

Coal gasification marketing in the fertilizer sector



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2004-5-21

Coal: From Green, Turn to Green



壳牌·可持续发展

煤,源于绿色,
也应归于绿色,
溶进洁净的
天空。

王瑞峰, 壳牌方家营本土教师, 其中还包含许多
别致的惊喜: 人类对煤的认识在逐渐加深, 煤已拥有了
革命性的进步: 煤其实也可以是一种绿色能源,
不时环保造成污染。

中石化石油石化公司煤油油煤王瑞峰老师介绍, 壳牌
的煤气化技术为公司的氢气生产提供新的途径, 晋东的石脑油,
使公司的石油生产自给自足: 今年, 煤作为原料, 在煤化工产品

最洁净, 煤的煤化利用导致了人们煤
的诸多成果, 清洁的煤化技术, 让人们重新认识了
煤炭真正的价值: 发电, 生产化肥, 合成汽油和
柴油, 制取工业原料等, 利用煤化技术制取材料,

“王瑞峰, 煤是清洁能源吗?” 通过采访,

小编为大家整理了壳牌煤油煤王瑞峰老师的采访。

www.shell.com.cn

Why Coal Gasification ?

- ◆ **What's Coal Gasification**
- ◆ **The Fearful Environment Situation of China**
- ◆ **Business Opportunity of Gasification**



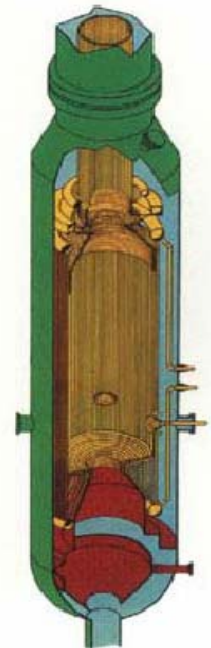
What's Coal Gasification ?

◆ **Convert coal from solid to gas, so can burn or utilize coal completely**

- **Release almost no Nitrogen or Sulfur**

◆ **Functions of Coal Gasification**

- **Clean energy**
- **Substitute of Petroleum**



流化床气化工艺(SFG)气化炉

The Fearful Environment Situation of China

GDP =

Gross Domestic Pollution



- ◆ From 1995 to 2002, China's GDP have grown by 72.6%
- ◆ In the same time, release of exhaust gas have grown by 63%
- ◆ 2002, out of all the 555 cities inspected, 279 or 50.3% were polluted by acid rain.



We are developing our economy in the cost of our environment

Scientific develop concept Sustainable development

- ◆ **Change the conventional develop path.**
 - **High consumption and low output.**
- ◆ **Walk the sustainable path.**
 - **From extensive developing to intensive developing**
- ◆ **Environment protection.**

Business Opportunity of Coal Gasification

- ◆ **Shenhua corporation**
- ◆ **Shell (China) Limited**
- ◆ **Market size of China Fertilizer industry**
 - **RMB 200 Billions**



Brief introduction of coal gasification

- ◆ **Significance of coal gasification for China**
- ◆ **Status quo of coal gasification**
- ◆ **Access to coal gasification**



Significance of coal gasification for China

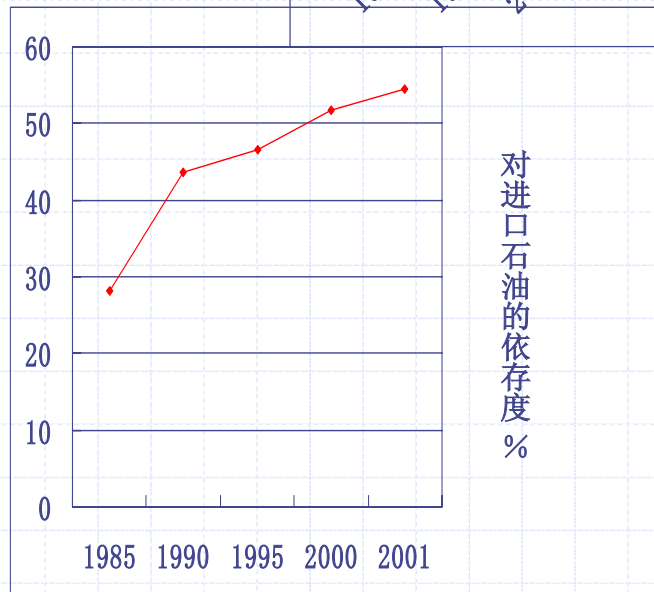
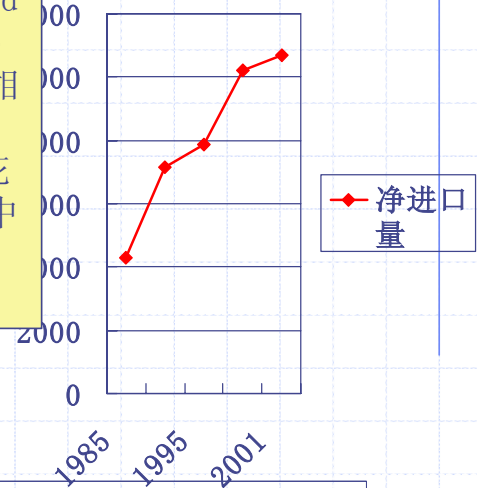
- ◆ **Significance of petroleum stratagem: substitute petroleum**
 - Import of petroleum
 - Price of petroleum
- ◆ **China's energy condition and trend**
 - Energy demand and consumption structure
 - China's energy reserve and structure
- ◆ **Significance of environmental for China: clean energy**



- ◆ In 1993: China turned from export crude oil country to import crude oil country
- ◆ In 2003 : the import turnover of crude oil excess 1000 million ton , occupying 36.1 percent of the total need of petroleum
- ◆ 2004: the petroleum import will reach 1200 million ton,
- ◆ 2010: the need of petroleum in China will reach 3200 million ton, and the import turnover will reach 1800 million ton. And that time China will depend the import at petroleum to a great extent
- ◆ 2015: the need of petroleum in China will reach 3600 million ton, and the import turnover will reach 1800 million ton
- ◆ 2020: the need of petroleum in China will reach 4300 million ton, and the import turnover will reach 2500 million ton



In 2003, China consumed 0.1 billion ton crude oil , 进口超过1亿吨, 相当于进口2~3个大庆油田。为进口石油, 我国花费218.7亿美元, 相当于中国2003年GDP的1.87



(根据: BP statistical review of world energy June 1986; June 2002)

- ◆ In 1998: the price of import petroleum of China was 116 \$ per ton
- ◆ In 1999: the price went up to 128 \$ per ton
- ◆ In 2000: the price ascend to 210 \$ per ton



图1 国际油价与国内油价走势图



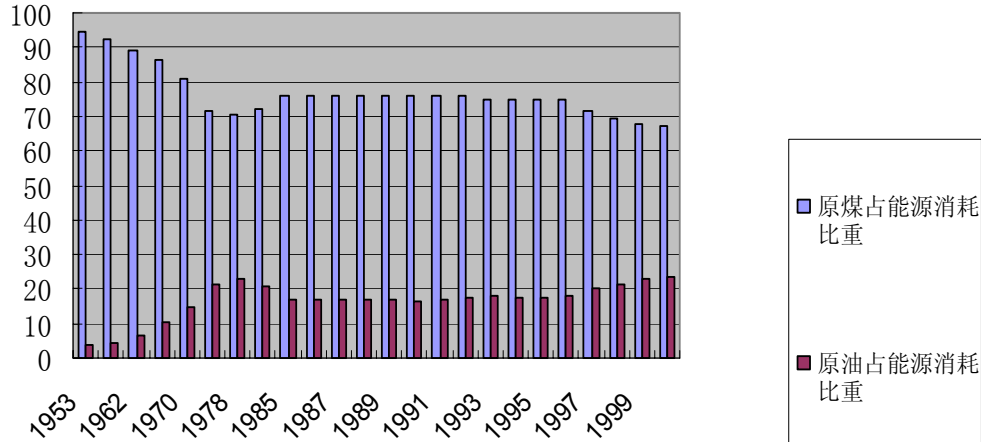
NEWS

- ◆ 2004年2月10日，欧佩克成员国部长会议决定：从4月1日起减少原油日产**限额100万桶**。同时，**削减现有超额**生产的150万桶。这样总计日产原油将减少250万桶。这一切使得2004年的石油价格毫无疑问将保持在高位振荡，而且应会高于去年每桶30美元的平均价格。
- ◆ 2004年5月14号讯，5月11日国际石油原油价格已经**突破了40美元**一桶，纽约商品交易所6月份交货的低硫轻质原油期价达到每桶40.06美元，为13年来的**最高水平**。目前国际原油价格同比上涨43%，汽油价格则位于历年最高价格水准。不少业内专家分析，就短期形势而言，国际市场原油在高价位上将会持续到今年下半年。

中国石油网



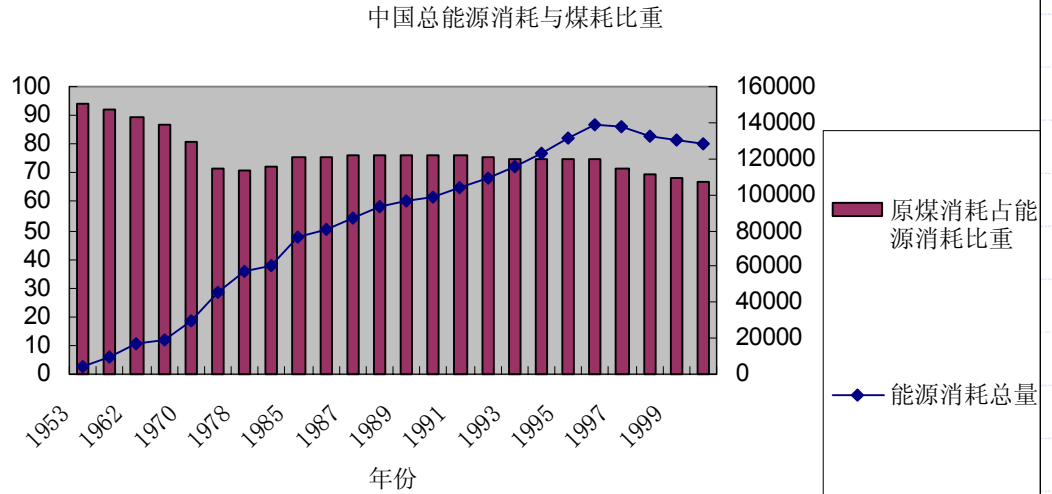
煤炭石油消费占总能源比重对比



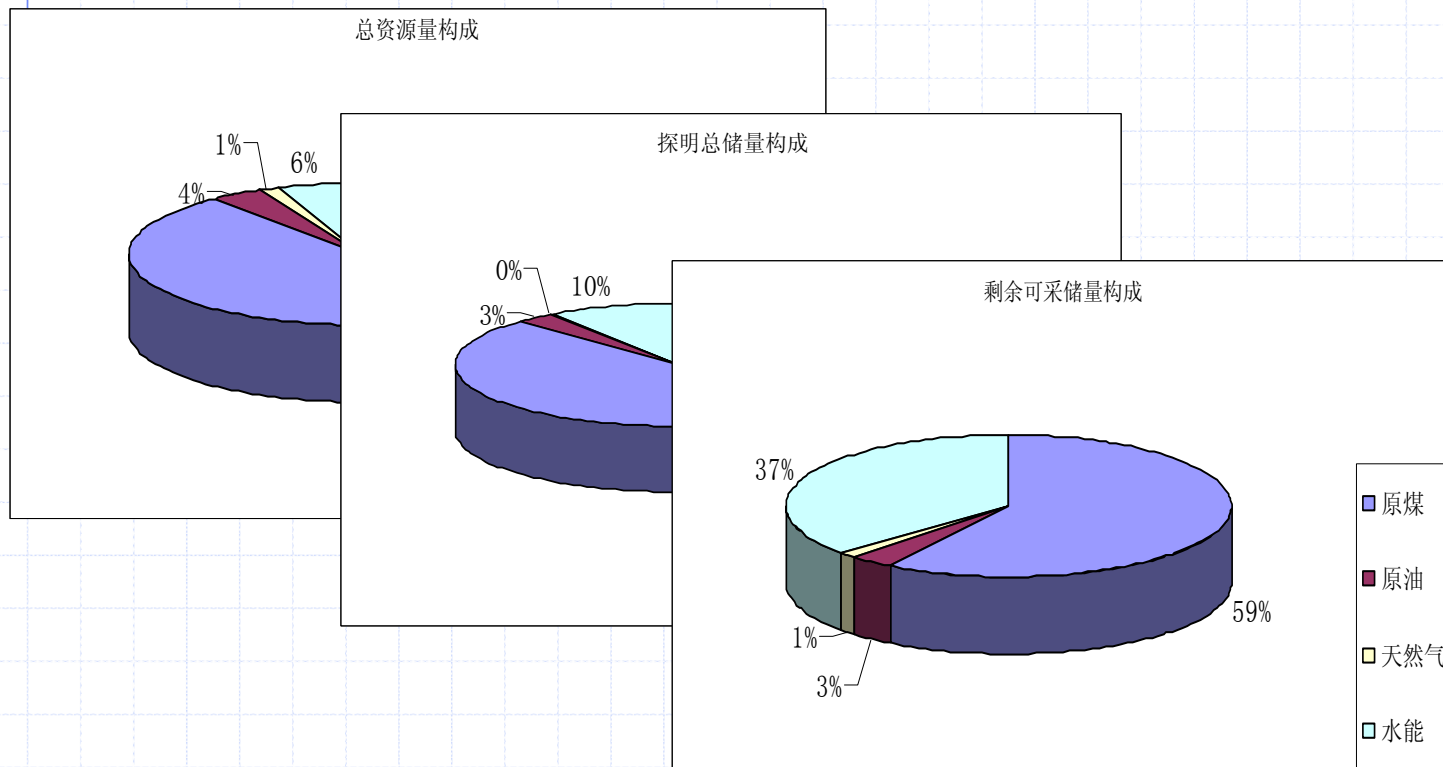
煤炭石油消费占总能源的比重

中国77%的发电能源、65%的化工能源、45%的民用商品能源是由煤炭提供的。

中国总能源消耗与煤耗比重



China's energy reserve and structure



The situation of our country coal consume

◆ The characteristic of our country coal consume

- Ninety percent burning coal, seventy-five percent directly burning

◆ Result

- In 1999, the total sulfur dioxide emission were 18.57 million ton, the soot emission were 11.59 million ton, and more than **75 percent** were related to coal burning, and there were 30 percent soil enrolled by acid rain because of burning coal.
- The sulfur dioxide emission were 19.27 million ton, which was the first. The world bank forecast, If China air pollution can't control effectively in following 20 years, China should spend 390 billion \$ on the disease caused by coal burning pollution, which occupying about 13 percent **G D P** at that time



A scenic landscape featuring a calm lake in the foreground with a small boat. The background consists of lush green mountains under a cloudy sky. The text is overlaid on this image.

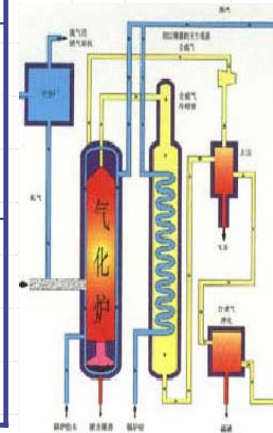
With coal abundance and oil less in China , we should depend on the coal to guarantee the energy safety;Coal is more than oil in China , we should depend on the coal to guarantee the energy safety

The pollution due to burning coal should solved by developing the clean coal technique.



Coal gasification classification

| | 固定床 气化 | 流化床 气化 | 气流床 气化 |
|------------------------------|------------------------|---------------|----------------|
| Coal quality | 块状煤 | 碎煤 | 粉煤 |
| process | 相对固定的 置煤床，转 化不充分 | 原料处于沸 腾状态 | 高温气化， 气化能力强 |
| Environ mental benefit | 污染较大 | 产生气体甲 烷含量高 | 污染小 |



The Technical Trend of The Coal Gasification

- ◆ Higher efficiency during coal gasifying;
- ◆ Less pollution; Wider adjustability;
- ◆ Higher air pressure; lower electricity-consuming
- ◆ Simplifying the technique and the structure; lower expenses; production with higher quality
- ◆ combine with modern control technology realize the auto control and optimized manipulation.
- ◆ Combine with other technologies



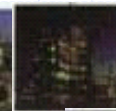
Access to coal gasification

◆ Purchasing the mature technology developed by foreign companies

- the Texaco Coal Gasification
- the Shell Coal Gasification

◆ Taking the initiative to developing our own technology

- the present obstacles
- the necessary trend



Two Major Coal Gasification Applying to Industry

◆ Shell Coal Gasification

- **Predominance: Air Current Bed, contain less water, blowing under high pressure(NO_2 \CO₂),high transform efficiency)**
- **Disadvantage: high cost both in equipment and desiccating coal, difficult to Milling)**

◆ Texaco Coal Gasification

- **coal slurry(contain water),pressurizing by pump, top ejecting**
- **Comparative lower efficiency, high oxygen consuming, high wastage**

The Necessity to Developing the Coal Gasification on Independence

◆ Corporation dimension

- High Cost of introducing Advanced Technology
 - ◆ Essential establishment: about 300 to 400 million RMB a furnace
 - ◆ The fee for transferring technique: with a standard about 2 yuan/m³
 $1 * 1000 * 20 = 40,000$ 元

◆ National dimension

- Key Competition Ability
- The Property Right of Knowledge Controlled by ourselves

Feasibility analysis of coal gasification marketing in fertilizer sector



Photograph by Joe McNally
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Group of Large
National Geographic magazine, October 2001

Coal gasification marketing in fertilizer sector

◆ **Core: cost-benefit analysis**

◆ **Key issue:**

- **Corporate dimension: stable cash income in foreseeable future**
- **National dimension: energy strategy/environmental protection law/environmental protection concept**

Analysis step

- ◆ **Potential market of coal gasification in fertilizer sector**
- ◆ **Feasibility analysis of coal gasification marketing in existing condition**
- ◆ **Trend of related policy and coal gasification marketing perspective**

Potential market of coal gasification in fertilizer sector

There has been a potential demanding market of coal gasification in fertilizer sector

- ◆ Challenge of entering WTO
- ◆ Low rivalrousness of nitrogenous fertilizer cost
- ◆ Status of China's nitrogenous fertilizer industry

Why demand?

How much is the demand?

Challenge of entering WTO

- ◆ **Indirect impact: increase competition among fertilizer firms due to farm product import increasing .**
- ◆ **Direct impact: impact of the fertilizer price.**



Low rivalrousness of nitrogenous fertilizer cost

None rivalrousness nitrogenous fertilizer exceed 1/2



natural gas



coal



petroleum

The aspect of raw materials

| | 大氮肥 | | | 中氮肥 | | | 小氮肥 | | |
|-------------|-------------------|--------|------------------|------|------|-------------------|-----|-------------------|-----|
| | 石油 | 煤炭 | 天然气 | 石油 | 煤炭 | 天然气 | 石油 | 煤炭 | 天然气 |
| 生产能力 (万吨/年) | 570 | 50 | 700 | | | 加上部分以煤为原料约650 | | 600 | |
| 大概成本 (元/吨) | 1100 ~ 1400 | 1000 | 900 ~ 1000 | | | 有优惠1000; 无优惠>1100 | | 有优惠1000; 无优惠>1100 | |
| 竞争力 | 无竞争力 | 有一定竞争力 | 有一定竞争力 | 无竞争力 | 无竞争力 | | | | |



The aspect of product

- ◆ 占我国氮肥生产能力约25%的碳铵企业,90%以上没有竞争力。
- ◆ 加入W T O后,国内尿素生产企业80%左右缺乏竞争力。

Status of China's nitrogenous fertilizer industry

- ◆ Sector gross production value: 1500,00million RMB
- ◆ Market scale : In the year of 2000, fertilizer firm totally 1924, including 696 nitrogenous fertilizer firms.

| | 生产能力 (万吨) | 企业 个数 (个) | 装置 套数 (套) | 以天然气为原料 的装置 (套) | | 以煤为原料的装 置 (套) | | 以油为原料的装 置 (套) | | 占全国 总生产 能力的 比重 | 备注 |
|-------------------------|--------------|-----------------|-----------------|--------------------|-----|------------------|-----|------------------|----------|-------------------------|-----------|
| | | | | 总数 | 效益好 | 总数 | 效益好 | 总数 | 效益好 | | |
| 大氮肥 | >30 | 27 | 29 | 15 | 8 | 2 | | 12 | 全部停 产 | 28% | 1/3停 产 |
| 中氮肥 | 20 ~30 | 52 | | 12 | | 32 | | 8 | | 19% | |
| 小氮肥 | <20 | 616 | | 70 | | | | | | 53% | |
| 占全国 总生产 能力的 比重 | | | | 21% | | 62.17% | | 16.1% | | | |

Feasibility analysis of coal gasification marketing in existing condition

- ◆ **Current problems of coal gasification**
- ◆ **Definition of existing condition and feasibility analysis**
- ◆ **Possible financing mode of corporation**

Current problems of coal gasification

- ◆ Lack of technology capacity
- ◆ Environmental policies and environmental laws an't strict enough
- ◆ Fund for construct
- ◆ Lack of special policy and financing policy for clean coal
- ◆ Lack of macro-policy mediation



Feasibility analysis of in existing condition

◆ Definition of existing condition

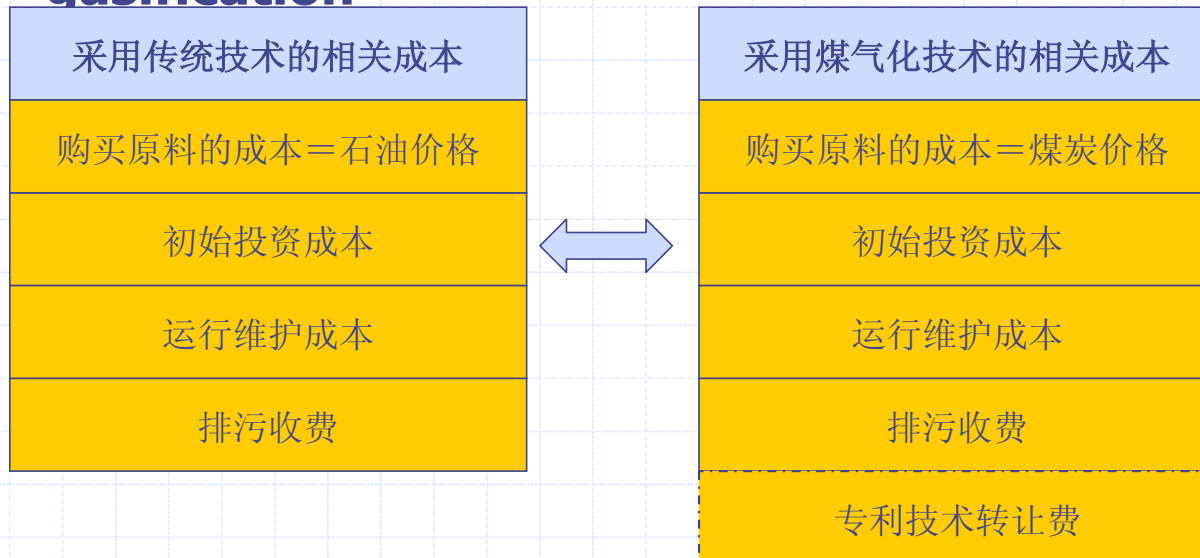
不变价格水平

现行环境标准

现行排污收费标准

不变产业政策

◆ Compare traditional technology and coal gasification



Example of medium-sized fertilizer firm of 1500t output per day

| 传统技术 | 煤气化技术 |
|-------------------------------|------------------------------|
| 购买原料的成本=10亿元 | 购买原料的成本=2亿元 |
| 初始投资摊销成本=0.25亿元 (5亿元; 20年) | 初始投资成本=0.55亿元 (11亿元; 20年) |
| 运行维护成本=0.1亿元 | 运行维护成本=0.2亿元 |
| 排污收费=10万元 | 排污收费=0 |
| | 专利技术转让费=0.15亿元 |

Possible financing mode of corporation

- ◆ 国内银行团的融资安排
- ◆ 风险融资
- ◆ 上市融资

灵活的贷款偿还合同,最优惠的利息折扣,低廉的融资费用

Trends of relevant policy and market prospect of coal gasification technique

- ◆ Price of oil and coal;
- ◆ Trends of China's charge policy of pollution discharge;
- ◆ Industrial policy relevant to clean coal technique.



Trend of relative price

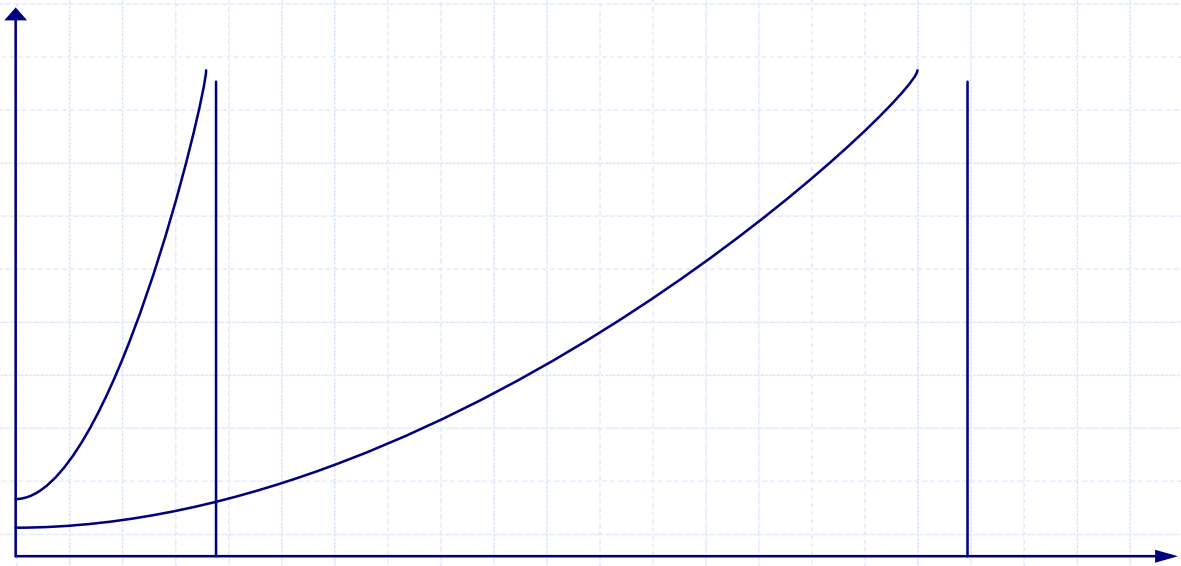
Figure 2 Energy resource of China and the world

| Fossil fuel | Coal (10 ⁸ t) | Oil (10 ⁸ t) | Gas (10 ¹² m ³) |
|--|--------------------------|-------------------------|--|
| Total amount of the world | 9842 | 1434 | 146.4 |
| Total amount of China | 1145 | 38 | 1.37 |
| Reserves-production ratio of China(%) | 11.6 | 2.6 | 0.9 |
| Reserves-production ratio of the world | 92 | 24 | 58 |
| Reserves-production ratio of the world | 218 | 41 | 63 |
| China's place | 1 | 5 | 19 |



Figure 1 Trends of the price of oil

The changing relative price of coal to oil



Trends of China's charge policy of pollution discharge

◆ History of China's charge policy of pollution discharge

| History | | | Main items | | | |
|---------|-----------|--------------------------------------|--|--|--------------|----------|
| Phase | Year | Features | Range | Type | Factor | Standard |
| I | 1978-1981 | Be proposed; tentative | Corporations whose discharges exceed standards | Charge when exceeding standard | single | |
| II | 1982-1987 | Be Set up; be carried into execution | Corporations whose discharges exceed standards | Charge when exceeding standard | single | |
| III | 1988-2002 | Be Reformed | Corporations whose discharges exceed standards; individuals | Charge when exceeding standard; charge of discharge of sewerage | single | |
| IV | 2003- | More perfect | Corporations whose discharges exceed standards; individuals | Charge when exceeding standard, together with immediate charge of discharge | multi | |

Trends of China's charge policy of pollution discharge

◆ History of China's charge policy of pollution discharge

- **Range: enlarged;**
- **Types: increased;**
- **Items: enlarged gradually;**
- **Factors: Transformed from single factor to multi factors;**
- **Standard: stricter**

Industrial policy relevant to clean coal technique

- ◆ Clean coal technique was looked on as a significant part of China's sustainable development strategy in *China's Agenda 21*;
- ◆ 1997年, 《中国洁净煤技术“九五”计划和2010年发展纲要》
- ◆ 1999年, 明确加快清洁能源、清洁生产相关技术及其产业的发展, 洁净煤是重要的组成部分
- ◆ 涉及洁净煤技术的法律法规, 如《中华人民共和国煤炭法》、《中华人民共和国节约能源法》、《中华人民共和国大气污染防治法》、《中国节能技术政策大纲》、《当前国家优先发展的高技术产业化重点领域指南(目录)》

more helpful for coal gasification marketing

- ◆ Relative prices of coal and oil are falling;
- ◆ Relevant environmental standards are becoming stricter;
- ◆ Relevant industrial policies
 - In favor of the market spread of coal gasification technique.



Thank you

