should work together to overcome difficulties, explore new opportunities and seek sustainable development. As a major player in the oil and gas industry and China's largest oil and gas producer and supplier, CNPC has been actively cooperating with the government and companies in the industry chain, and strives to provide clean, low-carbon, safe and efficient energy while meeting future energy demand, in an effort to jointly build a sustainable energy future.

Committing ourselves to the value pursuit of "pursuing green development and providing reliable energy supply to fuel our customers' growth and power people's happy life", we have been accelerating the green and low-carbon transition. We incorporate "green and low-carbon development" into the five strategies in the three-step plan "clean alternatives, strategic replacement, green transformation". First, we leverage our rich gas resources and increase gas production, while stabilizing oil production. Second, we make good use of our abundant resources and infrastructure to promote the integrated development of wind, solar, gas and electricity, with a focus on geothermal, electricity and hydrogen, accelerating the transition to become an integrated energy company covering "oil, gas, geothermal, electricity and hydrogen". Third, we promote the green action initiative, and implement energy conservation, emission reduction and clean energy replacement in production, to reduce fossil energy consumption and CO<sub>2</sub> emissions from the source, and achieve carbon reduction; we accelerate the industrial layout of CCUS/CCS, strengthen the development of forestry carbon sinks, chemical utilization of carbon dioxide, etc., striving to achieve carbon removal, and contribute to the achievement of the "Carbon Peak and Carbon Neutrality" goals.

### Strategic replacement (2026-2035)

- To promote the coordinated development of new energies and new businesses with the oil and gas business. To allow new businesses such as clean electricity, hydrogen energy industry chain and clean transformation of fossil energy to initially form a strategic replacement pattern for oil and gas resources.
- To promote the implementation of CCUS and carbon sink projects on a large scale to continuously reduce carbon emissions.

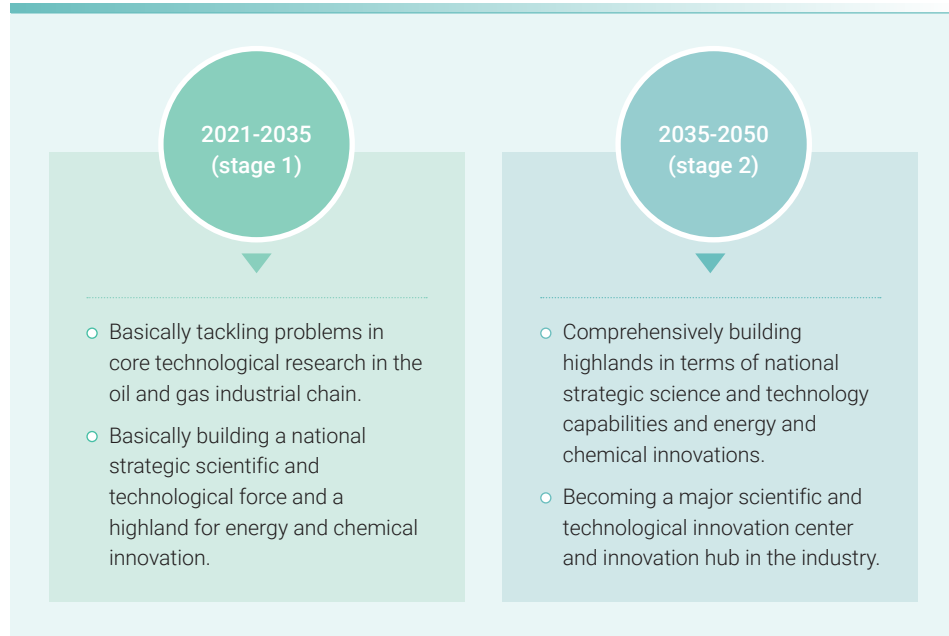
### Green transformation (2036-2050)

- To continue increasing the development and utilization of new energies and strategic replacement of oil and gas resources, and improve the five major energy platforms of "oil, gas, geothermal, electricity and hydrogen" energy.
- To intensively implement electrification transition, develop CCUS/CCS strategic replacement industries, and promote the development of carbon circular economy.

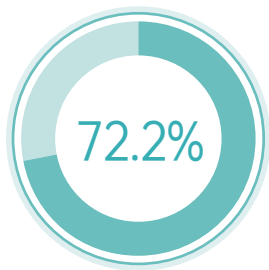
## Technology and Innovation

We put more emphasis on the innovation strategy. We endeavor to deploy innovation chains based on industrial chains, and enhance the value chains driven by innovation chains. We drive high-quality supply through innovation, and address global challenges such as equal access to energy, reduction of carbon emissions, and improved energy efficiency.

### CNPC's goals for technological development

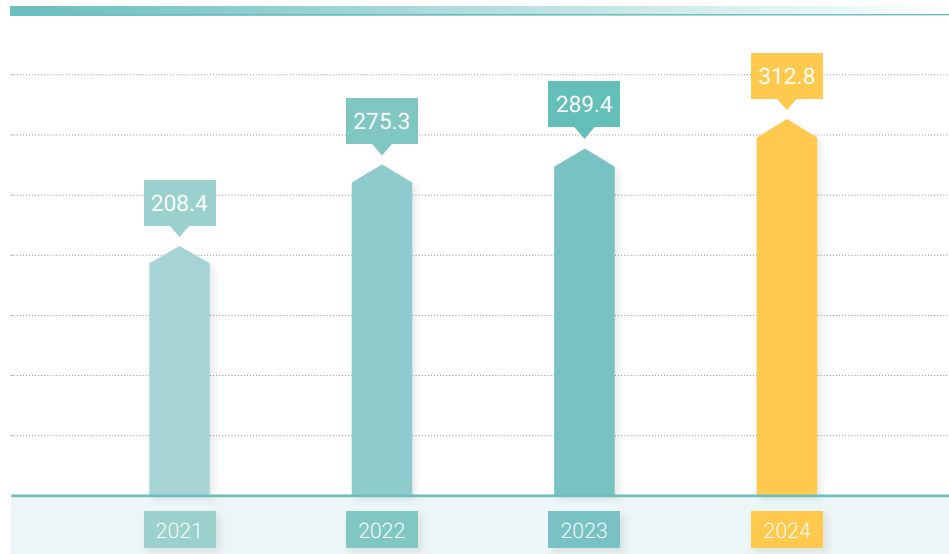


Proportion of R&D in total revenue



Key/core technology breakthrough rate

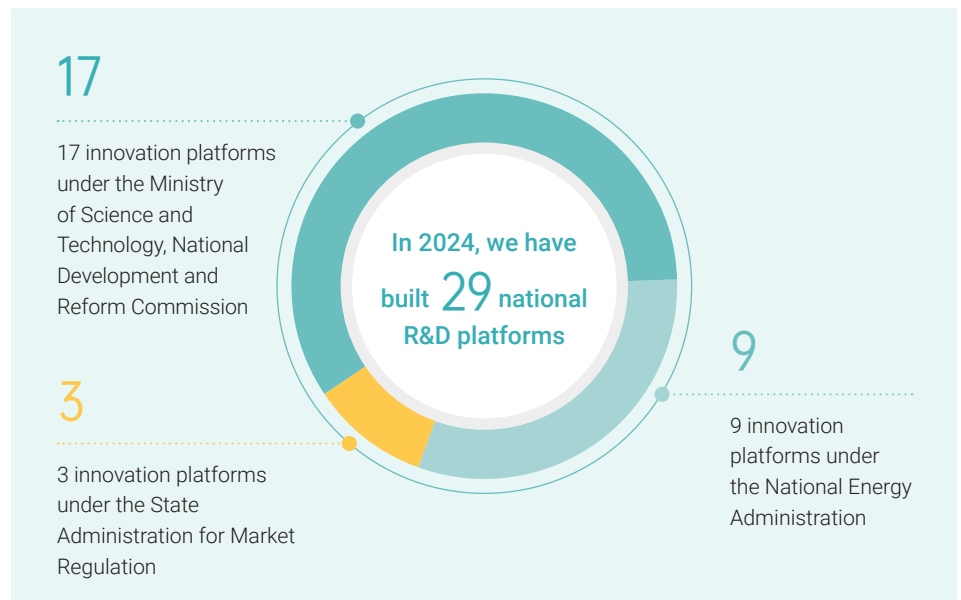
### R&D investment (RMB 100 million)



## » Innovation Platforms

CNPC has 91 research institutions and departments, with 13 directly affiliated to the Company and 78 enterprise-level scientific research institutions. CNPC also has 29 national R&D platforms and 57 CNPC key laboratories and experimental bases, covering the upstream, midstream and downstream sectors, and supporting and leading the Company's sustainable development.

CNPC maintains a two-level (national-level and provincial/industry-level) talent cultivation platform, and has formed an excellent team of 234 scientific and technological experts, 749 core research fellows, and 1,000 young scientific and technological candidates.



## » Scientific and Technological Achievements

Guided by the construction of national strategic scientific and technological forces, CNPC intensified efforts in its major scientific and technological projects for technological innovation and formed a batch of innovative theories and new technologies/new products with proprietary intellectual property rights. CNPC also accelerated efforts in breakthroughs in a number of key and core technologies, in order to provide strong technological support for the high-quality development of the Company.

### In 2024, CNPC

- Applied for **11,381** invention patents at home and abroad, with **3,850** granted.
- Formulated and released **6** international standards and **4** advanced foreign standards. Of which ISO/TS20790:2024 *Oil and gas industries including lower carbon energy – Guidelines for green manufacturing and lower carbon emission of oil and gas-field equipment and materials* was the first standard of its kind led by the Chinese oil and gas sector; also a new model for cooperation was set up for countries like Benin by helping to build national oil pipeline standard systems.
- Two experts from CNPC Tubular Goods Research Institute (TGRI) won the ISO Excellence Award for their contribution to ISO's technical work in standardization in pipeline transportation system.



On June 24, at the national science and technology award conference, BGP's "Key technology and equipment of wide azimuth, broadband, and high density seismic prospecting" was awarded the First Prize of the State Technological Invention Award.

**CNPC's Top 10  
Scientific and  
Technological  
Achievements  
in 2024**

- 1 Significant progress in key technologies for deep earth drilling into formations below 10,000 m
- 2 Industrial application of China-developed metallocene catalysts
- 3 Official release of the Kunlun Large Model with 70 billion parameters
- 4 Domestic substitution and industrial application of large geological engineering integrated fracturing software system
- 5 The first set of mobile "NMR-Laser-CT" integrated measuring equipment for rock samples at the well site
- 6 The 3000-m oSeis OBN supports oil and gas exploration in ultra-deep water
- 7 Innovative geological theory of the whole petroleum system promoted the discovery of insource reserves in the Fengcheng Formation, Northwest China's Junggar
- 8 Major breakthrough in nylon 66 complete technology with benzene as a single raw material
- 9 Development and commercialization of gas-phase polyolefin elastomer (POE) technology
- 10 1-MW downhole electrically heating steam dryness enhancement technology facilitates effective recovery of deep heavy oil

## » Digital Empowerment

The Company has incorporated "digital CNPC" as its fifth major strategic initiative. In line with the principle of "value orientation, strategic guidance, innovation-driven development, and platform support", it implements digital transformation through three pillars of business development, management reform, and technological empowerment. By building an industrial internet technology system and an application ecosystem centered on cloud platforms, the Company continuously extends its transformation from individual domains to the entire production and operation chain.

In 2024, we accelerated the progress in IT Reinforcement, Digital Empowerment and Intelligent Operation. Significant achievements were made in the building and application of the Service Station 3.0 Program, the Unified Office Platform, and the Engineering Intelligence Support Center etc. The Kunlun Large Model released two updates; the pilot projects of digital transformation were burgeoning; the Yunmengze Smart Platform was up and running; network security and new infrastructure support capabilities were further enhanced. All this demonstrates significant progress in the transition to a "digital CNPC" with a digital ecosystem for the intelligent energy and chemical operations, providing strong support for the Company's efforts in deepening reform and building into a world-class enterprise.

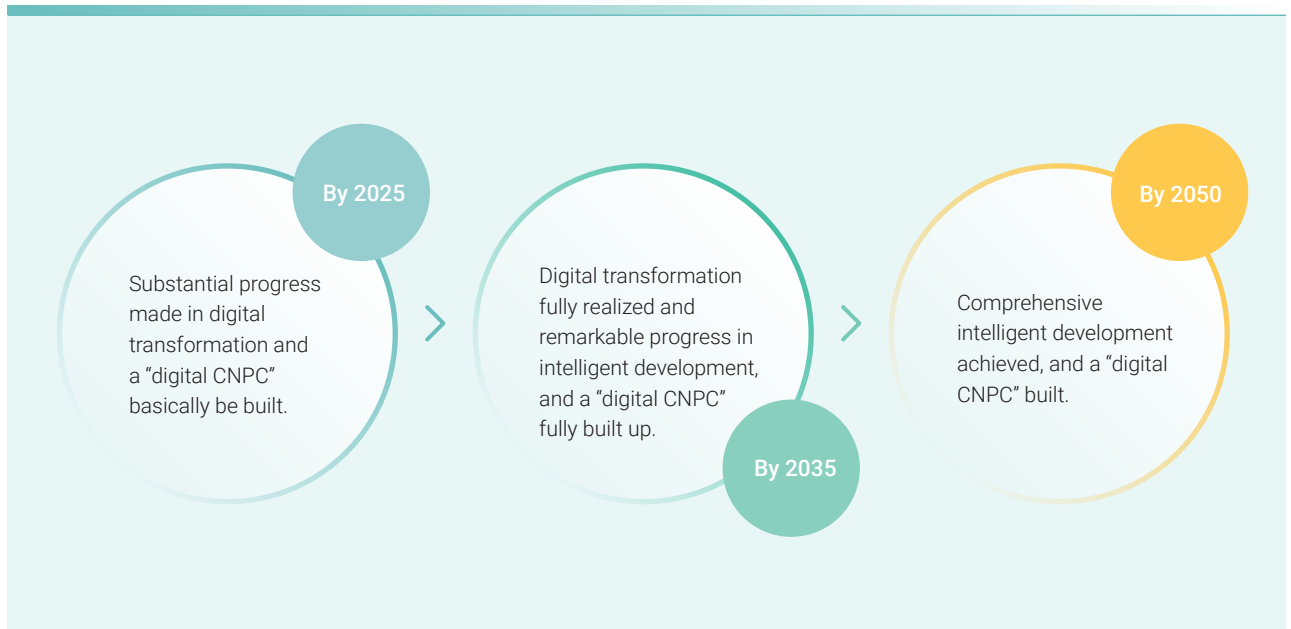
### Case | Launch of 70-billion-parameter Kunlun Large Model

In 2024, the Company launched the 70-billion-parameter Kunlun Large Model, presenting 43 specialized and general-purpose application scenarios designed for the petroleum industry. The Kunlun Large Model has passed China's generative AI service registration, becoming the first registered large model in China's energy and chemical industry. Jointly developed by CNPC, China Mobile, Huawei and iFLYTEK, the model was trained across 8 iterations, with 18 application scenarios developed. It established extensive industry-specific datasets, and built a customized AI mid-office, and an intelligent computing environment. This has led to the preliminary formulation of a methodology for implementing large models in major enterprises.




### Case | Pilot Launch of the Yunmengze Smart E-commerce Platform

In September, 2024, the pilot version of Yunmengze Smart Platform, CNPC's first e-commerce service platform for the energy and chemical industry was launched. This platform aims to streamline all aspects of the industrial chain, including production, trading, and distribution. Employing an "Agile + Waterfall" implementation strategy, it leverages CNPC's existing digital infrastructure to rapidly integrate across systems, providing comprehensive ecosystem-based services such as trading, logistics, finance, data, and technology to the energy and chemical industry chain. On December 31, 2024, the pilot phase included 743 functionalities, covering three core operations, i.e., marketing and sales of chemicals, logistics, and finance. The platform has been open to internal and external users through a unified enterprise portal and App, demonstrating a leading role in bolstering the online, standardized, and digital transformation of CNPC's trading operations.

### Development map for a "digital CNPC"



## Goals and achievements in CNPC digital transformation

Areas	Goals
<p><b>Business development</b></p> 	<p><b>Coordinated and optimized oil and gas businesses</b></p> <p>To achieve overall benefits and maximum value for shareholders, we made synergized efforts in resources allocation optimization, business performance coordination, and emergency response.</p> <hr/> <p><b>Transformation and upgrading of main businesses</b></p> <p>Industrial transformation and upgrading was driven by integrating Internet of Things, big data, AI etc. into the Company's businesses.</p>
<p><b>Management reform</b></p> 	<p>By digital transformation in decision-making, operation and management, collaboration OA, R&amp;D, and service sharing, we promoted the modernization of corporate governance systems and governance capabilities.</p>
<p><b>Technological empowerment</b></p> 	<p>To build first-class industrial Internet system of energy and chemicals, and empower digital transformation technologies.</p>

## Achievements

- The Company made steady headway in building its production and operation platform. Engineering Intelligent Support Center (EISC) introduced an engineering management model, featuring “Headquarters EISC for coordinated remote support, regional center for whole-process management, and direct instructions for on-site operations”. New functionalities such as intelligent fracture risk identification and real-time oil testing monitoring were added, achieving comprehensive coverage of geophysical exploration, drilling, logging, fracturing, and oil testing operations. New features of intelligent production safety management were added, including safety management scenarios for well sites, stations, oil depots, and refineries and petrochemical facilities etc. The safety management interface expanded to cover production sites, significantly enhancing the capability to prevent disruptive risks.
  - The Service Station 3.0 was fully launched, introducing the industry’s pay-by-palm scenario. Innovative applications such as e-fueling, one-click shift closing, volume-based performance, and intelligent risk control were being deeply integrated, significantly reducing single-customer service time.
  - The intelligent operation system was further streamlined by incorporating key data monitoring for natural gas uploading, new energy power generation, and all drilling rig operations. The scope of production and operation monitoring further expanded to enable daily tracking of the company’s full-chain production and operation plan execution and improve resource allocation capabilities in support of natural gas supply scheduling.
  - The industrial vision system was fully deployed, substantially enhancing visual insights in production processes and emergency control capabilities. The centralized carbon asset management platform was up and running, effectively facilitating the transition to facility-level carbon emission accounting.
- **Intelligent Oil and Gas Fields:** A new model designed to facilitate the transformation of our domestic oil and gas fields was introduced, featuring unmanned operation of key production sites, real-time sensing of equipment status, integrated exploration and development collaboration, intelligent connectivity and automatic optimization of the entire production process for wells, stations, plants, and equipment on the production site; and streamlined organizational and personnel structures. For overseas operations, a digital management and control mechanism for capacity construction and ground engineering was introduced; the pilot projects of unmanned operation rapidly advanced; and the management efficiency of oil and gas well production operations further improved. Changqing Oilfield passed the Level 4 Maturity Evaluation for Digital Transformation, and Tarim Oilfield was included in SASAC’s List of Digital Transformation Pilot Projects in State-owned Enterprises.
  - **Intelligent Refining & Chemicals:** The next-generation production and operation models were established, enabling comprehensive sensing, real-time monitoring, predictive alerts, intelligent response, collaborative optimization, and precise execution. Dushanzi Petrochemical and Guangdong Petrochemical passed the Level 4 Maturity Evaluation for Intelligent Manufacturing, and Lanzhou Petrochemical was included in SASAC’s List of Digital Transformation Pilot Projects in State-owned Enterprises.
  - **Intelligent Sales & Marketing:** Accelerating platform-based ecosystem development, the Service Station 3.0 system and the uSmile Mall fully supported the Company’s sales and marketing operations. The comprehensive management system of crude oil production and marketing was upgraded to support the unified management of crude oil by-product sales. The Sales & Marketing IOT achieved the full-coverage monitoring of all national-level key oil depots.
  - **Intelligent Natural Gas Sales & Marketing:** New achievements included an integrated model for online and offline sales, an omni-channel intelligent customer service system, an efficient response mechanism, and intelligent stations with 24-hour monitoring.
- The key IT Reinforcement projects advanced with high quality. In line with the four major goals of integrating logistics, capital flow, information flow, and workflow; integrating business and finance; coordinating production and operation; and coordinating upstream and downstream operations, the Company completed the blueprint design, centralized system implementation, and integrated testing with high quality with a focus on data, process and standardization. The full-chain verification of the first participating units achieved overall success with desired results.
  - The Unified Office Platform was launched, providing a collaborative and personalized workbench based on the “platform + application” approach and enabling “one-click login and unified to-do list”, and solving the problem of users logging into multiple systems, to promote the shift of work mode from “people-driven” to “task-driven”.
  - The global shared service system continued to expand, featuring a comprehensive quality management system with “risk management, regulatory compliance, standardization, and customer satisfaction” for shared financial services and the visualization of talent management and in-depth talent mining for shared HR services.
- The Kunlun Large Model released two versions, forming an industry large model with 70 billion parameters for language, 300 million parameters for vision, and 16 billion parameters for multi-modal processing. As the first nationally registered large model in China’s energy and chemical industry, the Kunlun Large Model is named one of the exemplary cases by the Ministry of Industry and Information Technology.
  - Based on its four data centers, the Company continued to improve the complementary and integrated network and strengthen the IT infrastructure support capabilities.
  - The Three-Year Data Governance Action Plan was completed, effectively improving data standards, consolidating the unified control foundation of data resources, and ensuring the integrity, efficiency and security of data transmission. The data catalog of CNPC was created, achieving “data retrieving on demand” across all data domains; the standardization of public data made progress, significantly improving the quality of operational management data.

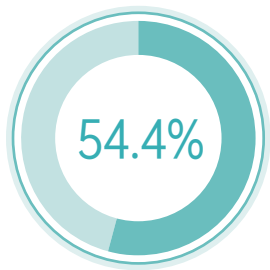
## Clean Energy

In order to secure the sustainable supply of clean energy in the future, we have been vigorously developing natural gas. Particularly, we accelerate the development and utilization of unconventional natural gas, and deploy the new energies and new materials businesses in a faster manner to meet market demand for clean and high-quality energy and products.

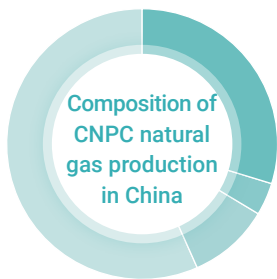
### » Natural Gas

As natural gas is a bridge from fossil energy to clean energy, its development and utilization is fundamental to green and low-carbon transition. Taking natural gas as a strategic, growing and value-added project, CNPC keeps strengthening natural gas exploration and development, developing unconventional natural gas such as tight gas, shale gas and coalbed methane, and importing overseas natural gas to build a diversified energy supply system.

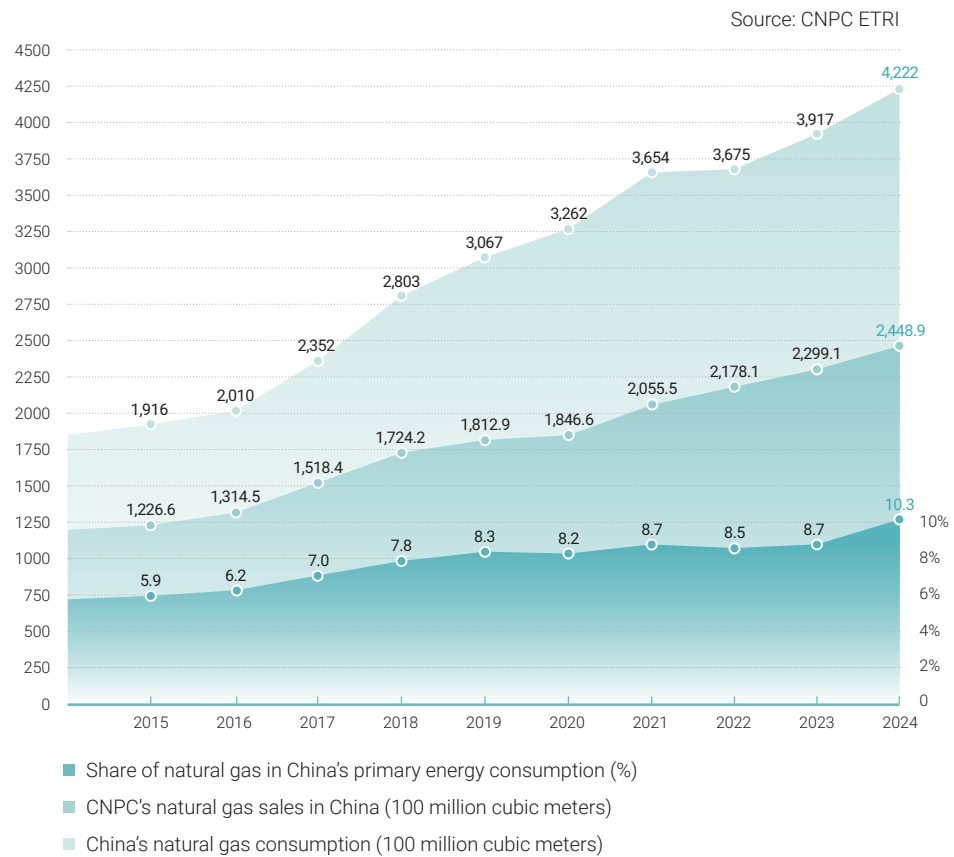
#### Optimized green energy structure



Share of domestic natural gas output in CNPC total oil and gas production equivalent



■ Tight gas	29.9%
■ Coalbed methane	3.8%
■ Shale gas	9.7%
■ Conventional natural gas	56.6%






In 2024, CNPC's natural gas output was 190.5 billion cubic meters, of which 158.64 billion cubic meters were produced domestically, an increase of 3.8% over the previous year, accounting for 64.4% of the national total. Throughout the year, the Company increased domestic natural gas production, intensified the introduction of overseas pipeline gas, and strived to enhance supply capacity. It supplied 244.89 billion cubic meters of natural gas to the domestic market, an increase of 6.5% compared with the previous year.

### Case Ensuring gas supply for residential heating in winter

1. We deployed in advance domestic key production capacities and the capacity building of gas storage and peak-shaving during the heating season. By tapping our production potential of domestic gas, imported gas and gas storage, we saw a steady increase in the total gas supply in the 2024-2025 heating season.
2. We actively coordinated to stabilize and increase the gas supply from Russia, and made every effort to secure an earlier incremental supply for winter heating. On December 1, 2024, we reached the contracted daily supply of 38 billion cubic meters per year for 2025 ahead of schedule.
3. We gave priority to ensuring the gas injection resources of gas storage facilities, guaranteed the completion of the national annual injection task, and consolidated the resource foundation for peak shaving and supply guarantee during the 2024-2025 heating season.
4. We worked flat out to ensure stable supply by signing new contracts, carrying out the verification of the gas consumption structure of urban gas users, ensuring the full coverage of gas for people's livelihoods, and striving to meet the new demand such as the "coal-to-gas" transformation in Hebei and Shaanxi provinces. We also formulated contingency plans for reducing supply interruptions and enhancing our abilities in comprehensive coordination and emergency response.

### Unconventional natural gas

		
<p style="text-align: center;"><b>Shale gas</b></p> <ul style="list-style-type: none"> <li>○ Five shale gas fields: Changning, Weiyuan, Luzhou, western Chongqing, Zhaotong.</li> <li>○ Total output: 15.32 billion cubic meters, an increase of 510 million cubic meters from last year.</li> </ul>	<p style="text-align: center;"><b>Coalbed methane</b></p> <ul style="list-style-type: none"> <li>○ Two coalbed methane bases: southern Qinshui Basin, eastern Ordos Basin</li> <li>○ Total output: 6.03 billion cubic meters, an increase of 1.72 billion cubic meters from last year.</li> </ul>	<p style="text-align: center;"><b>Tight gas</b></p> <ul style="list-style-type: none"> <li>○ Tight gas fields: Sulige (Changqing Oilfield), eastern Ordos Basin (Coalbed Methane)</li> <li>○ Total output: 47.43 billion cubic meters, an increase of 2.33 billion cubic meters from last year.</li> </ul>

### Utilization of Natural Gas as an Alternative Energy Source

We accelerated the construction of the production, supply, storage and marketing system, as well as the comprehensive utilization of clean energy projects. We continued to promote the comprehensive utilization of natural gas as urban gas, industrial fuel, chemical raw materials, and vehicle and vessel fuels, and in power generation. We accelerated the implementation of renovation projects using natural gas as an alternative to coal, and continuously promoted projects such as gasification in Longjiang, Gansu, Yunnan, and Xiong'an (Hebei), enabling clean energy to benefit thousands of households. In 2024, the total domestic terminal sales of natural gas increased by 14.0% year-on-year.

**Case** Green transportation

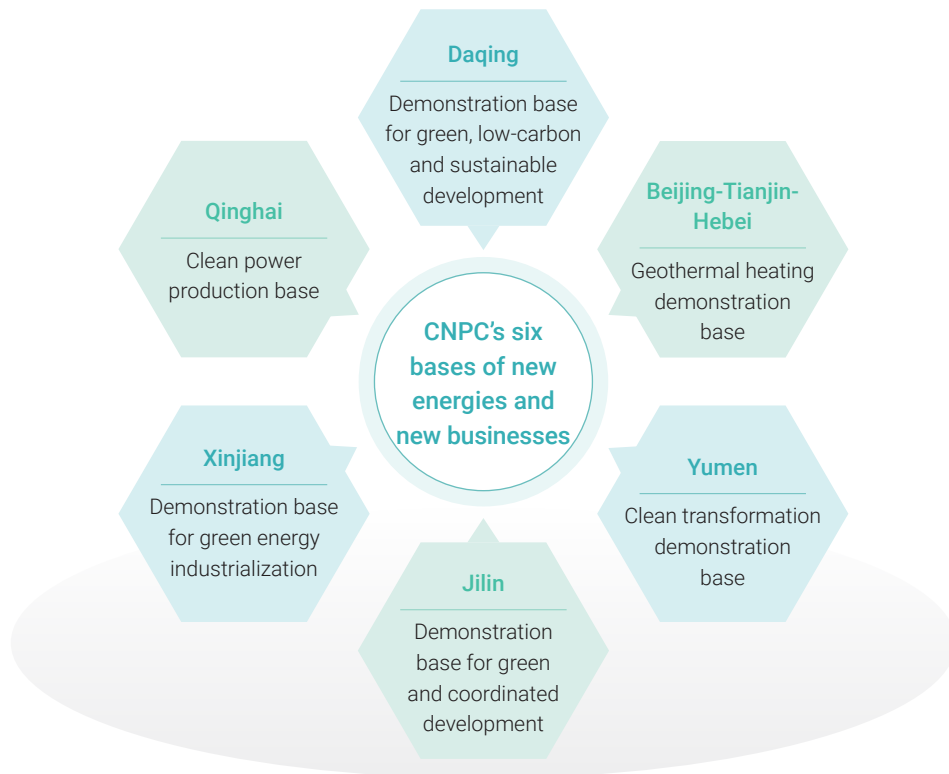
CNPC is committed to LNG application in shipping, by giving full play to the advantages of industrial synergy to fulfill social responsibilities. As one of the three domestic operators with offshore LNG refueling capabilities, CNPC has achieved regular refueling in Shenzhen and Zhoushan since it completed the first LNG refueling at Yantian Port (Shenzhen) in November 2022, providing clean and low-carbon LNG fuel for international ocean-going vessels.

**Case** Green power drives regional development


In 2024, CNPC supplied 40.7 billion cubic meters of natural gas in the Beijing-Tianjin-Hebei region. The supply in the Yangtze River Delta region reached 32.89 billion cubic meters, with a year-on-year increase of 5.0%. It supplied 12.5 billion cubic meters in the Pearl River Delta region, with a year-on-year increase of 11.7%.

» New Energies

We incorporated new energy into our main operations and formulated a special plan for the development of new energies and new businesses. We vigorously promoted the integrated development of geothermal energy, wind, solar PV, gas, and electricity, advanced the fullindustry-chain development of hydrogen production, transportation, storage and utilization, and pushed forward the transformation of CNPC into an integrated energy service provider of "oil, gas, geothermal, electricity and hydrogen", striving to become the backbone of supplying clean energy and building a beautiful China. In 2024, Jilin Oilfield's first large-scale centralized wind power project has been connected to the grid, and a number of key new energy projects in Daqing, Xinjiang, Tarim have started construction.




### Progress in new energies and new businesses in 2024



Geothermal

- New geothermal heating area exceeded 15 million square meters (including operation and maintenance), and the cumulative heating area exceeded 50 million square meters (including operation and maintenance).
- Signed a new geothermal heating agreement covering 75.12 million square meters.
- The geothermal heating project in Caofeidian New Town, eastern Hebei Province, has set a new record for the largest single geothermal heating project in the middle and deep layers in China.

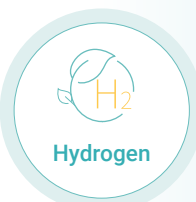
---



Wind and solar

- The cumulative installed capacity of wind and solar power generation has exceeded 10 million kilowatts (including visual progress).
- Jilin Oilfield Angge 550 MW wind power project, Qinghai Oilfield Golmud 1-million-kW power projects has been connected to the grid for power generation.
- The Korla 1.3 million kilowatt photovoltaic power generation project was completed in Tarim Oilfield.

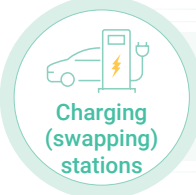
---



Hydrogen

- The total annual production capacity of high-purity hydrogen reached 8,100 tons, an increase of 23% compared with the previous year.
- 813 tons of high-purity hydrogen were produced, an increase of 136.3% compared with the previous year.
- The drilling for CNPC's first "hydrogen-to-oil" project in Sulige, Changqing Oilfield - has started.
- A total of 26 hydrogen refueling stations were built, representing an increase of 24% from the previous year.

---



Charging (swapping) stations

- 3,803 charging (swapping) stations (47,000 charging guns) were in operation.

### » Green Products

We optimized the energy consumption structure by upgrading energy products. In 2024, our hydrogen production capacity has been further enhanced. The high-purity hydrogen project of Qingyang Petrochemical with five sets of operating facilities has been put into operation. The annual production capacity of high-purity hydrogen has reached 8,100 tons, and the output has increased by 136.3% year-on-year.



**8,100** tons per year

High-purity hydrogen production capacity

**813** tons

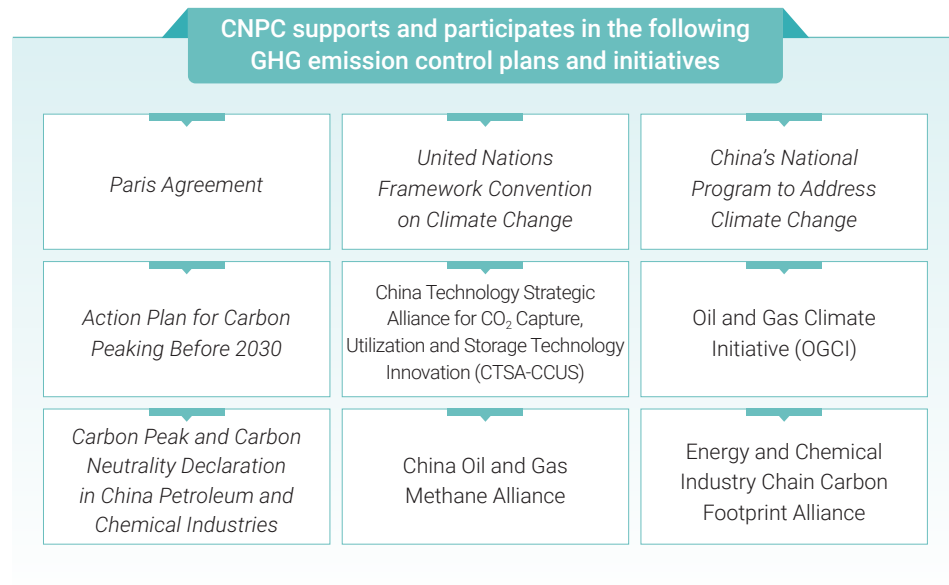
High-purity hydrogen output

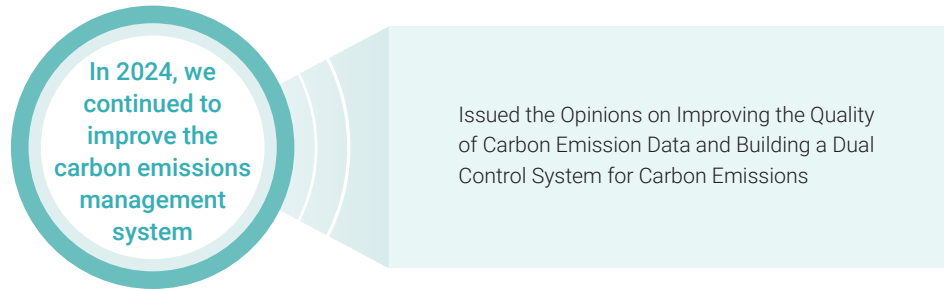
## Climate Change

We respond to the *Paris Agreement*, and actively contribute to China's efforts to peak CO<sub>2</sub> emissions. We take the initiative in international climate governance, and actively respond to climate change.

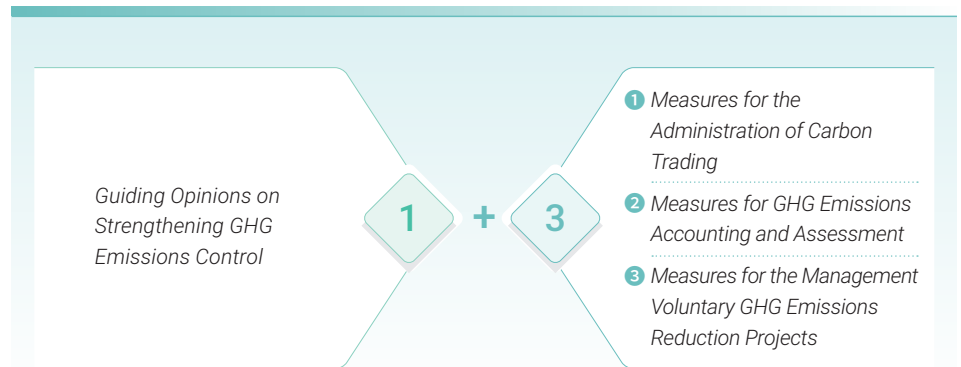
### » Carbon Emission Management

We pay close attention to greenhouse gas (GHG) emissions. We continually improve our carbon emission control system, strengthened methane emission reduction management and control, take an active part in the building of the carbon market, and deeply participate in cooperation with the global oil and gas industry to cope with climate change. In 2024, the Company's total GHG emissions from domestic and international businesses amounted to 187 million tons of carbon dioxide equivalent, with a methane emission intensity of 0.27%. It has been recognized as a "Low-carbon Case" for thirteen consecutive years.





**CNPC “1+3” mechanism for carbon emissions**



**In 2024, we advanced methane emission control, achieving industry-leading performance**

- Led the formulation of ISO standard on Methane Leak Detection and Repair from Oil and Gas Operation.
- Formulated and implemented the Action Enhancement Plan for Methane Emission Control, held work promotion meeting, to stress the requirements for methane emission control, and carried out monitoring and control of methane leakage from shut-in wells.
- As the chair of China Oil and Gas Methane Alliance, appointed six domestic experts as first advisers to jointly carry out exchanges and discussions on cutting-edge technologies.
- In line with international standards to carry out the construction and application of methane MRV, organized key enterprises to implement methane leakage detection and repair at stations, built a pilot methane three-dimensional monitoring network by deploying cloud platforms/handheld laser methane gas monitoring, etc., and used satellite remote sensing to identify flares and high-emission sources in pilot enterprises.

**» Global Climate Governance**

CNPC has been engaged extensively in international cooperation in addressing climate change, joining hands with global peers in promoting green and low-carbon transformation of the oil and gas industry. In 2024, CNPC organized the COP29 side event themed “China’s Efforts, Progress and Opportunities on Methane Emissions Abatement”, and co-organized the side event themed “China’s SOEs towards Green Development” with the Bureau of Social Responsibility, SASAC. CNPC also took an active part in global climate governance and OGCI cooperation.

## » Clean Substitution

While providing clean oil products to society, we also pay attention to optimizing our own energy consumption structure. We pay attention to carbon emissions and carbon footprints in production and operation, striving to reduce the consumption of fossil energy and lower the intensity of energy consumption. In 2024, the Company continued to develop low-carbon oil and gas fields. With the continuous increase in oil and gas production, energy consumption and carbon emission intensity decreased by 2.8% and 3.2% respectively. Among them, the Hudson Oilfield in the Tarim Basin has successfully built the first megaton oilfield with zero fossil energy consumption. Xinjiang and Liaohe oilfields have actively promoted the clean substitution of heavy oil thermal recovery, improving and the green and low-carbon operation of oil and gas fields.

## » Participating in Carbon Emission Trading

We actively participate in the national carbon emissions trading market. We increased our carbon assets reserves and enhanced our performance by purchasing carbon emission allowance (CEA) and China Certified Emission Reduction (CCER). In 2024, the Company fully completed the annual carbon allowance compliance.

### Case Biomass+gas power carbon trading

Through its subsidiary PetroChina International, CNPC has established dedicated power trading and global carbon trading teams to support its green and low-carbon development strategy.

#### Carried out carbon credit trading in the natural gas industry chain

In 2021, we signed the world's first five-year carbon-neutral LNG agreement with Shell to conduct full life cycle greenhouse gas emission accounting for some of the cargos. At the same time, we purchased high-quality nature-based solutions carbon credits to offset the calculated emissions. By the end of December 2024, 19 LNG carbon-neutral long-term trade agreements have been executed, and approximately USD 800 million worth of carbon-neutral LNG transactions have been completed. We also used international carbon credits (VCU) to the carbon compensation of the pipeline natural gas industry chain to assist the building of "zero-carbon factories" for green energy enterprises in Sichuan Province.

#### Expanded the green power business in Australia

In March 2024, we signed a memorandum of understanding on wind power trade cooperation with Pacific Blue, a wholly-owned subsidiary of the State Power Investment Corporation Limited in Melbourne, Australia. This is the Company's first green power trading project in Australia. Based on the MoU, the two sides signed a two-year 60-megawatt wind power purchase agreement for the Portland Wind Power Plant in Victoria, Australia.

#### Steadily advanced the biofuel trade

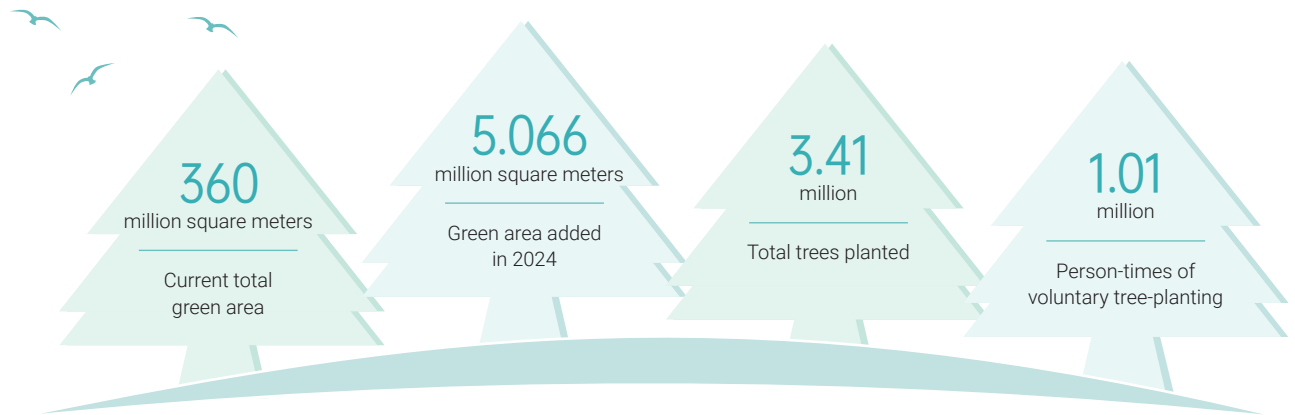
The Company is deeply involved in the European biofuel market and the European carbon emissions trading, and closely follows the dynamics of the European bio-jet fuel market. In April 2024, we completed our first bio-jet fuel transaction on the Argus Europe Biofuel Open Market Platform. This was the world's first physical window transaction for bio-jet fuel. In June, a shipment of bio-jet fuel was successfully delivered to KLM Royal Dutch Airlines, completing the world's first bio-jet fuel transaction settled overseas in RMB.

## » Developing Forestry Carbon Sinks

We actively developed carbon sinks and carbon neutral forests to accelerate carbon neutrality goals. In 2024, our workforce contributed 3.41 million tree plantings through 1.01 million employee participations in voluntary initiatives.

### In 2024, CNPC

- Participated in the campaign "Planting a Tree for Carbon Neutrality". RMB 47 million has been raised and 4,550 mu of forestry carbon sinks has been built since 2022.
- Supported the World Economic Forums' One Trillion Trees Initiative. Through its "Tree-Planting in 10,000 Well Sites" campaign in oil and gas field companies, 1.624 million trees have been planted at 8,724 well sites and stations since 2023.



▲ Carbon-neutral ecological park at Daqing Oilfield

## Energy Cooperation

Adhering to the philosophy of “mutually beneficial, win-win cooperation and development”, we give full play to our advantages in integration as well as in finance, technology and management, and work with host governments and partners to address local energy challenges, meet local energy demand and maintain regional energy security.

### » International Energy Cooperation

In the face of the complex and volatile situation in the world, we work with host governments and partners to ensure the smooth operation of cooperation projects. We carried out all-round cooperation with the BRI countries in the fields of upstream, downstream, trade & marketing, technical support, etc., and signed cooperation agreements on the purchase and sale of natural gas, pipeline transportation, etc. In 2024, the Company completed an oil and gas operation production of 187.106 million tons in oil equivalent terms overseas. The overseas oil and gas equity production maintained stable and cost-effective, making due contributions to meeting the energy supply of the host countries and supporting local economic development.

#### Key international energy cooperation projects in 2024



- In December, at the fifth anniversary of the China-Russia East-Route natural gas pipeline, the milestone of full-load operation of 38 billion cubic meters per year was achieved ahead of schedule.
- In September, CNPC signed a PSC with Staatsolie on the Blocks 14 and 15, the first offshore operator project in ten years.
- In July, CNPC signed a Strategic Cooperation Agreement with ADNOC, further elevating partnership and contributing to a comprehensive energy cooperation pattern.
- In January, CNPC became lead contractor of West Qurna-1 oilfield, deepening cooperation with the Ministry of Oil of Iraq and promising more opportunities for China-Iraq energy cooperation.

#### In 2024, our achievements in BRI

48 oil and gas investment projects in 19 countries, of which oil and gas equity production accounted for 82.7% of the total overseas production.





▲ Bangladesh Single Point Mooring (SPM) and Dual-Pipeline project, Bangladesh's first mega sea-land oil storage and transportation system built by CNPC

## » E&P Cooperation in China

We continued to make steady progress in cooperation with international partners in developing oil and gas resources in China. While deepening cooperation in conventional areas, we reinforced cooperation with IOCs in unconventional resources. The E&P projects including the Changbei Project, the South Sulige Project and the Northeast Sichuan Project achieved steady progress. Our domestic oil and gas production in cooperation with international partners amounted to 12.668 million tons in 2024.

## » International Trade

We coordinated and optimized global resource allocation, and made every effort to promote high-quality development of international trade. Based on our overseas oil & gas operation centers and trading network, we traded with over 120 countries and regions in the forms of joint venture or cooperation etc., hence enhancing our abilities in optimizing and allocating global resources. In 2024, the total global oil and gas trade volume reached 530 million tons, with the revenue of USD 283.7 billion.