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How does the power industry support the national economic and social sustainable development?

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1. Introduction

- In China, the power industry is the main energy consumer and key energy-saving industry.
- The annual energy consumption for power generation is more than 40% of the energy consumption of the whole society and the SO₂ emissions in power industry is more than 50% of the SO₂ emissions of the total industries.
- During the “ Eleventh Five-Year Plan ” period (2006-2010), the Chinese power enterprises have positive contribution to the sustainable economic and social development of the country by remarkable energy conservation and emission reduction.
- In the future, the power industry will keep on playing an important role in energy conservation and emission reduction, and promoting the sustainable economic and social development of the country .



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2. The achievements of energy conservation and emission reduction in power industry

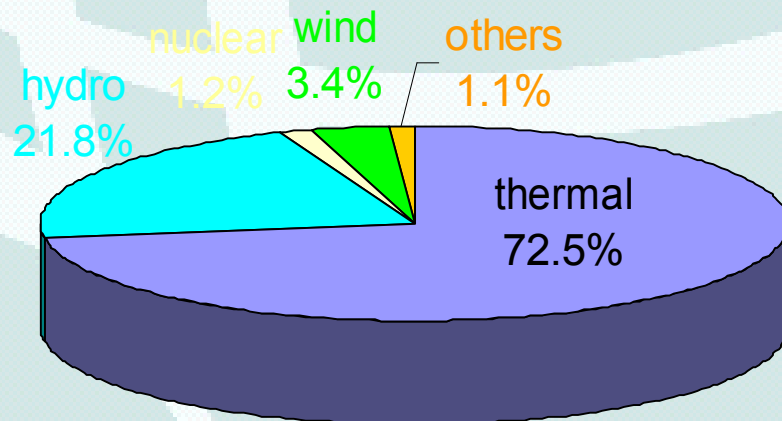
2.1 Power industry overview

- power generation and grid scale: **No.1 in the world**
- hydro- and wind- power installed capacity: **No.1 in the world,**
- nuclear power construction capacity: **40% of the world**

At the end of 2011

Supply side

generating capacity reached 1056 GW



Structure of generating capacity

Transmission

➤ **loop length of the transmission line of 220kV and above:**

0.50 million km

➤ **substation equipment capacity:**

2200 GVA



2.1 Power industry overview

- **Clean energy has been developed rapidly and the power structure has been gradually optimized. From 2005 to 2011, the installed capacity of hydro power, nuclear power, wind power and other clean energy has increased from 126 GW to 288 GW with an average annual growth rate of 14.8%.**
- **Large units have been developed and small ones have been suppressed in steady progress. At the end of 2010, the number of the ultra-supercritical units with capacity of 1000 MW has exceeded over 30, the proportion of thermal power units with capacity of 300 MW has accounted for more than 70% of the thermal power installed capacity, the average capacity of thermal power has reached 108.8 MW, about two times of that in 2005 (60.9 MW).**



2.1 Power industry overview

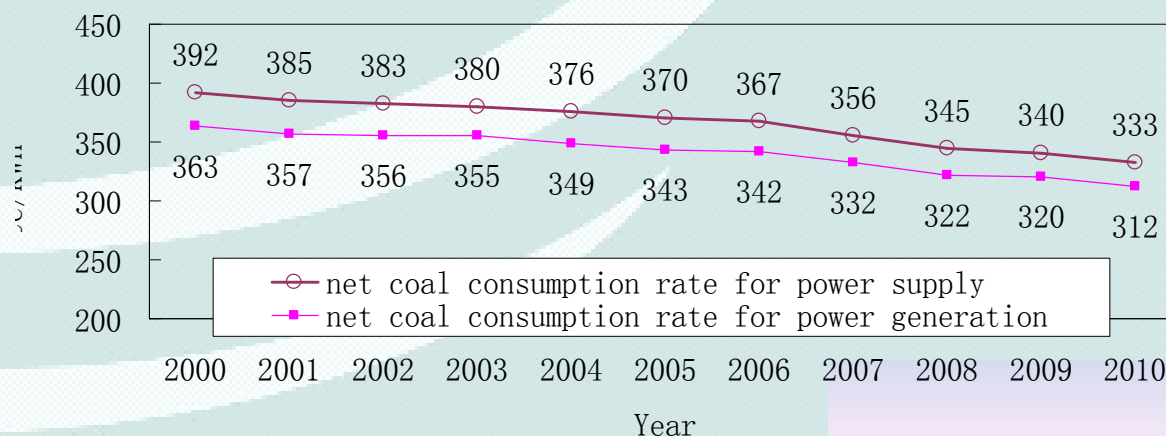
- **Promotion of desulfurization equipments has been speeded up, the total emission of SO₂ has reduced. In the case of the power output has increased by 70%, the SO₂ actual net emissions reduction was about 4 million ton during the “Eleventh Five-Year Plan” period.**
- **National network has been initially formed; benefits from large grid gradually have been achieved. In 2001, the trading volume was only 2.3 TWh. It increased to 77.4 TWh in 2005. In 2010, it further increased to 149.2 TWh. Southeast Shanxi - Nanyang – jingmen (1000 kV), Xiangjiaba - Shanghai (± 800 kV), Yunnan - Guangdong (± 800 kV) and other UHV AC or DC projects were put into operation, that creates a good situation for building a strong and smart grid.**



2.2 Key indicators: Net coal consumption rate for power supply

➤ Along with the building of a large number of new large capacity units, the technological renovation of old units and the close of small units, the technical and economic indicators have been gradually improved.

➤ It has decreased from 370 gce/kWh in 2005 to 333 gce/kWh in 2010, a drop of 37gce/kWh and a decrease of 10%.



Changes of the net coal consumption rate of Chinese thermal power units



2.2 Key indicators: Net coal consumption rate for power supply

- In general, the larger the capacity of the units is, the higher the efficiency and the lower the net coal consumption rate is.

Net coal consumption rate for power supply of units with different capacity in 2010

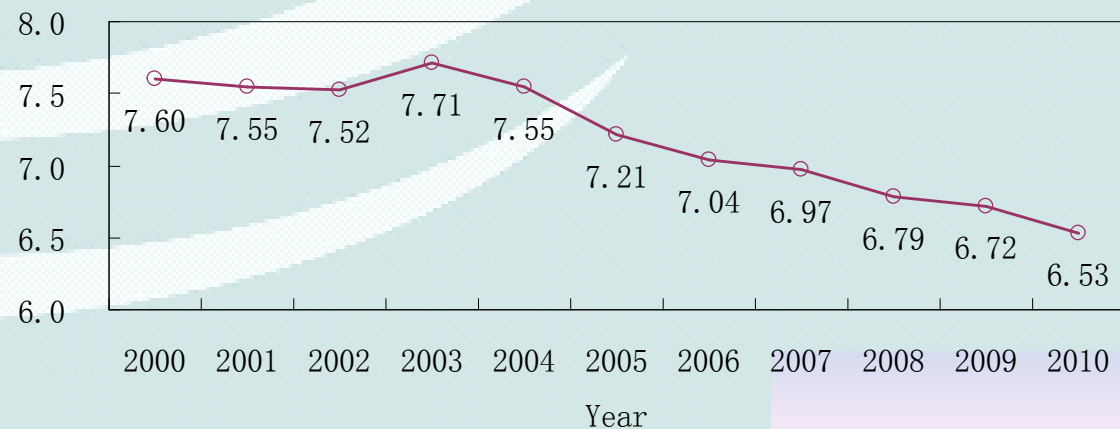
Capacity of the unit / MW	Net coal consumption rate for power supply / gce/kWh
below 100	363
100-200 (excluding 200)	358
200-300 (excluding 300)	348
300 - 600 (excluding 600)	330
600-1000 (excluding 1000)	317
1000 and above	293



2.2 Key indicators: Line loss rate

➤ Due to the grid structure strengthened continually, equipment performance improved continually, energy-saving technology extended continually, management faculty gradually intensified, proportion of secondary industry power consumption rising and other factors, the line loss rate has generally shown a downward trend.

➤ During the "Eleventh Five-Year Plan" period, it has fallen by 0.68 percentage, a decrease of 9.4%.



Changes of China power grid line loss rate



2.2 Key indicators: Line loss rate

- The line loss rate of SGCC and CSG have been lower than that of the local grid, and been with a significant downward trend.**
- The line loss rate of SGCC has decreased from 6.97% in 2003 to 6.38% in 2010.**
- The line loss rate of CSG has decreased from 7.47% in 2003 to 6.28% in 2010.**
- Local grid line loss rate is generally 10% or more. In some areas, it is even more than 20%.**



2.3 Benefits of energy conservation and emission reduction

➤ During the “Eleventh Five-Year Plan” period, the energy consumption intensity has decreased with a significant benefit.

Several key indicators of the power industry

	Unit	2005	2006	2007	2008	2009	2010
Net coal consumption rate for power supply	gce/kWh	370	367	356	345	340	333
Net coal consumption rate for power generation	gce/kWh	343	342	332	322	320	312
Auxiliary power rate	%	5.87	5.93	5.83	5.9	5.76	5.43
Wherein: the thermal power	%	6.80	6.77	6.62	6.79	6.62	6.33
Line loss rate	%	7.21	7.04	6.97	6.79	6.72	6.53



2.3 Benefits of energy conservation and emission reduction

➤ The key indicators are all completed ahead of schedule.

Energy-saving and emission reduction targets completion of the power industry

Indicator	unit	Reference value in 2005	2010		
			Target value	Actual value	Target completion
Net coal consumption rate for power supply	gce/kWh	370	355	333	in 2008
Comprehensive line loss rate	%	7.21	7.00	6.53	in 2007
Water consumption for power generation	kg/kWh	3.10	2.80	2.45	in 2008
SO2 emissions of Power industry	million ton	13.50	9.52	9.56	in 2009
Desulfurization units operation capacity	GW	53	408	over 500	in 2008
Comprehensive utilization rate of industrial solid waste	%	55.8	60.0	68-69	in 2008



2.3 Benefits of energy conservation and emission reduction

- **Take 2005 as references, the primary energy saved in 2010 was 120 million tce, the alternative fossil fuels saved were 110 million tce, and the SO₂ emission reduced was 3.9 million ton.**
- **energy saved by the power industry is accounting for 15.7%.**
- **SO₂ emission reductions by the power industry is accounting for over 100%.**



2.4 Power enterprises' experience

The power companies, especially the central ones, have focused on improving the technical level, promoted the upgrading of the structure, promoted and applied the new energy-saving technologies and products, established a comprehensive and systematic energy management system and index system, set up many Energy Service Companies (ESCO), improved the level of energy saving, made remarkable achievements, and accumulated a lot of experience.



2.4 Power enterprises' experience

- Actively adjust power and unit structure**
- Attach importance to energy-saving technological reformation**
- Strengthen the comprehensive utilization of resources**
- Promote the nationwide inter-regional electricity trading**
- Actively promote the construction of the high-voltage transmission grid**
- Actively develop power trading and energy-efficient scheduling**
- Strengthen the guarantee of the full acquisition of renewable energy power**
- and the others**



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3. The trend of energy conservation and emission reduction in power industry

➤ The next decade will be a critical period for the comprehensive building of a well-off society in China. The country will further increase energy conservation and emission reduction efforts.

In 2015,

- the **net coal consumption rate for power supply** of thermal power industry in China would be expected decreased to 325gce/kWh, a decrease of 8 gce/kWh compared with 2010;
- the **grid line loss rate** would fall to 6.3%, a decrease of 0.23 percentage.
- in the case of power generation increasing by 50%, the **SO₂ emission** would have a net decrease of 1.56 million ton, a decrease of 16%, and the **NO_x emission** would have a net decrease of 3.05 million ton, a decrease of 29%.

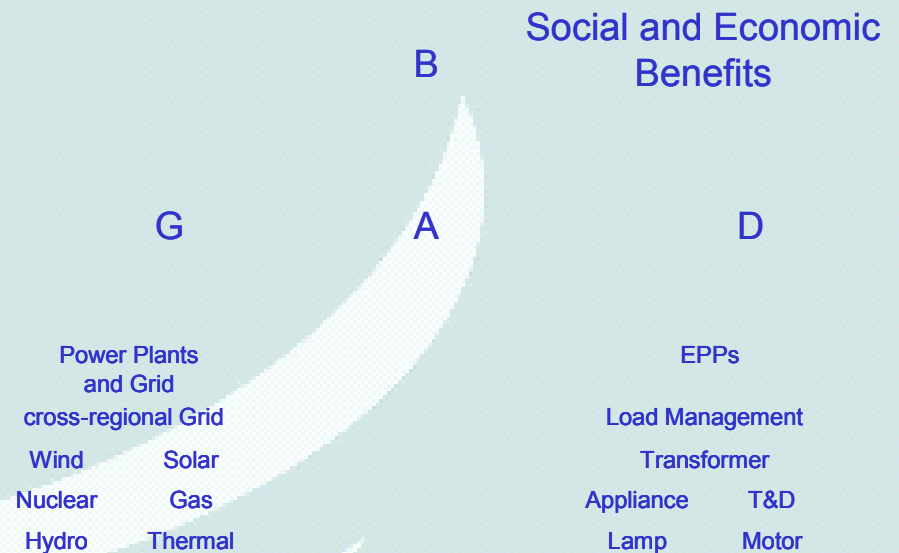


It is predicted that by 2020,

- China's power generation capacity will reach about 2000 GW, wherein the total of hydropower, nuclear power, wind power capacity shall account for about 40% of the total installed capacity;**
- the proportion of the big units with capacity of 600 MW and above in the thermal power generation units will be over 50%;**
- the coverage rate of the desulfurization equipment will increase to more than 95%, and that of the denitration equipment will increase to about 80%.**



➤ **Regarding the trans-regional interconnection and EPP as a restriction of the Integrated Resource Strategy Planning (IRSP) model, EPP potential would be 200 GW, account for 10% of the installation capacity of CPP.**





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4. Conclusion

It is suggested that government departments should encourage power companies to carry out the following work, and make efforts to promote the effective development of the power industry and the national energy conservation and emission reduction work:

- vigorously develop hydropower, nuclear power, wind power and other renewable energy projects, further optimize the power structure;**
- actively construct large thermal power plant groups, hydropower groups, and nuclear power groups, and rationally plan the power plant and grid;**
- rationally develop large-scale efficient environmental-friendly thermal units and thermoelectric cogeneration units;**



- **further improve the power grid technology, accelerate the construction of a strong and smart grid;**
- **actively develop efficient and clean coal-fired power generation equipment, high-voltage power transmission equipment, large-scale circulating fluidized bed boiler, large wind turbines and other advanced and applicable technologies;**
- **promote energy-saving power generation scheduling and GRTM;**
- **establish a sound supervision and management mechanism for energy conservation and emission reduction, speed up amendments to the relevant laws and regulations and industry standards, establish a price formation mechanism, and guide the whole society to energy conservation and emission reduction.**



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Thanks a lot!





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