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CO_2 EOR in China

二氧化碳驱油技术在中国的应用

Mingyuan Li

China University of Petroleum, Beijing

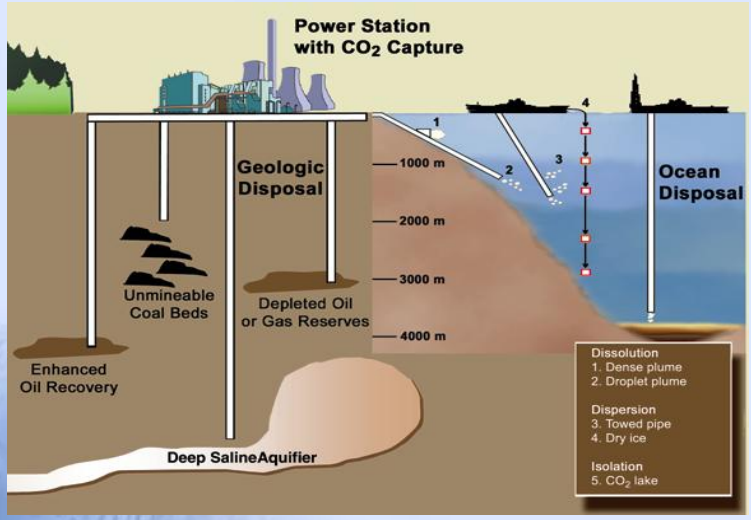
Sep. 18 2011

中国石油大学（北京）

Outline

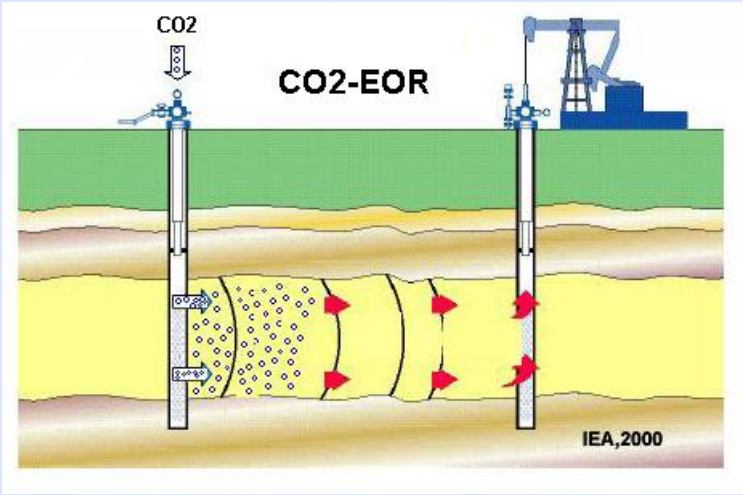
- CO_2 EOR and storage
- CO_2 EOR and low carbon economy
- CO_2 EOR + Storage
- CO_2 EOR + Storage in the future of China
- Conclusion

CO_2 EOR and storage



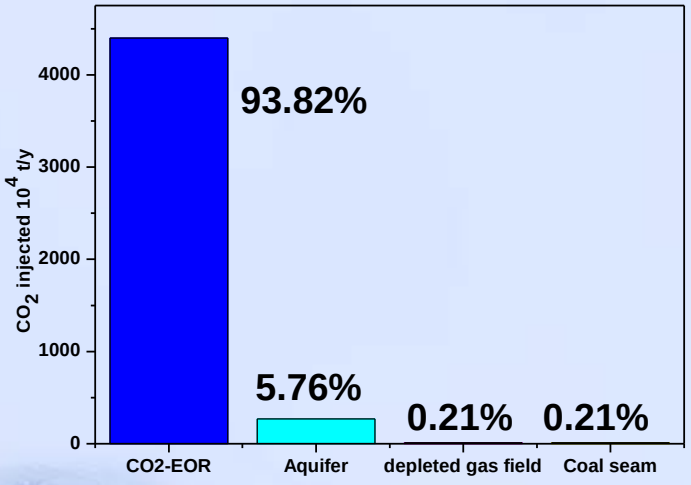
Options for CO_2 Storage

- Deep saline aquifer
- Depleted oil and gas reservoirs
- CO_2-EOR (Enhanced Oil Recovery)
- Coal seam



- About 60% of CO_2 injected for EOR could be stored in the reservoirs.

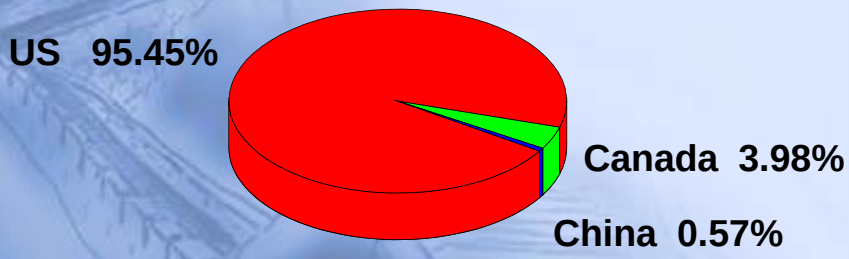
CO_2 storage in the world (2009)

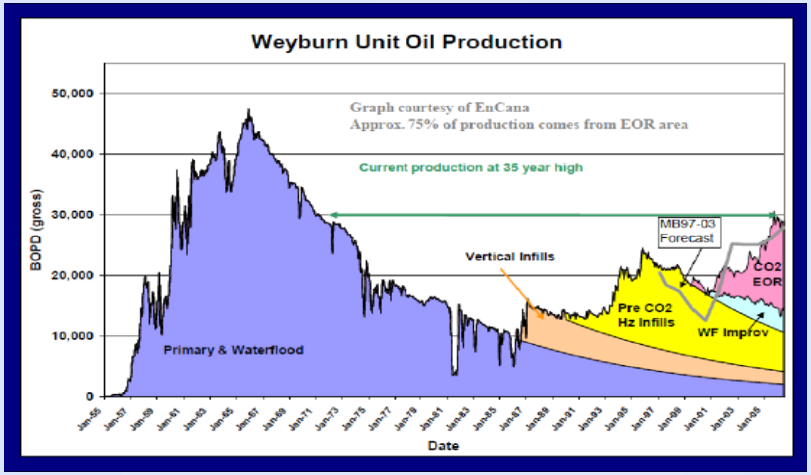


Advantage of CO_2 EOR for CCS

- Well defined geological structure
- Developed technology
- Better economic benefit
- Commercialization
- Sustainable for CCS

CO_2 EOR in US, Canada and China





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CO_2 EOR and low carbon economy

"Green Oil"

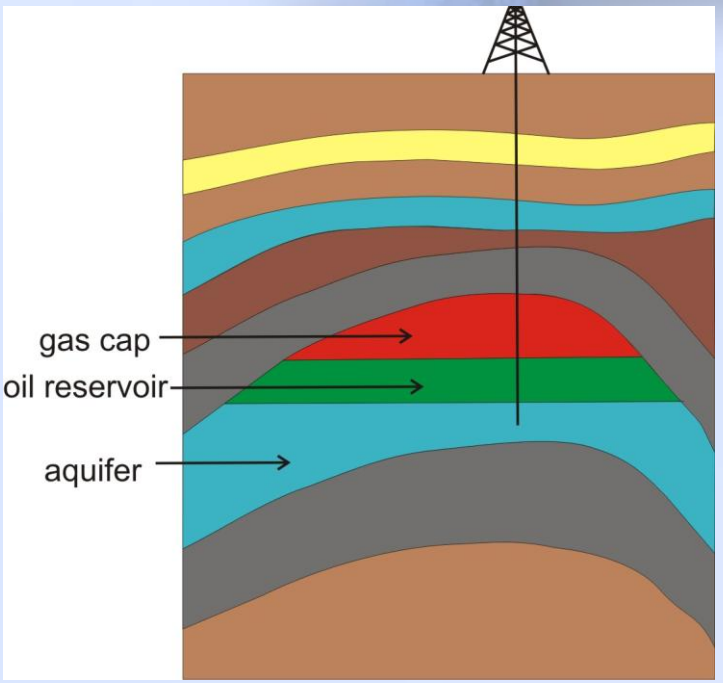
2.68 t of CO_2 is released when 1 t of oil is combusted.

If CO_2 used for EOR and stored in reservoir are more than 2.68 t to produce 1 t oil, the oil produced could be "Green Oil".

The release of CO_2 from the oil will be zero or negative.

CO_2 EOR + Storage

Inject CO_2 into both oil reservoir and saline aquifer — **CO_2 EOR + Storage**



Application of CO_2 EOR + Storage technology could produce "**Green oil**"

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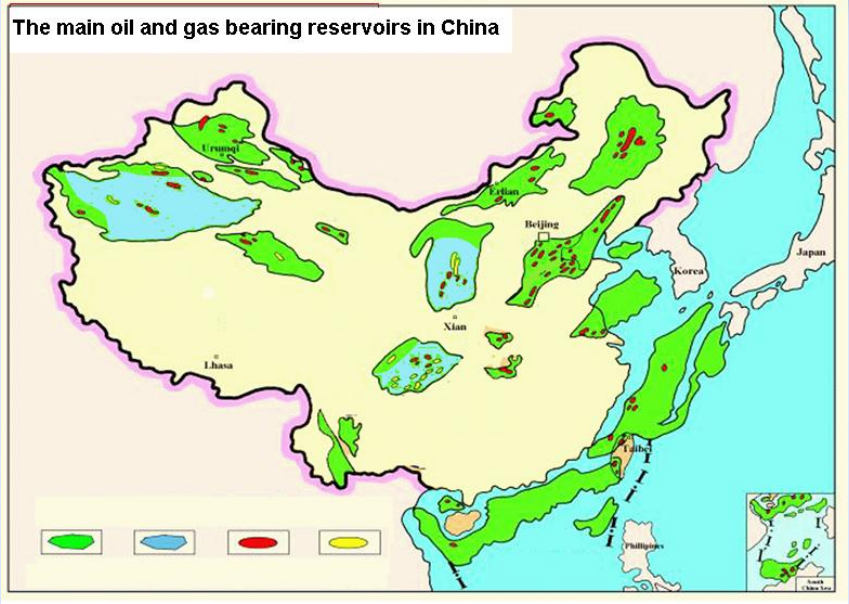
CO_2 EOR + Storage in the future of China

- China has a proved OOIP of low-permeability reservoirs as 6.32 billion tons, which is 28.1% of the total proven OOIP.
- Gas or CO_2 injection could improve the oil recovery of these oil reservoirs.



Main oil/gas fields in China

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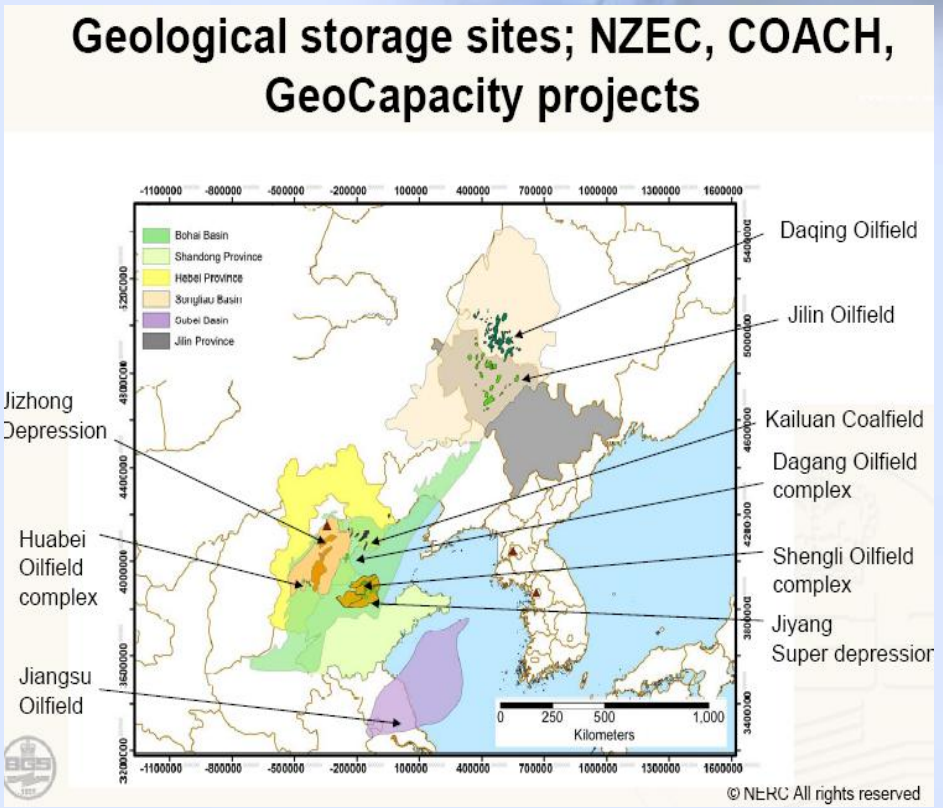
Main projects on CCS in China

- Enhanced Oil Recovery by Utilizing Greenhouse gas (973 project), China Ministry of Science and Technology, 2006
- GeoCapacity, China-EU, 2006
- Cooperation Action within CCS China-EU, (COACH), 2006
- Near Zero Emissions Coal Initiative (NZEC) , China-UK, 2007
- Support to Regulatory Activities for Carbon Capture and Storage ($STRACO_2$), China-EU, 2007
- China Australia Geological Storage (CAGS) project, China- Australia, 2009



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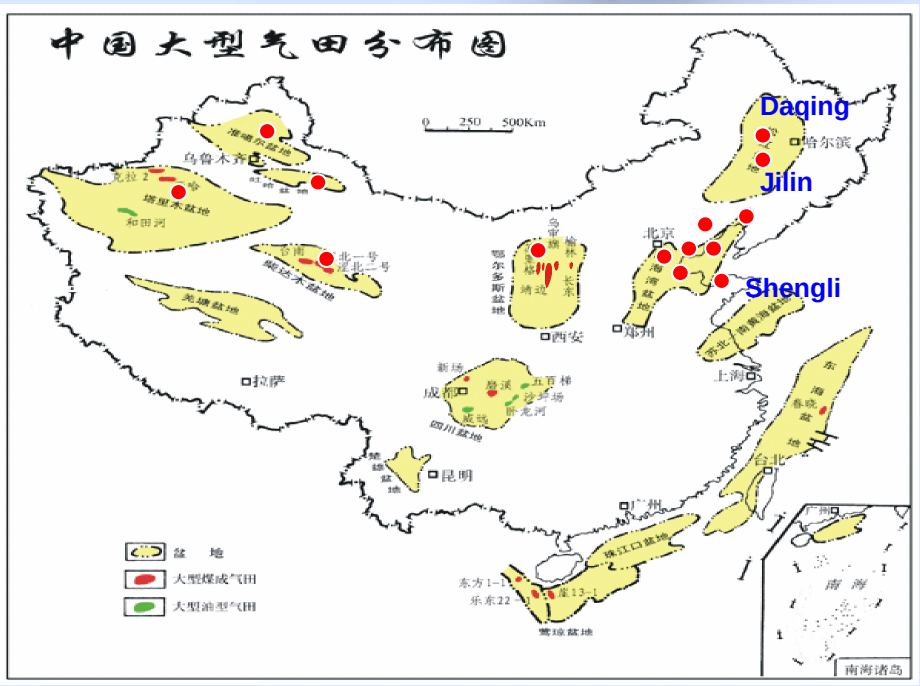
Main CO_2 EOR projects in China

- Jilin Oil Field, CO_2 flooding, 2006 (Petrochina)
- Daqing Oil Field, CO_2 flooding, 2007 (Petrochina)
- Shengli Oil Field, CO_2 flooding, 2007 (Sinopec)
- Other oil fields.



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1. CO_2 EOR in Jilin Oil Field

Start: 2006

CO_2 source: natural gas, 10-14% of CO_2.

Injection: June 2008

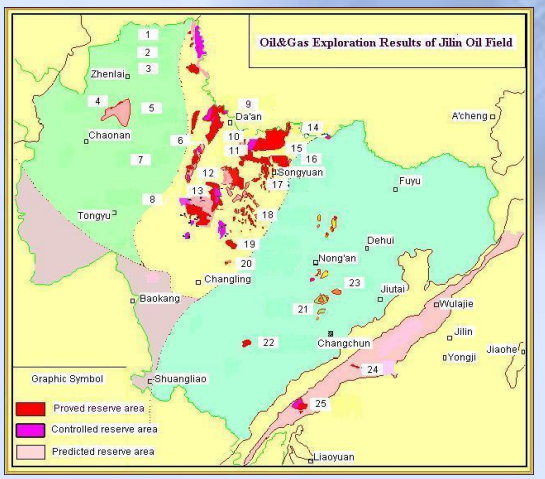
5 injection wells, 300-400t/d,

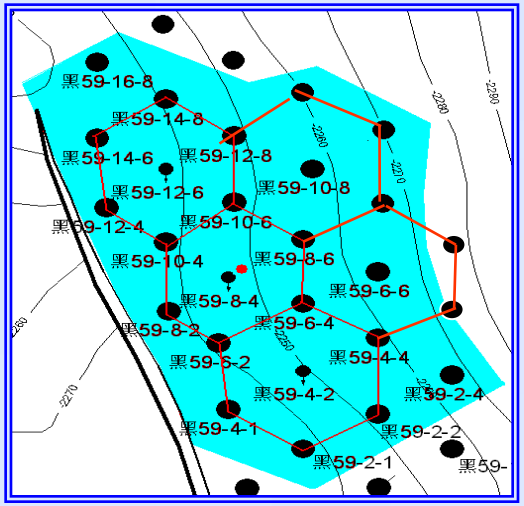
21 production wells, oil production 180 t/d, increased 80%.

Objective:

80 Mt CO_2 injected and stored 50 Mt

Total oil will be produced 40 Mt





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2. CO_2 EOR in Daqing Oil Field

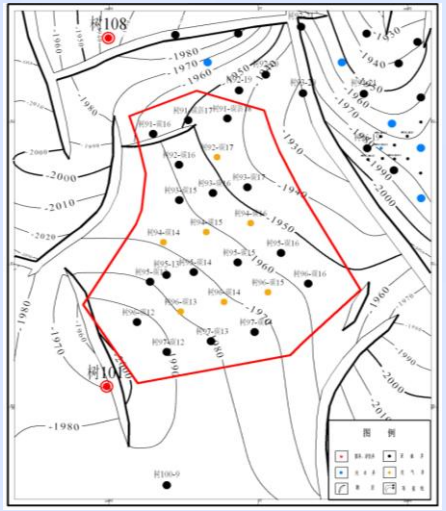
Start: Jan. 2007

CO_2 source: Chemical plant

Injection: Dec. 2007

7 injection wells, 70-100 t/d,

16 production wells, oil production 30-40 t/d,

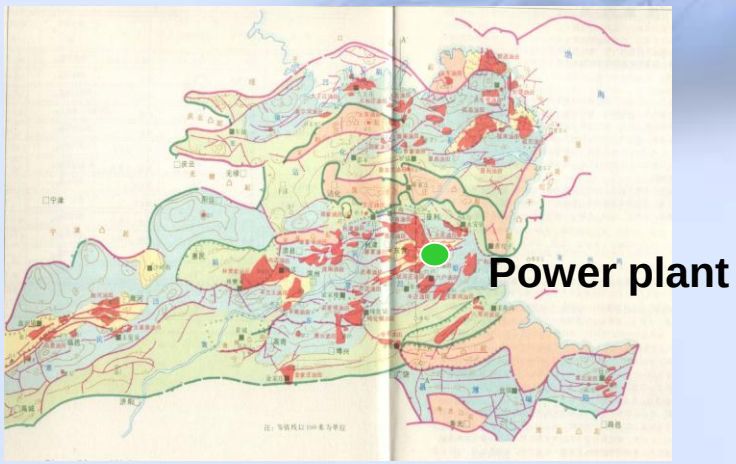


Shu 101 CO_2 EOR pilot

3. CCS demonstration project in Shengli Oil Field

CO_2 source:

Shengli thermal power plant，13.5% CO_2 in the flue gas.



Demonstration:

CO_2 captured 100t/d, post combustion, modified MEA adsorption technology.

Investment $4.5 M, Cost $45-50/t $_{CO2}$

Operation: September 2010

CO_2 transportation: truck

Distance between source and sink: 5-7 km

Reservoir:
Low permeability, light oil, 4 injection wells and 12 production wells.

Objective:

CO_2 injected: 0.5 Mt(15 years)

Oil will be increased: 158×10^3t

Conclusion

- China has great potential for CO_2 EOR and storage in oil oil fields;

- CO_2 EOR + storage could produce "Green oil";

- CO_2 EOR + storage should be the first option and promoted in China.

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