



CNPPC



**China National Petroleum Corporation**

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## bout Us

China National Petroleum Corporation (CNPC) is a world-leading integrated energy company with businesses covering oil and gas upstream and downstream operations, oilfield services, engineering and construction, petroleum material and equipment manufacturing and supply. Everyday, CNPC provides to the society **2.69** million barrels of crude oil, **4.6** billion cubic feet of natural gas and processes **2.48** million barrels of crude.



# Our Responsibilities and Actions

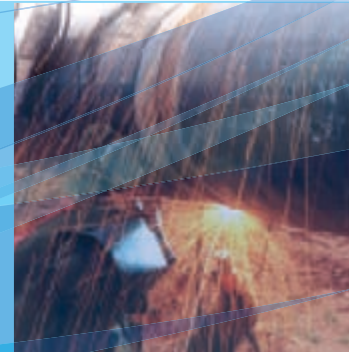
**"Caring for Energy, Caring for You"** is our corporate principle, core value and unswerving pursuit. As a responsible corporation, we place the principle of **"Achieving excellence through innovation and integrity"** as the focus of everything we do. While offering energy and creating wealth for society, we endeavor to ensure a harmonious relationship between energy and the environment, production and safety, our corporation and our staff, and our corporation and society.

# International Cooperation

We have oil and gas assets and interests in **26** countries and are now operating **69** oil and gas investment projects. In 2006, the total overseas oil production and gas production reached **54.6** million tons and **5.7** billion cubic meters respectively.

We provide seismic prospecting, well drilling, well logging, pipeline and engineering construction services for **48** countries and regions and export petroleum materials and equipments to **62** countries and regions around the world.

We have built international oil and gas trading relations with **80** countries with an annual transaction volume of **94.39** million tons.



# R esearch & Development System

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CNPC attaches great importance to technical innovation and takes it as the strategic key for CNPC's sustainable development. In discovering and exploiting oil and gas resources, CNPC has developed a series of unique oil and gas exploration, development and processing technologies as well as various specialized engineering technology and advanced equipment manufacturing technology.

**R&D institutions and teams:** CNPC has 76 research institutions, among which 6 are of headquarters level and 70 are of enterprise level, engaging nearly 30,000 technicians and researchers including 16 members of Chinese Academy of Sciences, 60 national outstanding contribution awardees and 176 company level experts.

**R&D projects and achievements:** According to strategic arrangement of technological innovation, CNPC's investment on R&D increases year by year. Totally 15 national key science & technology projects and 60 major technical breakthrough projects had been accomplished in the past 5 years. At present, CNPC undertakes two national-level oil and gas specialized researches and five key infrastructural projects. Its researches on geophysics, well drilling, biological oil recovery, and new chemicals have all been listed in the National 863 Plan.

**Technical exchanges and cooperation:** CNPC has been actively building an open research framework through both domestic and overseas scientific cooperation. Long-term and flexible relationships with Chinese Academy of Sciences, colleges and universities and other institutions have been established. In the meantime, CNPC continues to strengthen technical exchanges with international partners in oil and gas exploration and development and environment protection to promote common development.



# R&D and Application of Key Technologies and Equipments

## Exploration:

Major breakthroughs were made in oil and gas exploration technologies, resulting in rapid growth of the reserves and expansion of exploration domains.

## Exploration for Lithostratigraphic Reservoirs

- Sequence stratigraphy and effective trap identification technology have been expanded; and the understanding on reservoir-forming rules in Litho-Stratigraphic strata has been deepened.
- Newly discovered oil reserves from litho-stratigraphic reservoirs accounted for 60% of CNPC's total reserve increase in 2005, and natural gas reserves discovered from litho-stratigraphic reservoirs accounted for 80%.



## E xploration for Foreland Basins

- ✦ The theory of fault-related folding and the technology of structure modeling have been developed; the understanding on the characteristics of China's foreland basin structure and reservoir-forming rules has been deepened; and the technologies for mountain seismic data acquisition, VSP and deviation control faster drilling have been applied.
- ✦ It has provided solid technical support for the discoveries of large and medium oil and gas fields such as Kela-2, Dina-2 and Qingxi. Newly proven gas reserve has been added by 1.7819 trillion cubic meters over the past five years.



# H igh-efficient Exploration of Block 1/2/4 and Block 3/7 in Muglad Basin, Sudan

- ✪ Geological model of passive rift basins has been established; accumulation mechanism of Muglad passive rift basin has been understood and a series of 12 supporting technologies for rapid exploration and development has been formed.
- ✪ An annual production capacity of 15 million tons of oil has been achieved and been stable for three years.







### Development:

New progresses in oil and gas exploration and development technologies make the company's crude production grow steadily and booster its natural gas production.

## EOR by Chemical Flooding

- ✦ Chemical oil displacement agent with IPR has been developed; polymer flooding technology has been improved and major breakthroughs have been made in ASP pilot test and likely to be applicable in industrial scale.
- ✦ The annual oil production by polymer flooding is more than 10 million tons, accounting for over 20% of the annual oil production in Daqing Oilfield.

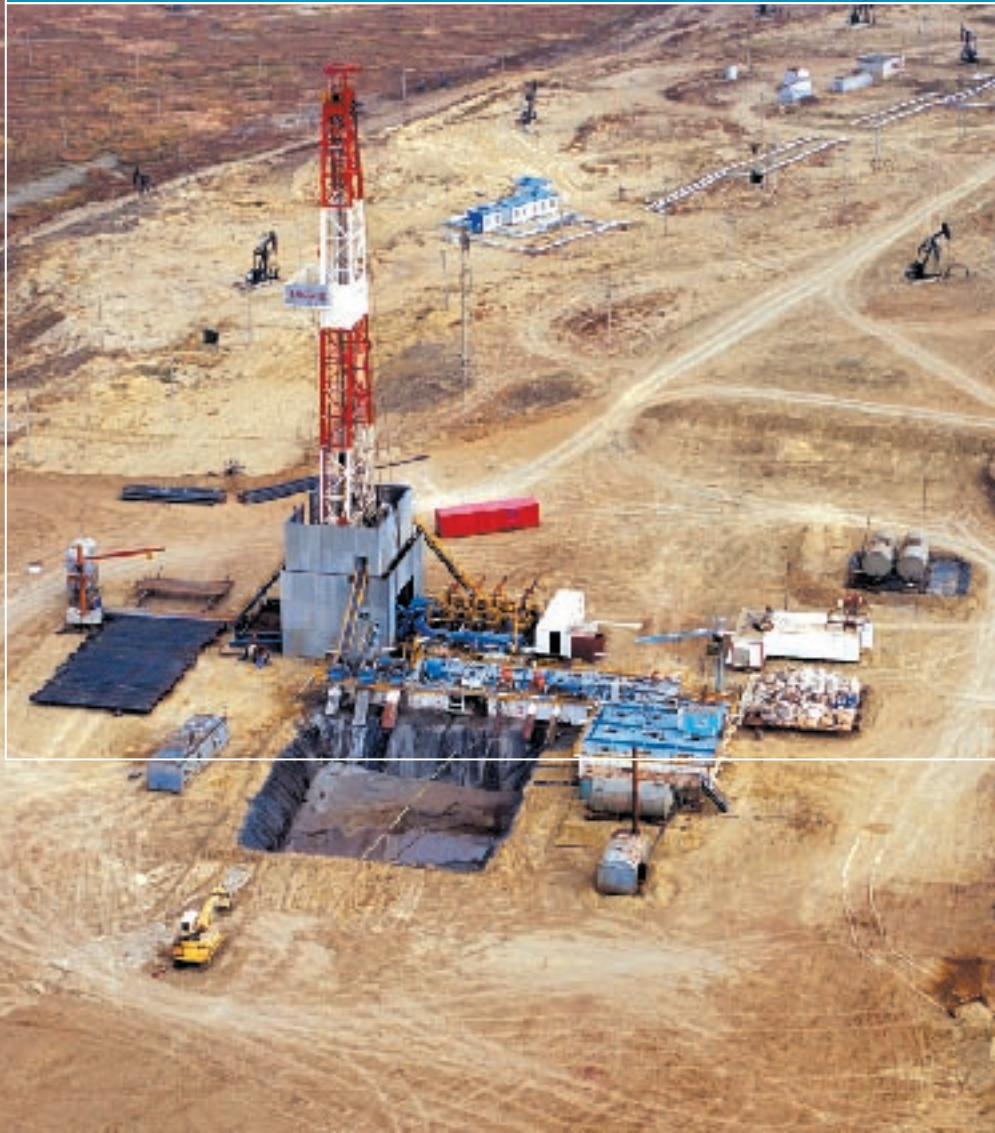


## Development of Low Permeability Oilfields



- ✦ Matching technologies such as fine reservoir evaluation, numerical simulation, optimization and adjustment of flood pattern, water injection prior to pressure drop, fracturing during production, horizontal wells have been formed basically.
- ✦ A number of one-million-ton oilfields such as Xifeng, Yingtuodong in Jilin, Daqingzi Wellblock, Luliang in Xinjiang and Hudson in Tarim have been established.

## Development of Kenkiyak Subsalt Reservoirs in Kazakhstan



- ✦ Breakthroughs have been made in developing carbonate rocks under mass salt-gypsum bed by combining open hole completion and balanced drilling techniques on the basis of fine reservoir description.
- ✦ The average daily output per each newly-drilled well increased from 38 tons to 300–500 tons and an annual crude production capacity of 2 million tons has been established.

## Oil and Gas Pipeline Technology and X70, X80 Steel Pipe

- ✦ The design technology of satellite remote sensing, automatic welding of inside and outside of pipeline and shield structure crossing technology have been mastered. Component and industrial designs of the X70 and X80 pipeline steel are made. Matching program of welding rods and welding flux and reasonable processing parameters were optimized. Transportation resistance has been decreased and per unit deliverability has been increased by developing the coating production line and the coatings.

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- ✦ The West-East Gas Project with the total length of 4,000 km is now in full commercial operation. X70 and X80 steel pipes have been put into industrial production.

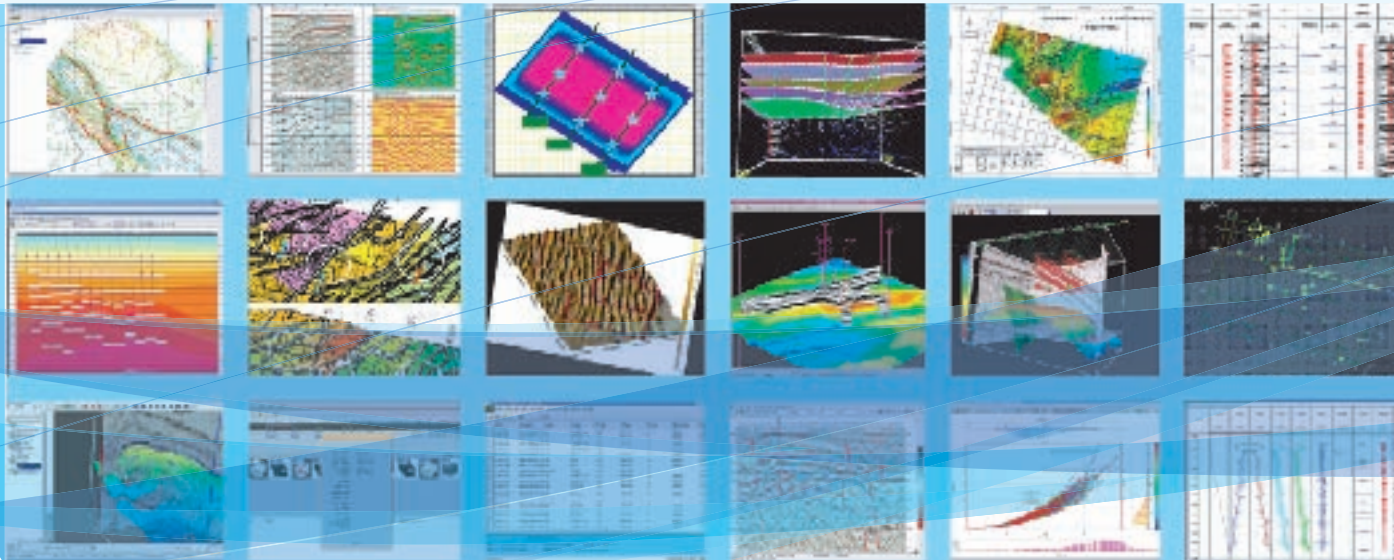
# Two-Stage Riser Catalytic Cracking

- ✦ Two-stage riser reactor was used to realize oil and gas tandem, catalyst relay, sub-reaction, shortening response time and improving average performance of the catalyst. Single pass conversion increased greatly and good product distribution under the high conversion rate has been achieved so as to enhance light oil yield and significantly improve the quality of catalytic gasoline. Olefin content in catalytic gasoline has been decreased greatly and the isohydrocarbon and aromatics content been increased so as to enhance the octane number of catalytic gasoline.
- ✦ Diesel/gasoline ratio increased by 0.2 unit. Light oil yield enhanced by over 1.5 percent. Olefin content in catalytic gasoline decreased from 58% to 35%. And the rate of propylene recovery enhanced by more than 2 percent.



# GeoEast V1.0 Integrated System for Seismic Data Processing and Interpretation

- ⊗ The sharing of data and information and the visual interaction have been realized. New functions such as the pre-stack migration imaging, the extraction and analysis of the reservoir characteristics from pre-stack seismic information and 3D visual interpretation made it an integrated software system for seismic data cooperatively processing and interpretation with unified data platforms, unified display platforms, unified development platforms and dynamic system assembly.
- ⊗ 21 sets of such systems have been installed and applied in 16 blocks to complete the processing and interpretation of 2170km<sup>2</sup> of 3D profiles and 4600km of 2D lines.



## EILog-05 Logging Outfit

- ✪ The system mainly includes an integrated ground equipment, an integrated conventional combination logging device, a domestic-made imaging logging tool, and the integrated processing and interpretation software (LEAD logging integrated application platform). High-temperature seal of subsurface equipment is 175°C high-pressure seal 140Mpa, anti-vibration 5g, anti-impact 50g and the job success ratio 95%.

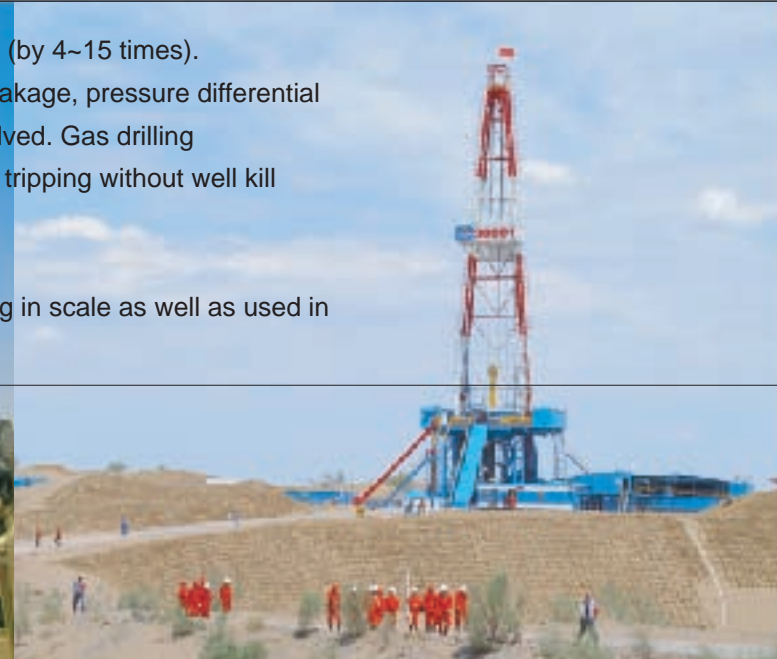
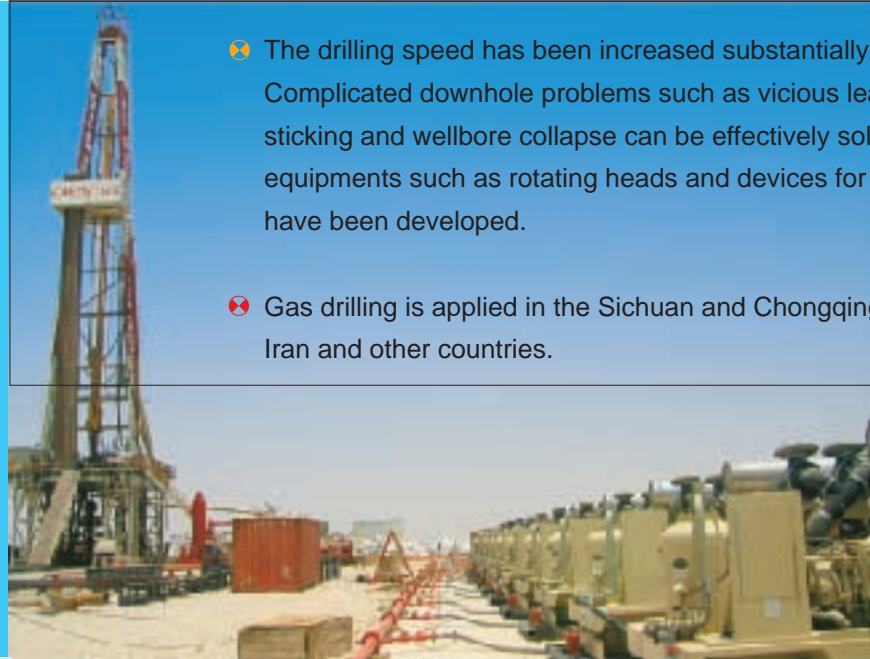
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## Gas Drilling

- ✦ The drilling speed has been increased substantially (by 4~15 times). Complicated downhole problems such as vicious leakage, pressure differential sticking and wellbore collapse can be effectively solved. Gas drilling equipments such as rotating heads and devices for tripping without well kill have been developed.
- ✦ Gas drilling is applied in the Sichuan and Chongqing in scale as well as used in Iran and other countries.

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## ZJ90/6750DB 9000m Drilling Rig

- ✦ The most advanced AC variable frequency control technology in the world has been adopted to simplify the driving system and realize a digital operating process. Sound design has been made in anti-cold, high-temperature resistance, leak-prevention, antisepsis, explosion prevention and sand proof to ensure excellent reliability and adaptability so as to fully meet the requirement of onshore or offshore oil and gas drilling conditions below 9,000 meters.





# Frequency AC Top Driving Drilling Equipment

- ✦ Integrated innovative technology of full scope two-way floated back-up wrench; integrated innovative mud-umbrella set; integrated innovative gear box with cup-shaped seal; unique two-load channel technology and unique one-to-one driving and load balancing technology.



## C GDS-I Near Bit Geosteering Drilling System

- ✦ The system can adjust and control the whole track at real time according to the sedimentary feature monitored by bit and can identify oil and gas reservoir while drilling. The system can directly serve geological exploration to enhance the discovery rate of exploratory well. It is applicable to development wells in complex formations and thin oil bearing zones to save drilling cost.





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## Super-Power Stack Gas Turbine

- ⊗ CFD flow field modeling technology has been developed and the stability analysis method for the rotor in imbalanced status has been innovated. High hardness and anti-wear coating material of ceramic matrix has been developed to improve the life of flue gas turbine vane. Advanced alveolate sealing technology introduced from aviation industry has the feature of installing and running with zero clearance. The special structure and material could automatically form sealing clearance according to wear status so as to effectively protect the gas turbine rotor.
- ⊗ It was successfully operated on 3Mt/a RFCC of Lanzhou Petrochemical Company; each machine makes energy saving of 240 million kwh per year, generates 100 millions RMB Yuan profits.

# C hina Petroleum Technology & Development Corporation

China Petroleum Technology & Development Corporation (CPTDC), a wholly-owned subsidiary of China National Petroleum Corporation (CNPC), is the largest supplier of Chinese petroleum and petrochemical materials and equipment in the world.

CPTDC has established a mature marketing network, with 38 overseas offices, 4 warehouses, 7 maintenance centers and 2 joint ventures strategically located in 26 countries throughout the world. CPTDC has been supplying its products to more than 67 oil-related countries and regions worldwide and maintained stable relationships with world major oil and service companies, boasting an annual contract volume of over USD 1 billion.

CPTDC was granted with ISO 9001:2001 Certificate in 2003 for its quality management system, and ever since 2004, the corporation has cooperated with API to set up Center for the Promotion of API Certification Programs to provide consulting and education services related to API certification and standards in China so as to help more Chinese products enter into the world market.

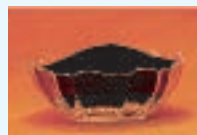
CPTDC possesses a substantial resource system. In China, it has organized an unrivalled China Petroleum Material & Equipment Export Network, consisting of more than 170 petroleum machinery manufacturers and refineries. Most of those manufacturers and refineries are API or ISO certified, the product quality and performance of which have reached the international advanced level. Up to now, CPTDC's exports cover a full range of petroleum materials, equipment and related engineering services, ranging from upstream to downstream.

CPTDC has strong technical support capabilities and after-sales services system. To date, the corporation has provided over 145 drilling rigs to the world market and has been fully capable to provide customers with rig design, integration, inspection, debugging, on-site installation and personnel training. Striving on the operation motto of "Basing on Service, Seeking Excellence", CPTDC has established 7 maintenance and service centers to offer customers the most professional services.

CPTDC adopts an effective quality management system, which gives comprehensive inspection on the whole process of manufacturing.

Adhering to its business principle of "Customer First, Quality First and Reputation First", CPTDC commits to offer the best services to customers both at home and abroad and to make more contribution to the development of the world energy industry.





Hydrogenation Ractor

High Pressure Heat-Exchangers (HP Heat Exchangers)



ZJ90(3000HP)DB/6750 Electric Drive Drilling Rig



ZJ70(2000HP)D Electric Drive Drilling Rig

**PETRO** 石油四机



ZJ30 (1000HP) Drilling Rig



Workover Rig



GJC70-25 Twin Pump Cementing Truck with ACM system

HRSB



BOP

北石 BPM



Hydraulic Control System for BOP

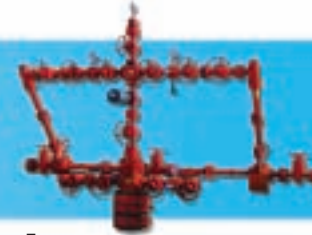
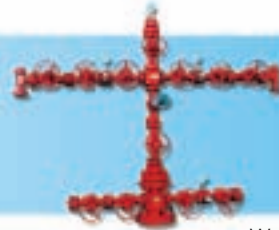


Downhole Tools



Down Hole Screw Motor

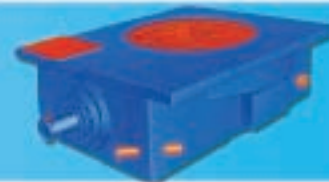
JMP



Well Head & Christmas Tree



Mud Pump



Rotary Table



Hook



Traveling Block



Swivel



Model DD Drill  
Pipe Elevator



Model CD Casing  
Elevator



Elevator Link



Casing Tong



Workover Power Tong



Rotary Slip



Pneumatic Spider



Pumping Unit



Drive Head



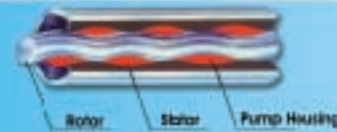
Mixer

Polished Rod Clamp

Gear Box  
Polished Rod  
Packing Assembly



Torque Anchor



Rotor Stator Pump Housing



Casing

Tubing

Tooler

Huber

Rotor

Anchor



Sections of  
Coated Tubing

Coated Drill  
Pipe



Drill pipe



Casing

Screw Pump Oil Production System

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