



Sinopec Approaches to Resource & Energy Conservation and the Effect & Achievements

China Petrochemical Corporation

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Guideline :

- 1. Paying equal attention to resource development and conservation**
- 2. Giving priority to conservation,**
- 3. Improving resource efficiency**

Achievements in resource conservation:

- 1. Improving energy efficiency,**
- 2. Mitigating resource shortage,**
- 3. Reducing environmental pollution,**
- 4. Improving the quality and efficiency of the economic growth in petroleum and petrochemical business**
- 5. Ensuring its sustained & healthy development**

During 10th 5-year-plan period :

- **Power consumption per ton crude oil production was decreased by 18.1%.**
- **Comprehensive energy consumption per ton refining throughput was decreased by 13.5%**
- **Fuel and energy consumption of Ethylene was decreased by 8.6%**
- **water consumption of per ton crude oil production was decreased by 47.1%**
- **Recycle rate of water for industrial use was increased from 87% to 95%**



Practice & Effect

- ✓ **Special attention paid by senior management**
- ✓ **Carrying out policies and regulations**
- ✓ **Progress in technology**
- ✓ **Informatization**
- ✓ **Resource conservation**



Practice & Effect

- ✓ **Special Attention Paid by Senior Management**
- **Established & improved the supervision organizations for energy conservation**
- **Established Sinopec Energy Conservation Technology Center and Sinopec Oilfields Energy Testing Center**
- **Set up a special supervision team for water conservation, Initiated the 11th 5-year-plan for water conservation & emission reduction**



- ✓ **Carrying out policies and regulations**
- **Assessing index of energy conservation and water conservation**
- **Making a development plan of resource conservation**



- ✓ **Progress in technology**
 - **Promoting large-scale and intensive equipment to reduce energy consumption through technological transformation.**
 - **Insisting on science and technology innovation, Developing and applying advanced technology**



✓ Informatization

- Optimizing internal resources of region and company
- Implementing ERP to promote the whole level of company completely



Practice & Effect

- ✓ **Measures of Resource Conservation**
 - **Oil Conservation & Alternatives**
 - **Combined Heat & Power**
 - **Adjusting Energy & Equipment Mix**
 - **Optimizing Energy System**
 - **Flare Gas Recovery & Utilization of Remaining Heat & Pressure**



✓ Oil Conservation & Alternatives

- Using coal or petroleum coke as oil alternatives; consuming less feedstock oil and fuel oil
- 5 CFB projects in operation including Zhenhai Refining & Chemical Co., Ltd., Shanghai Petrochemical Co., Ltd. and Jinling Company. There are some new CFB fuel coal/petroleum coke boilers.
- Coal gasification project has been carried out in 4 companies which produce chemical fertilizers from naphtha such as Dongting Nitrogenous Fertilizer Plant.



✓ **Combined Heat & Power**

◆ **Utilization hours of Sinopec power plants:
6023 hours,**

national thermal power plants: 5374 hours

◆ **Average standard coal consumption for
power supply: 366g/kwh, better than the
average of power industry**



✓ Adjusting Energy & Equipment Mix

- Chemical fertilizer plants have initiated preliminary work for *coal gasification*. After the operation starts, it is estimated that the chemical feedstock will be saved over 200,000 tons per year.
- In Shengli Oilfield and Yanshan Petrochemical Co., Ltd., *coal water slurry* has been commercialized as a fuel oil alternative.
- Seven 10-million-tonnage refining complexes have been established



- ✓ **Optimizing Energy System**
- **Utilizing system engineering method to optimize resources**
- **Utilization of remaining energy and heat integration technology**



- ✓ **Flare Gas Recovery & Utilization of Remaining Heat & Pressure**
- **Almost all torches in Sinopec refineries and chemical plants have been shut down, reducing the emission of about 4.1 million tons carbon dioxide to the air every year**
- **Effective recovery and utilization of H_2S deriving from the refining process, less pollution caused by H_2S and SO_2**
- **Promoting technologies including Combined Heat and Power, thermal combination among units, utilization of heat under low temperature and remaining heat recovery in the condensation of water.**



Opportunities, Challenges & Problems

- ✓ **The National Status Quo**
- ✓ **The Oil Resources**
- ✓ **Challenges**
- ✓ **National Policies**



Opportunities, Challenges & Problems

✓ **The National Status Quo**

- **Serious loopholes in energy conservation**
- **Lagging behind the international standard in terms of energy efficiency**
- **Urgent demand from sustainable development**
- **To achieve economic growth with less energy input greatly depends on whether we can effectively tap the potential for energy conservation**



Opportunities, Challenges & Problems

✓ Oil Resources

- Domestic oil & gas production is growing slowly: in 2005, 42.9% of the oil was imported and it is expected to reach 50% in 2010 and 60% in 2020.
- With the development of China's petrochemical industry, in which ethylene takes the lead, shortage of chemical feedstock becomes increasingly severe. The ratio of refining throughput to ethylene yield is expected to drop to 20:1 from the current 40:1, making it more difficult for petrochemical feedstock self-reliance.



Opportunities, Challenges & Problems

✓ Challenges

- ◆ Most oilfields are in the ultra-high water-cut period (water cut above 92%); facilities are aged with low system efficiency.
- ◆ The energy consumption index for most refineries are lagging behind the international advanced standard; similar facilities in these refineries are quite different in terms of energy consumption and conservation
- ◆ Low capacity, high material & energy consumption, out-of-date technology



Opportunities, Challenges & Problems

✓ National Policies

- Chinese Government issued *A Circular of the State Council on Near-term Priorities for Building a Conservation-minded Society* and *Several Opinions of the State Council on Speeding up the Development of Circular Economy*
- *Renewable Energy Law* was brought into effect in 2006
- *Energy Conservation Law* was officially promulgated and effective in 1998. The corresponding regulations have been issued: *Energy Conservation Management Measures on Key Energy Consumers*



Development Goals & Agenda

✓ Development Goals

- **The comprehensive energy consumption index per RMB 10,000 output in 2010 will drop by 20 percentage points than at the end of 10th 5-year-plan period. Specifically:**
 - **Energy consumption per ton crude oil production: 150kg standard oil**
 - **Energy consumption per ton refining throughput: below 65kg standard oil**
 - **Energy consumption per ton ethylene production : below 650kg standard oil**



Development Goals & Agenda

✓ Agenda

- Oil conservation and alternatives
- Combined Heat & Power
- To improve the location of companies in coordination with region economy
- Insisting on the scientific & systematic approach to energy conservation
- To update traditional industries with modern information technology
- Water conservation
- Comprehensive use of resources



Development Goals & Agenda

✓ Agenda

□ Oil Conservation & Alternatives

- ◆ To avoid unreasonable use of oil with fuel alternatives, reducing the energy loss in the production process
- ◆ To develop oil alternatives such as the ethanol-blended fuel & biodiesel.
- ◆ To develop auto fuel alternatives and natural gas/coal based chemical industry, building demonstration plants
- ◆ To development of new energies and renewable energies, including terrestrial heat, remaining heat in sewage, wind & solar energy, etc.



Development Goals & Agenda

✓ Agenda

□ Combined Heat & Power

- **Pilot experiment of the combined power generation, heat supply & refrigeration model**
- **To enhance the thermoelectric efficiency by increasing the annual utilization hours and the heat-power ratio of the CHP plants**
- **To abandon old CHP plants with low capacity and efficiency**



Development Goals & Agenda

✓ Agenda

- **To improve the location of companies in coordination with region economy**
- **To rationalize the location of refineries and petrochemical companies**
- **To form industrial clusters in the Pearl River Delta, Yangtze River Delta and around the Bohai Bay**



Development Goals & Agenda

✓ Agenda

- Insisting on the scientific & systematic approach to energy conservation
- To improve energy efficiency by overall energy optimization & integration and the rollout of new technologies, equipments and processes
- New energy conservation technologies and equipments
- To develop and apply *Process Energy Optimizing Technology*



Development Goals & Agenda

✓ Agenda

- To update traditional industries with modern information technology
- To intensify the overall technology development, forming proprietary technologies such as the whole sets of technologies for large ethylene & aromatics units, PE & PP technology, etc.
- To promote IT application, to achieve great-leap-forward development, and to intelligentize Sinopec plants with digital technology



Development Goals & Agenda

✓ Agenda

☐ Water conservation

- **To intensify control system and performance appraisal**
- **To apply clean production technologies**
- **To optimizing water supply, utilization & drainage system to reduce intrasystem consumption & leakage and to consume less once-through cooling water**
- **To recycle waste water for environmental benefit**



Prospects for Cooperation

✓ **Disparities**

✓ **Prospects for Cooperation**



Prospects for Cooperation

✓ Disparities

- **Coal plays a dominant role in China's nonrenewable energy mix**
Coal consumption in 2005: 2.14 billion tons, about 68.9% of the total national energy consumption
- **Lower energy efficiency in comparison with US, where oil & gas dominate**
- **Lagging behind US in energy conservation technologies and equipments**



Prospects for Cooperation

✓ Future Cooperation

- ❑ Encouraging new and renewable energies
(terrestrial heat, remaining heat in sewage,
wind & solar energy, etc.)



Prospects for Cooperation

✓ Future Cooperation

- **Rolling out advanced technologies to reduce coking**
- **Reducing air pollutants discharged from flue gas**



Prospects for Cooperation

✓ **Future Cooperation**

□ Developing IT to realize great development

Applying information systems which covering production processes and all management activities



Prospects for Cooperation

✓ **Future Cooperation**

- ❑ **Exploring measures to enhance the efficiency of coal /coke CHB boiler**



Prospects for Cooperation

✓ Future Cooperation

□ Strengthening understanding and communication each other and drawing successful experiences from US in energy conservation & environmental protection:

- Energy efficient technologies, processes and equipments;
- Policies, administration & market system

To realize sustainable development of petrochemical industry



Thank You!

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