



China's Report

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■ Oil & Gas Activities In China

- ✿ Exploration and Production Progress
- ✿ Carbon Capture & Storage (CCS)
- ✿ Investment Opportunities

■ EPPM Technical Activities In China



Major Petroleum Companies In China



中国石油天然气集团公司
CHINA NATIONAL PETROLEUM CORPORATION

CNPC

Onshore
Offshore



中国石油化工集团公司
CHINA PETROCHEMICAL CORPORATION

SINOPEC

Onshore
Offshore



中国海洋石油总公司
CHINA NATIONAL OFFSHORE OIL CORP

CNOOC

Offshore



Exploration and Production Progress

- ◆ In 2008, China had made significant progress in domestic petroleum exploration and production. 19 new oil and gas fields were proved. Oil and gas reserve additions and production continued to grow.

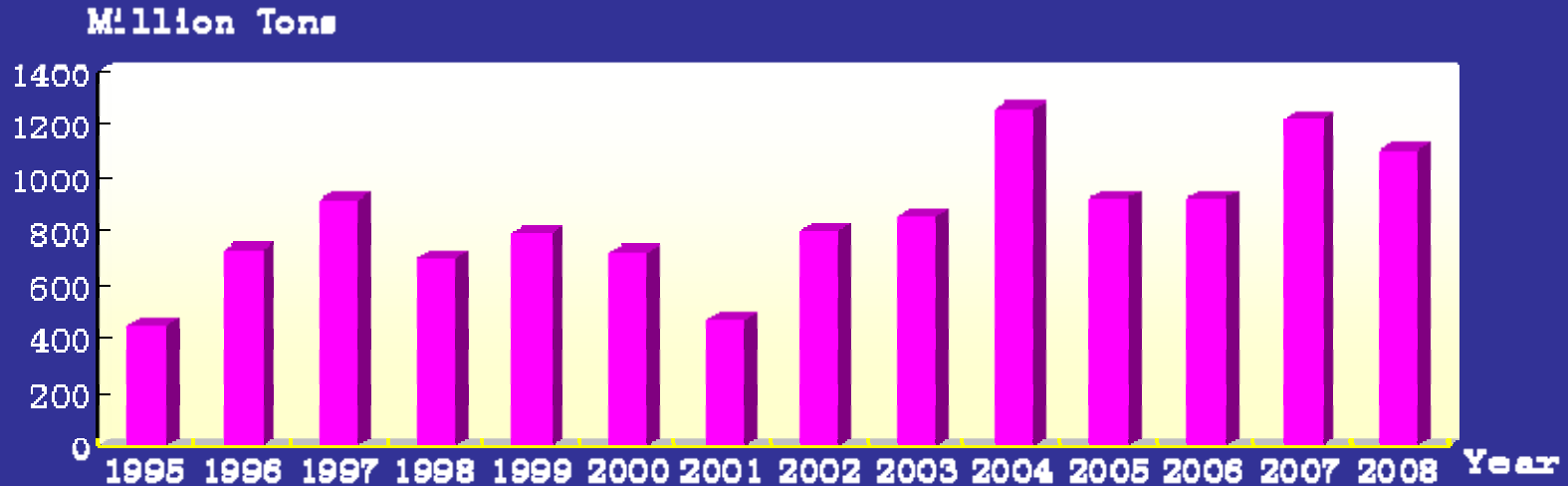
New Oil and Gas Fields in 2008

Fields	Onshore	Offshore	OOIP	Share of total additions
14 oil fields	9	5	201.7X10 ⁶ t	18.2%
5 gas fields	4	1	259X10 ⁹ m ³	54.5%



Exploration and Production Progress

- In 2008, China's crude oil reserve in-place additions kept high level, totaling 1106.8×10^6 t.
- By the end of 2008, the cumulative crude oil reserves in-place stood at 28.86×10^9 t, the proved reserves were 2.13×10^9 t, ranking the 13th in the world.



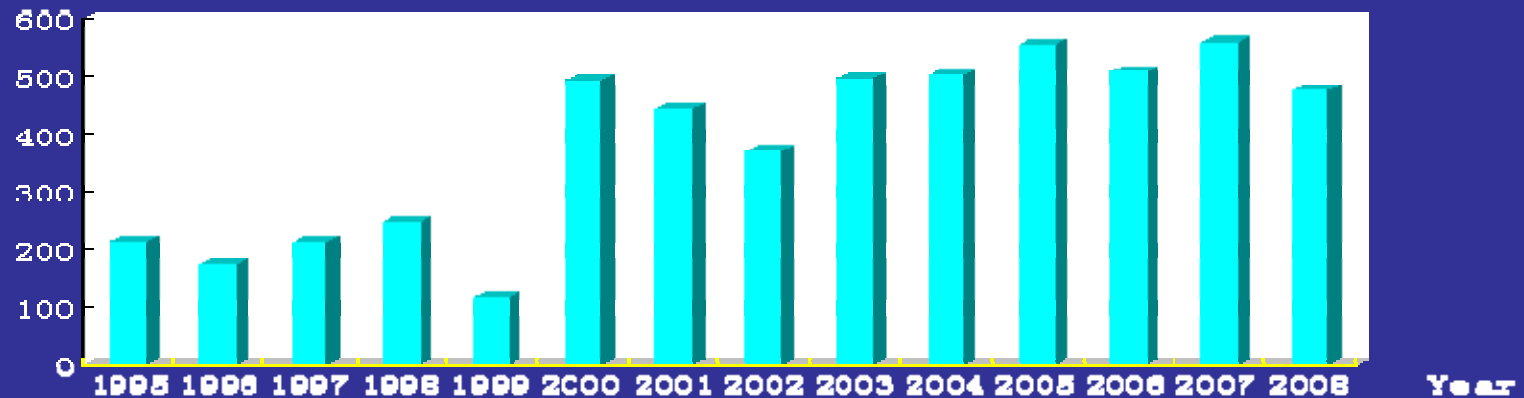
1995-2008 Crude Oil Reserve In-place Additions In China



Exploration and Production Progress

- In 2008, China's natural gas reserve in-place additions continued to keep rapid growth trend, totaling $475.7 \times 10^9 \text{m}^3$.
- By the end of 2008, the cumulative natural gas reserves in-place stood at $6335.68 \times 10^9 \text{m}^3$, the proved reserves were $2.69 \times 10^{12} \text{m}^3$, ranking the 12th in the world

Billion Cubic Metres

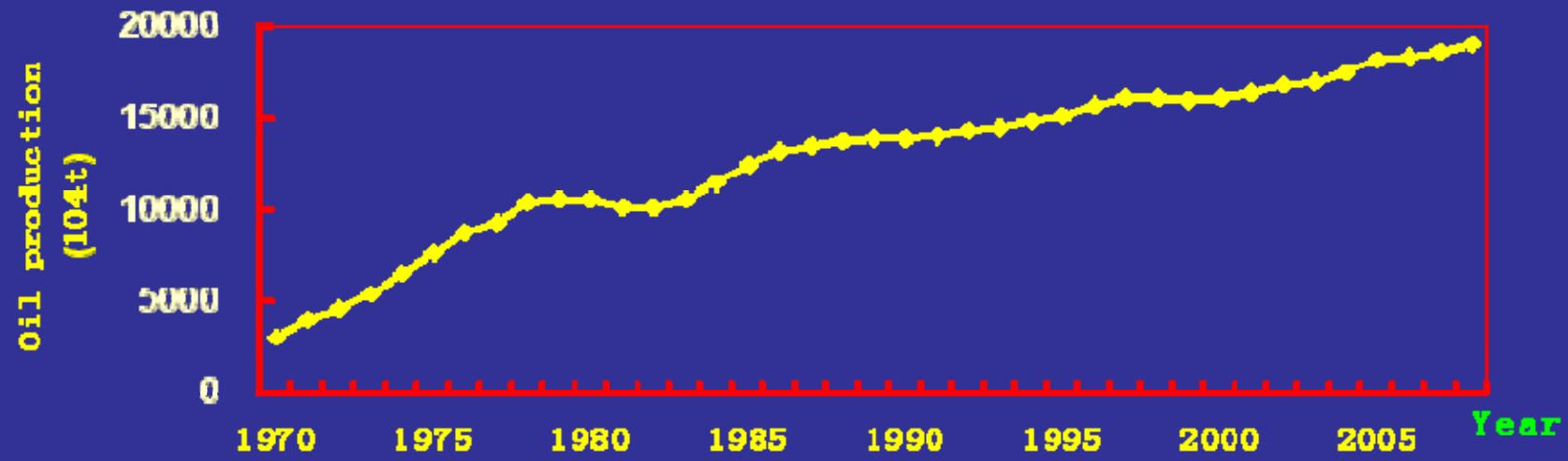


1995-2008 Natural Gas Reserve In-place Additions In China



Exploration and Production Progress

◆ In 2008, China's oil production was 189.46×10^6 t, China was the 5th largest oil producer in the world.

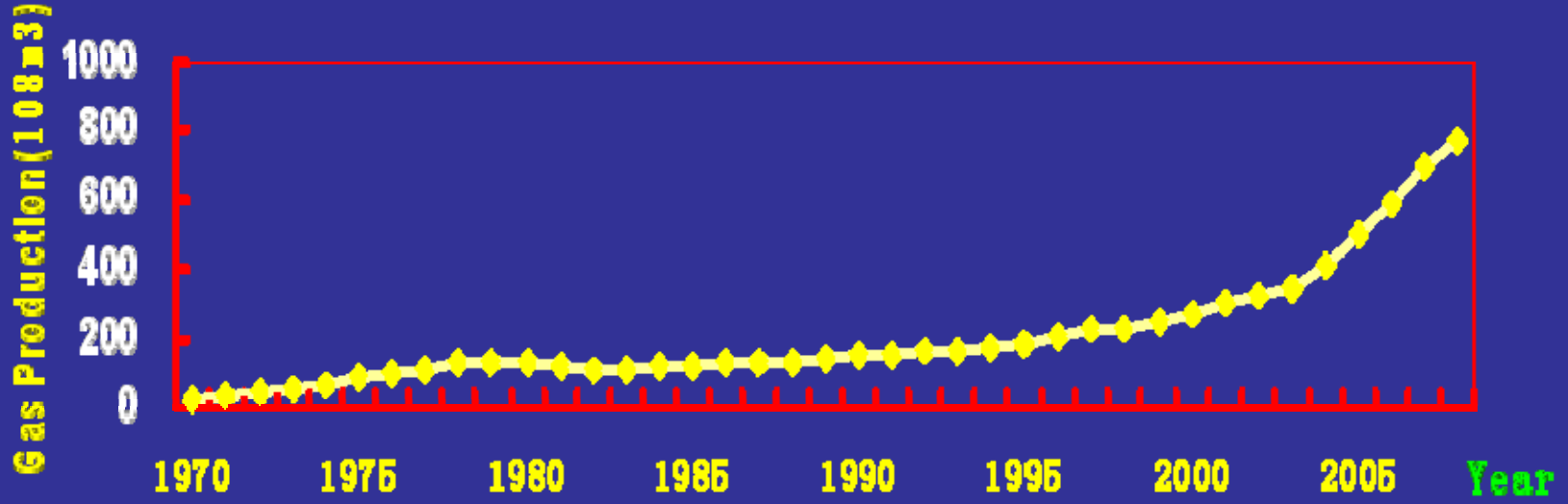


1970-2008 oil production change in China



Exploration and Production Progress

- In 2008, China produced $77.5 \times 10^9 \text{m}^3$ of natural gas, ranking the 8th largest gas producer in the world

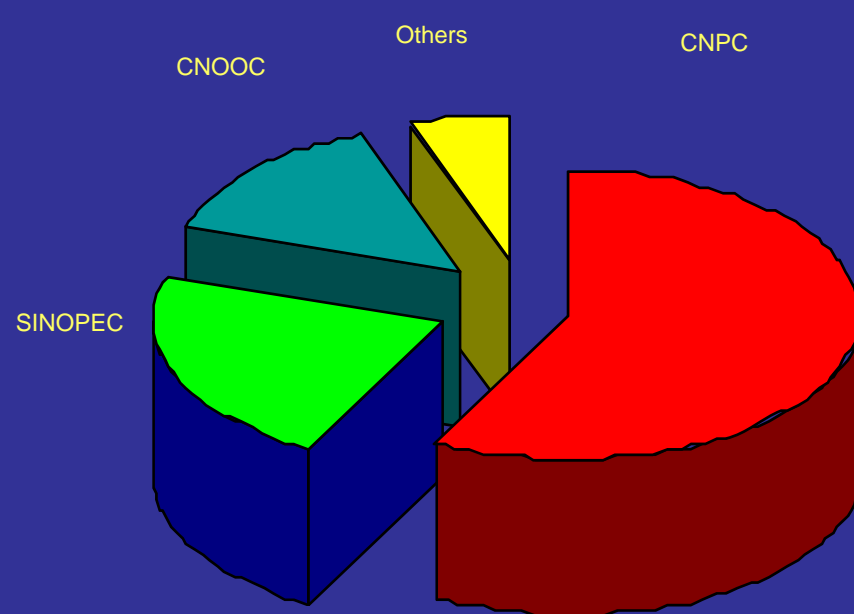


1970-2008 natural gas production change in China

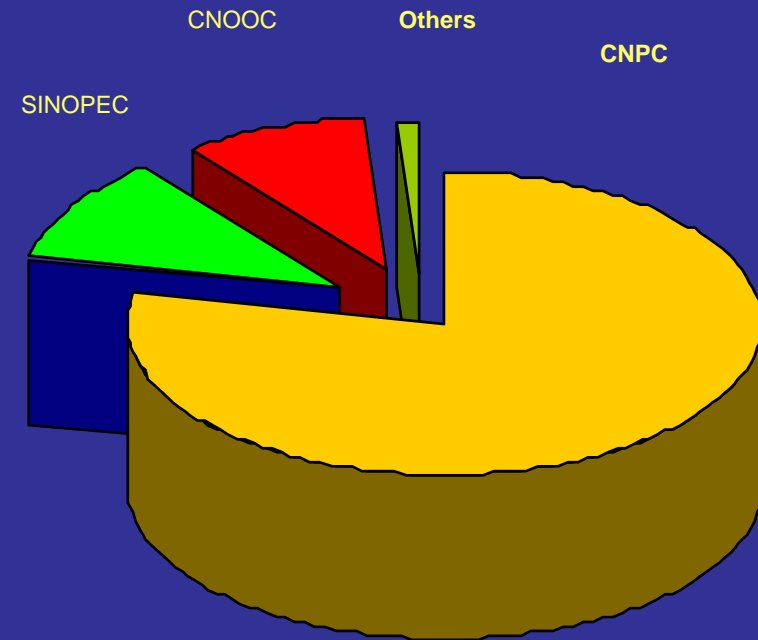


Exploration and Production Progress

Oil and Gas Production shares in Chinese Oil Companies In 2008



Oil Production



Gas production



Carbon Capture & Storage (CCS)

TO reduce CO₂ emission and utilize CO₂ resources, the Chinese government is actively promoting CCS technology. China has made a lot of progress in CCS in recent years.

- Launching many national R & D Programs on CCS
- Developing some demonstration (pilot) projects on CCS
- Building wide international cooperation on CCS



National R & D Programs on CCS

- ◆ In 2005, the CCS was integrated into the China National Medium- and Long-term Science and Technology Development Plan as a key technology by Chinese government .
- ◆ In 2006, the Ministry of Science and Technology of China authorized a key national basic research program ---Carbon capture and geological storage technology .
- ◆ In 2007, the National Nature Science Foundation of China supported basic research on CCS.
- ◆ In 2008, the National Development & Reform Committee of China launched a key national science and technology program -- -- CO₂ capture and storage for EOR .



Demonstration (pilot) projects on CCS

- Sinopec has launched 4 CO₂ for EOR Pilot Projects in recent years .
 - These projects will enhance oil recovery by injecting CO₂ sourced from the gas fields
- ◆ Yaoyingtai oil field, South Songliao Basin
 - ◆ Block Gao89-1, Jiyang Depression , Bohai Bay Basin
 - ◆ Block Wen88, Dongpu Depression , Bohai Bay Basin
 - ◆ Caoshe oil Field, Subei Basin



Sinopec CO₂ for EOR Pilot Project Map



Demonstration (pilot) projects on CCS

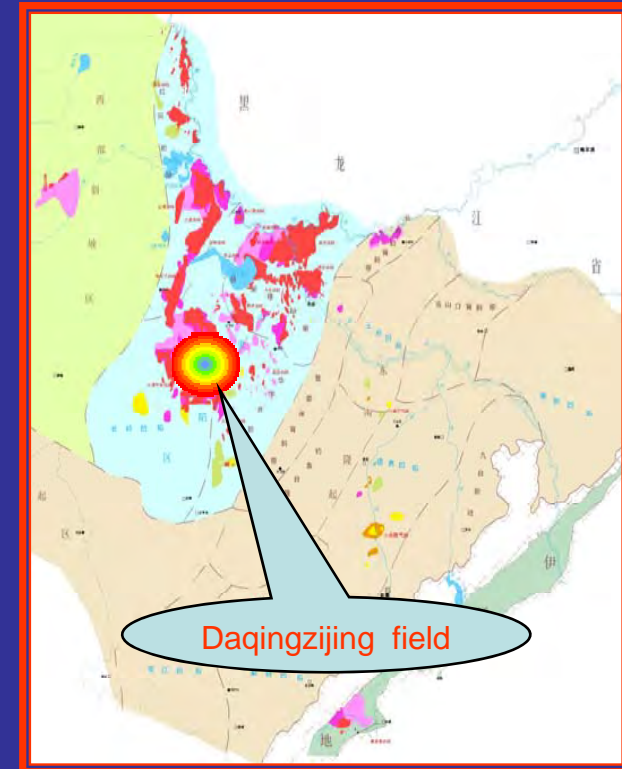
- In 2007,CNPC launched a engineering demonstration project of CO₂ for EOR in Daqingzijing oil field, Songliao Basin

Block-Hei79

Depth: 2,350m OOIP : 1 million tons
CO₂ utility coefficient: 0.17ton/bbl
Theoretical storage: 0.38 Mts
Effective storage:0.19 Mts
Improved recovery fa:10%

Block-Hei59

Wells: 5 injection & 19 production wells Depth: 2,400m
Pressure: Downhole pression \leq 40MPa Downhole flow
pression \geq 7MPa
Inject rate: 30-40t/d Inject mode: continuity liquefied CO₂
MMP:22MPa



South Songliao Basin



Demonstration (pilot) projects on CCS

- Huaneng Group, China largest power company, is actively promoting carbon capture technology. Two carbon capture projects were launched by Huaneng Group.
- Gaobeidian project in Beijing, started operations before the Beijing Olympic Games in 2008, and is now capturing 3,000 tons of carbon dioxide every year. The captured carbon dioxide is used for industrial utilizations (food processing).
- Shidongkou project was launched in July 2009 in Shanghai, the project will capture 100,000 tons of carbon dioxide annually. The project will follow the Gaobeidian model.



Gaobeidian power plant in Beijing



Demonstration (pilot) projects on CCS

- Shenhua Group, China's largest coal producer, is building CCS project at its coal-to-liquids plant in Ordos ,Inner Mongolia. Which is described as the country's first commercial CCS project.
- For the CCS project, storage measures, including geological storage, are being considered, which will be put into full operation in two years.



Shenhua's coal-to-liquids plant in Ordos



International cooperation on CCS

- In 2009, The European Commission set out a plan to help finance the design and construction of a power plant to demonstrate carbon capture and geological storage (CCS) technology in China.



- French Total held the Total China scientific forum which focused on CO₂ capture, storage and conversion (CCS) technology in Shanghai in 2008.





International cooperation on CCS

- Sino—UK project—Near Zero Emissions Coal Initiative (NZEI)
- Funded by Defra/DTI and the Ministry of Science and Technology of China
- Phase of NZEI
 - ◆ **Phase 1 2006-2009** To explore the options for near-zero emissions coal in China – assessment
 - ◆ **Phase 2 2009-2011** To define, plan and design a demonstration project
 - ◆ **Phase 3 2011-2014+** To construct and operate a demonstration project





International cooperation on CCS

□ In July 2009, China and the United States announced to establish a joint research center on clean energy (Sino-US clean energy center). The center will develop scientific cooperation on CCS



□ China Shenghua Group and US West Virginia University signed a cooperation agreement on carbon capture and storage technology at coal –to- liquids plant in Sept 2009.



International cooperation on CCS

□ Huaneng group signed an agreement with the Commonwealth Scientific and Industrial Research Organization (Australia's national science agency), to develop clean-coal power generation and CCS technologies in 2007



□ China and Japan agreed to continue research on CO₂ capture and storage (CCS) technique to enhance oil recovery in 2008.



Investment opportunities

- ◆ The Chinese Government has always been encouraging and attracting foreign companies and institutes to participate the exploration and development in the Chinese petroleum sector. A lot of achievements in Sino-foreign cooperation have been made.
- ◆ **By maintaining stability of the investment environment, China has become one of the best places in the world for investment.**
- ◆ The Chinese government will continue to encourage, support and promote the opening of petroleum industry to the outside world, and try to create many investment opportunities for foreign investors.



Investment opportunities

Main Investment opportunities

- Petroleum Exploration in West China (Tarim /Junngar/Ordos/Sichuan and so on)
- Carbonate/Volcanic Reservoir Development
- Tight Reservoir Development (low Permeability oil reservoir / Tight gas sandstone)
- Heavy Oil Reservoir Development
- Unconventional Gas Exploration and Development (CBM /Shale Gas)
- Deep-water Exploration and Development
- CCS for EOR



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■ EPPM Technical Activities In China



EPPM Technical Activities In China

- China actively takes part in all EPPM technical activities at home and abroad.
- China and CCOP jointly held a workshop on CCOP metadata standard and requirement analysis in April 2009, in Shanghai
- China, CCOP and PETRAD jointly organized a workshop on natural gas field with high CO₂ and H₂S in Sept. 2009, in Chengdu .



Two EPPM Workshops In China



EPPM Workshop
in Shanghai

EPPM Workshop
in Chengdu





EPPM Technical Activities In China

- By attending EPPM activities, Chinese participants from oil companies and government institutes have learned the knowledge and experiences on resources assessment, CMD, CCS, metadata, etc.
- The knowledge and experiences are useful to our challenges in the natural gas development .
- We have made some valuable suggestions regarding the solutions to the challenges in the natural gas development and utilization



EPPM Technical Activities In China

- The knowledge and experiences from EPPM project have been transferred into all the organizations related to oil industry in China.
- Chinese participants have shared the knowledge and experiences with others through many ways:
 - **Intranet**
 - **Reports of EPPM technical activities**
 - **Workshops / training courses**
 - **Annual meeting for national coordinators**

Thanks
for your attention

