# Energy Conservation and Pollution Reduction in China

Shen Longhai
Senior Advisor, NDRC Energy Research Institute
Director, EMCA
October, 2008

# overview

一, Importance and urgency of energy conservation

二, Policies and measures

三, New energy conservation mechanism

四, Strengthening cooperation

## 一, Importance and urgency of energy conservation

1,China is currently the second largest producer and consumer of primary energy in the world.

In 2006:

Primary Energy Production : 2.21 billion tce;

primary Energy Consumption: 2.46 billion tce;

and 2.57 billion tce in 2007.

## 一, Importance and urgency of energy conservation

2, Along with the increase of population and the acceleration of industrialization and urbanization, the economy will increase continually and rapidly in China.

The demand for energy will increased significant. Its energy consumption coefficient of elasticity reached 1.05 during 2000-2005 period.

## 一, Importance and urgency of energy conservation

3, China faces three main problems:

---Rising constraints imposed by the shortage of the energy resources supply

---Growing energy supply-demand contradictions

---Serious environmental pollution and climate change problems.

# 一, Importance and urgency of energy conservation

The deposits in energy resources is abundant, but China's exploitable energy resources per capita stands far below the world average.

The proven reserves of coal and hydropower per capita were about 50% of the world average;

The proven reserves of oil and natural gas per capita were only 1/15 of the world average.

# 一, Importance and urgency of energy conservation

The primary energy consumption is increasing quickly, from 1.386 billion tce in 2000 to 2.57 billion tce in 2007. The primary energy consumption increased 1.184 billion tce during the recent seven years.

The primary energy consumption will exceed 5.0 billion tce by 2020 in terms of energy consumption coefficient of elasticity 1.0.

## 一, Importance and urgency of energy conservation

There is security issue on energy supply, particularly oil.

In 1993, China become a country of net oil imports.

China's 2007 crude oil imports totaled 160 million tons, accounting for some 50% of the nation's oil needs.

## 一, Importance and urgency of energy conservation

With coal being the leading source of energy, China is the second largest emitter of CO2 in the world. 70% of CO2 and 90% SO2 emissions come from coal burning.

SO2 has caused one third of China ‘s land to be encroached be acid rain.

## 一, Importance and urgency of energy conservation

China's huge challenge:

----Saving energy resource

----Obtaining the balance between energy demand and supply

----Reducing energy consumption as well as pollution

----protecting ecosystem

# 二, Policies and measures

1, The Chinese government has gave high priority to conserving resources and saving energy and protecting the environment, and has formulated and implemented a serial of laws、regulations and policies on energy conservation and pollution reduction.

# 二, Policies and measures

----Resources conservation is one of China's basic national policies.

----《The Energy Conservation Law of the People's Republic of China》 was put into effect in 1998. The revision of this law was passed in October 2007 and executed on April 1,2008.

# 二, Policies and measures

----The first 《China Medium and Long Term Energy Conservation Plan》 was formulated in 2004.

----《The Decision on Strengthening Energy Conservation》 has been made by the State Council in 2006.

# 二, Policies and measures

----《The National Leading Group on Climate Change and Energy Conservation and Pollution Reduction》has formed by the State Council.

----The State Council held video-phone conventions for the national energy conservation and pollution reduction, published and distributed 《The Integrating implementing Project on Energy Conservation and Pollution Reduction》.

# 二, Policies and measures

----China will push and accelerate structure adjustment, including adjusting industrial structure, product structure, and energy consumption structure, and eliminate backward technology and equipment and production capacity with high energy consumption and pollution.

# 二, Policies and measures

----Chinese government send out the notices on energy conservation and pollution reduction on electric power industry, such as《Increase large power generator and reduce small power generator》, and《Differentiated Electricity Price》, and《Dispatching Electricity of energy Conservation》and so on, to promote energy conservation and pollution in electric power industry.

# 二, Policies and measures

----Ministry of Finance and NDRC jointly issued and distributed 《Temporary Regulation on Rewarding and Managing the Funds for Technology Renovation on Energy Conservation》, and《The Notice to Adjust the Government Procurement Lists on Energy Conservation Products》.

# 二, Policies and measures

----In 2008, The State Council has formulated and implemented 《Energy Conservation Rules of Public Institutions》, and《Energy Conservation Rules of Residential Building》, and Strengthened oil and electricity conservation further.

# 二, Policies and measures

2, Clearly define energy conservation goals and individual responsibilities and carry on evaluation.

----Chinese government has set goals of Eleventh Five-year Plan (from 2006 to 2010) to combat climate change.

To reduce energy consumption per unit GDP by 20% by 2010 over that of 2005;

To reduce SO2 and COD by 10%;

To increase the share of renewable energy to 10%.

# 二, Policies and measures

In 2007, the energy consumption per 10,000 Yuan RMB GDP was down 3.27% from 2006, and the country saved a notable 89.8 million tce in energy.

In 2007, the emissions of sulfur dioxide (SO2) and chemical oxygen demand (COD) fall 4.66% and 3.14% respectively from 2006.

# 二, Policies and measures

---The energy conservation goals and responsibilities fall onto each of the relevant government leaders and the key energy consumption enterprises, which will be evaluated, i.e. adding the energy conservation and pollution reduction as part of performance evaluation of the relevant government leaders and the State-Owned major enterprises.

# 二, Policies and measures

3, It's more important to take actions when it comes to resources conservation

----During the Eleven Five-year Plan period, China is implementing the ten key energy conservation projects:

# 二, Policies and measures

- Coal-burning industrial boiler (kiln) retrofit,
- District cogeneration,
- Residual heat and pressure utilization,
- Petroleum saving and substituting,
- Motor system energy saving,

# 二, Policies and measures

- Energy system optimization,
- Building energy conservation,
- Green lighting,
- Government agency energy Conservation,
- Energy saving monitoring and testing, and technology service system building.

# 二, Policies and measures

----In 2006, China launched 《One Thousand Key Energy Intensive Enterprise Action》.It includes companies with energy consumption over one hundred and eighty thousand tce per year from nine key industries which covers the steel and iron, the nonferrous metal, the petrochemical, the chemical, the building materials, the coal, the electric power, the light, and the textile industry etc.

# 二, Policies and measures

----In 2007, the action of 《Energy Conservation and Pollution Reduction by Everyone》 was sponsored by NDRC with seventh related government agencies and covered nine special areas in the community, the youth, the enterprise, the school, the militaries, the government, the technology, the popular science and the media etc.

# 三, New energy conservation mechanism

At present, there are a lot of problems in energy conservation work in China.

Three major problems are as follow:

1, Knowledge of the importance of energy conservation is insufficient, and the guideline policy to give priority to energy conservation , has not been fully implemented.

# 三, New energy conservation mechanism

2, The new energy conservation mechanisms adaptive to market driven economy system has not been established.

The new energy conservation mechanisms such as integrated resources planning (ARP), power demand side management (DSM), energy performance Contracting (EPC), and voluntary agreements (VA), not widely applied in China, though some are already being tested and developed.

# 三, New energy conservation mechanism

3, Lack of the energy conservation investment. Most enterprises are faced with financing difficulty to disseminate and apply energy conservation. On the whole, investment for energy conservation is insufficient, particularly in the west area in China.

# 三, New energy conservation mechanism

- What is EPC?

  EPC, introduced in developed countries in the wake of oil crisis in the 1970s, is a practical and effective way to finance and install proven energy-efficient technologies, improve the energy performance of your building or facility, and save your money and energy.

# 三, New energy conservation mechanism

- Your energy efficiency plan is typically designed and installed by an energy service company (ESCO, EMCo in China). You pay the ESCO through reduced energy bills, typically sharing the energy cost savings over a predetermined length of time, after which all of the energy savings revert to you, the facility owner.

# 三, New energy conservation mechanism

- There are three EPC models currently adopted in China.

  *1) Energy saving sharing – ESCO finances and implements energy efficiency contract and shares profits with client in line with agreement. All equipment and profits will belong to client after contract expires.*

# 三, New energy conservation mechanism

*2) Energy saving guarantee – ESCO implements contract financed by client and makes profits from guaranteed energy savings. ESCO is obliged to compensate client if the energy savings do not reach the level guaranteed in the contract.*

# 三, New energy conservation mechanism

*3) Outsourcing– ESCO manages and upgrades energy equipment and systems for client. Both will benefit from reduced energy costs.*

# 三, New energy conservation mechanism

- China Energy Conservation Promotion Project cooperated with World Bank and Global Environment Fund.

  Phase I: 1998 - June 2006

  Three pilot energy service companies:

  Beijing EMCo

  Liaoning EMCo

  Shandong EMCo

# 三, New energy conservation mechanism

Three pilot EMCos have made energy conservation projects 475 for clients 405 during about ten years.

Total investment: RMB 1.33 billion yuan

Net earnings :

EMCo: RMB 420 million yuan

Clients: 8-10 x RMB 420 million yuan

# 三, New energy conservation mechanism

- The Project has brought in both energy conservation and environmental benefits:

  *-- annual energy saving of 1.49 million tce*

  *-- annual carbon dioxide reduction of 1.45 million tons*

# 三, New energy conservation mechanism

- Phase II: 2003 – 2008

  The objective of Phase II is to promote the adoption of EPC energy saving mechanism, foster and develop energy service industry, expand investment in energy efficiency projects, and reduce carbon dioxide emissions and other pollution.

# 三, New energy conservation mechanism

- Phase II includes two subprojects –

  1) a Loan Guarantee Special Fund was established to help EMCo secure loans from commercial banks to implement energy efficiency projects.

  2) the ESCO Association (EMCA) was created in April 2004 to facilitate the operation of EPC in China.

# 三, New energy conservation mechanism

- The Loan Guarantee Special Fund funded 110 projects for EMCos 25 between 2004 and 2007.

  Total investment: RMB 587 million yuan

  Amount loaned: RMB 385 million yuan

  Amount guaranteed: RMB 346 million yuan

# 三, New energy conservation mechanism

The members of EMCA were increasing to 308 in the end of 2007 from 89 in 2004, 158 in 2005, 212 in 2006.

Most of members located the east cost area and big cities such as Beijing, Shanghai, shenzhen, etc.

# 三, New energy conservation mechanism

According to investigation, the total revenue of members reached RMB 21.6 billion yuan in 2007 from RMB 1.767 billion yuan in 2003;

The total investments of EPC projects (640) reached RMB 6.55 billion Yuan in 2007 from 851 million Yuan in 2003.

# 四, Strengthening cooperation

1, Strengthen energy cooperation, particularly energy conservation and renewable energy among the Northeast Asian countries.

We should deepen cooperation both bilaterally and multilaterally.

# 四, Strengthening cooperation

2, Strengthen cooperation in energy saving technology, product and management.

China should develop the clean coal technology as coal is main energy.

We should establish the technology transfer mechanism to promote the cooperation between developed and developing countries.

# 四, Strengthening cooperation

3, Strengthen cooperation in promoting new energy conservation mechanisms such as EPC, DSM, etc among the Northeast Asian countries.

The second Asia ESCO conference held in Beijing last year. We should continue to promote cooperative relations on energy conservation service companies in the region.

# 四, Strengthening cooperation

4, Strengthen cooperation in personnel training, particularly in managers and youths.

We should create managers and youths who are armed with strong skills for energy conservation such as energy auditing, energy conservation measurement and verification, etc.

# 四, Strengthening cooperation

5, Strengthen cooperation in the development of new energy and renewable energy and use less fossil energy in order to reduce green house gas emissions and contribute to global environmental protection.

In recent years, China has made much progress in the development and use of wind power, solar energy, geothermal energy, and biomass energy. It should cooperation with Northeast Asian countries.

# Contact me

Add: RM518 SINOCHEM Tower,
A2 Fuxingmenwai St.
Beijing, 100045, P.R.China
Tel: 8610-6360-0182
Fax: 8610-6360-0459
Website: www.emca.cn
E-mail: slh@emca.cn