

Gas-fired power generation opportunities in China



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General developments - 1

- An important policy to develop the natural gas industry
- The production is still low
- Developing quickly
- Mostly used as chemical raw materials
- 0.64 billion m³ (about 2.63%) used as power generation in Year 2000

General developments - 2

- Few large and stable consumers
- The upper corporations cannot develop quickly without such consumers
- Gas-fired power plants are what we wanted
- The effective method to break through the “bottleneck”

The characteristics of gas-fired power generation - 1

- **Big environmental benefits**
 - less SO_2 & NO_x (less acid rain)
 - less CO_2 (slower global warming)
 - less ash & dust (better life space)
 - less PM10 (better health)

Case: compared environmental benefits of 500MW power plants

	Coal-fired power plants (tons/year)	Gas-fired power plants (tons/year)	Gas-fired/Coal-fired (%)
SO₂	8,043	7	0
NO₂	5,056	971	19
CO₂	2,942,375	1,241,292	42
Ash	125,000	0	0
Dust	350,000	0	0
PM10	428	21	5

The characteristics of gas-fired power generation - 2

- Space occupation saving 50%, water saving 1/3, number of operators is about 20% (compared with large coal-fired power plants)
- Many auxiliary equipments saved, such as coal handling system, ash removal system, and so on
- Gas turbines can be started up and shut down rapidly, better to be used in peak regulation

The characteristics of gas-fired power generation - 3

- High efficiency (GE-MS7001H: 60%)
- Gas-fired power plants can be located near load center:
 - Reducing the works of transmission and substation
 - Improving the power supply reliability
- Others:
 - lighter equipments
 - less investment, ...

International developments of gas-fired power generation - 1

- Japan, 26.8%, mostly natural gas (including fuel cells & methanol); Tokyo Electric Power Company, 45%
- USA, gas-fired power plants account for 65% among the newly-built power plants
- United Kingdom, 30% (installed capacity), still increasing
- Russia, over 60%

International developments of gas-fired power generation - 2

- Others are different for their own resources and energy policies:
 - countries like Malaysia, over 70%, short of coal & water;
 - countries like Holland, 40~60%, having other resources;
 - countries like Italy, 20~40%;
 - countries like Korea, 10~20%.

International developments of gas-fired power generation - 3

- What's about China?
 - percentage: **less than 3%!**
 - which part? **Plenty of natural gas (No. 19 in the world) & coal (No. 3 in the world)!**
- Experience shows:
 - large potential...

Key areas to develop - 1

- Unbalanced economy
- Key areas:
 - the Yangtze River delta area
 - the Pearl River delta area
 - the Jing-jin-tang area



The Yangtze River Delta Area - 1

Key areas to develop - 2

- General situation:
 - a sector with a 300-kilometer radius centered by Shanghai;
 - including some cities nearby;
 - the installed capacity: 49.75GW (in 2001)
 - the economy, developing quickly

The Yangtze River Delta Area - 2

Key areas to develop - 3

- Four primary reasons :
 - benefit the utilization of power generated by Sanxia (obvious seasonal feature)
 - decrease the tense situation of primary energy supply(imported coal), improve the structure
 - environmental benefits (most cities: controlled areas for acid rain and sulfur dioxide)
 - relatively higher investment of gas-fired units

The Yangtze River Delta Area - 3

Key areas to develop - 4

Shanghai:

- GDP, increasing over 10%
- The electricity demand increased quickly, too
- The government plan:
 - no more coal-fired power plants
 - reform old units into gas-fired units step by step
 - 1000 MW gas-fired power generation units in 5 years

The Pearl River delta area – 1

Key areas to develop - 5

➤ **General situation:**

- a circle with a 150-kilometer radius centered by Guangzhou and Shenzhen;
- including some cities nearby;
- the installed capacity: 33.60GW (in 2001)
- GDP increasing rate: over 10%
- the demand of electricity, increasing rapidly

The Pearl River delta area – 2

Key areas to develop - 6

- The electricity consumption structure has changed (commerce, telecom and service industry developing quickly)
- The gap between peak load and valley load is larger and larger
- But, the grid is mainly made up of coal-fired units
- Plan: to reform old units or to build new gas-fired units

The Jing-Jin-Tang area

Key areas to develop - 7

➤ **General situation:**

- including Beijing, Tianjing, Tangshan and cities surrounded;
- mainly depending on power transmitted from Inner Mongolia and Shanxi;
- to fulfill the safety, peak regulation and local environmental protection requirements

➤ **Plan:**

- 2100MW gas-fired units, before 2001;
- annual gas consumption, 18 billion m³.

Conclusions

➤ Advantages: high efficiency, low pollution, good peak load regulation capability, high availability, low water consumption, zero ash and slag discharge...

➤ Problem: the cost (the price of natural gas)

➤ Opportunity:

China is standing at the beginning stage of the natural gas industry now!



Thank you!