中华人民共和国科学技术部

Ministry of Science and Technology of the People's Republic of China

# IGCC

## – Sustainable Technology For Coal Utilization

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MOST

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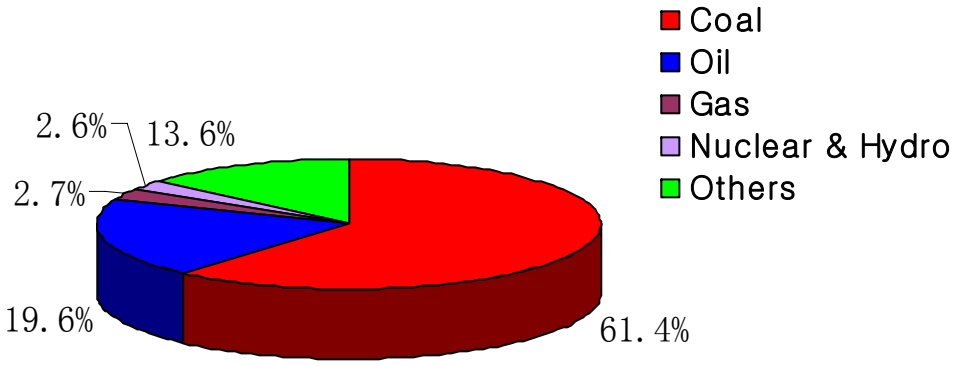
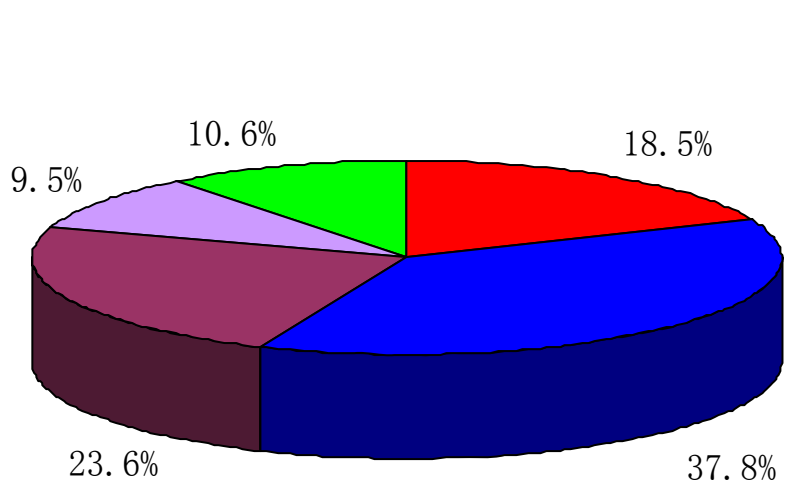
# Coal Is Dominant Energy in China

**Oil remains the largest single source of energy in most parts of the world. However, coal is dominant energy in China.**




**China Energy Supply, 2004**
**Total 1626 Mtoe**




**World Energy Supply excluding China, 2004**
**Total 9578 Mtoe**

**Big challenge in clean and efficient use of energy in China.**

*WEO 2006, IEA*

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# CCT Is Most Important Energy Technology in China

**Total Energy Production（2210 Mtce）**

- **Crude Coal 76.9%**
- **Crude Oil 11.9%**
- **Natural Gas 3.5%**
- **Hydro, Nuclear and Wind Power 7.7%**

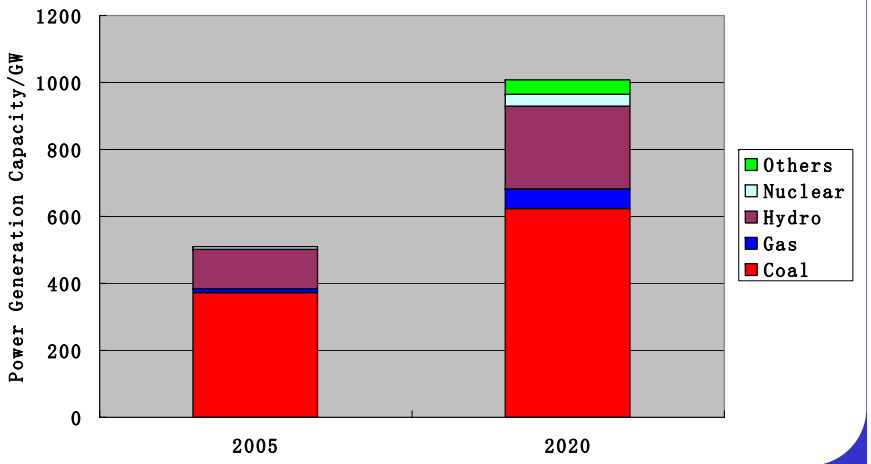
**Year 2006**

**Total Energy Consumption（2457 Mtce）**

- **Coal 68.7%**
- **Oil 20.4%**
- **Natural Gas 3.2%**
- **Hydro, Nuclear and Wind Power 7.7%**

**No matter we like it or not, coal will be China's dominate energy for long time.**

- By 2020, expected
  - Natural gas，120 billion cubic meter
  - Nuclear power，40,000MW
  - Hydro power，300,000MW
  - Renewable energy，increasing from 7% of total energy consumption in 2006 to 16% in 2020.



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# Why IGCC?

- So if Coal, which technology?

## USCPC or IGCC ?

USCPC

- Conventional technology
- High efficiency 39%-- 43%
- Lower cost

- Cost increasing due to tightening emissions
- Difficult to tackle $CO_2$

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# Why IGCC?

- **IGCC**
- **Greater potential efficiency than conventional coal plants (39%-44%)**
- **40-90% improvement in air emissions at lower cost**
- **Cost effective process for capturing and collecting $CO_2$**
- **Higher development cost**

Energy Security, $CO_2$ Capturing!

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# Why IGCC?

**FutureGen**

**Co-Production**

IGCC

**Technologically consistent,**

**Technologically realistic,**

**Economically beneficial,**

**Ecologically friend way to $CO_2$ mitigation, capture, and further sequestration**

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# Why IGCC's Deployment So Slow

**Barriers :**

**High cost**

**IGCC is more like chemical plant**

**Abundant and cheap natural gas**

**No limitation for $CO_2$ emission**

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# Challenges for IGCC Deployment in China

- **Cost**
  - --Local equipment providers
  - --Co-Production
    - Power+Chemicals+fuel
- **Policy and strategy**
- **Need a successful demonstration**

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# Opportunities for IGCC

**The Chinese government states to pursue a new path to industrialization featuring the application of advanced technologies, good economic returns, low resource consumption, less environment pollution and full utilization of human resources.**

- **Energy consumption and environment indicators during the 11th Five-year (2006-2010) Plan period**
  - **Reduction of energy consumption per unit of GDP by 20%**
  - **Reduction of total emission of major pollutants by 10%**

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# 863 R&D Project

- Co-Production
- Coal Gasification
- Gas Turbine

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# FutureGen Project Feature

- **Commercial – Scale**
- **275-MWe plant**
- **1 million tones/year $CO_2$ captured and sequestered**
- **Co-production of $H_2$ and electricity**
- **"Living laboratory" to test and validate cutting-edge technologies**
- **Public- private partnership**
- **Stack- holder involvement**
- **International participation**
- **On-line 2012**

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# FutureGen -- Partnership


## Government Participation

USA, Japan, China, India, Korea

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# FutureGen is a Platform

- Evolution of IGCC technology
- Greater fuel flexibility
- Demonstrates $CO_2$ separation/capture/sequestration
- Demonstrates $H_2$ production turbine / fuel cells
- Enable technology breakthroughs

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# Thank you !

- IGCC
- IGCC is a Chemical pant, which allows production of power, chemicals and liquid fuels
- Very low emission, and provides the most technological robust and cost effective process for capturing and collecting CO2
- Could offset petroleum consumption in the transportation sector
- Use less water 20%-50%

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- **Opportunities**
- **Greater potential efficiency than conventional coal plants (39%-44%)**
- **40-90% improvement in air emissions at lower cost**
- **cost effective process for capturing and collecting $CO_2$**
- **Lower water demand**
- **Reduced solid waste**
- **Co-generation of hydrogen and other valuable products**
- **Challenges**
- **Few IGCC plants in operation**
- **Current IGCC technology at least 15-20% more costly**
- **Additional economic penalty with western coals at higher altitude**
- **No currently operating IGCC plants capture $CO_2$**