The Current Status of Thermal Power Plants SO_2 Control in China

China Electricity Council

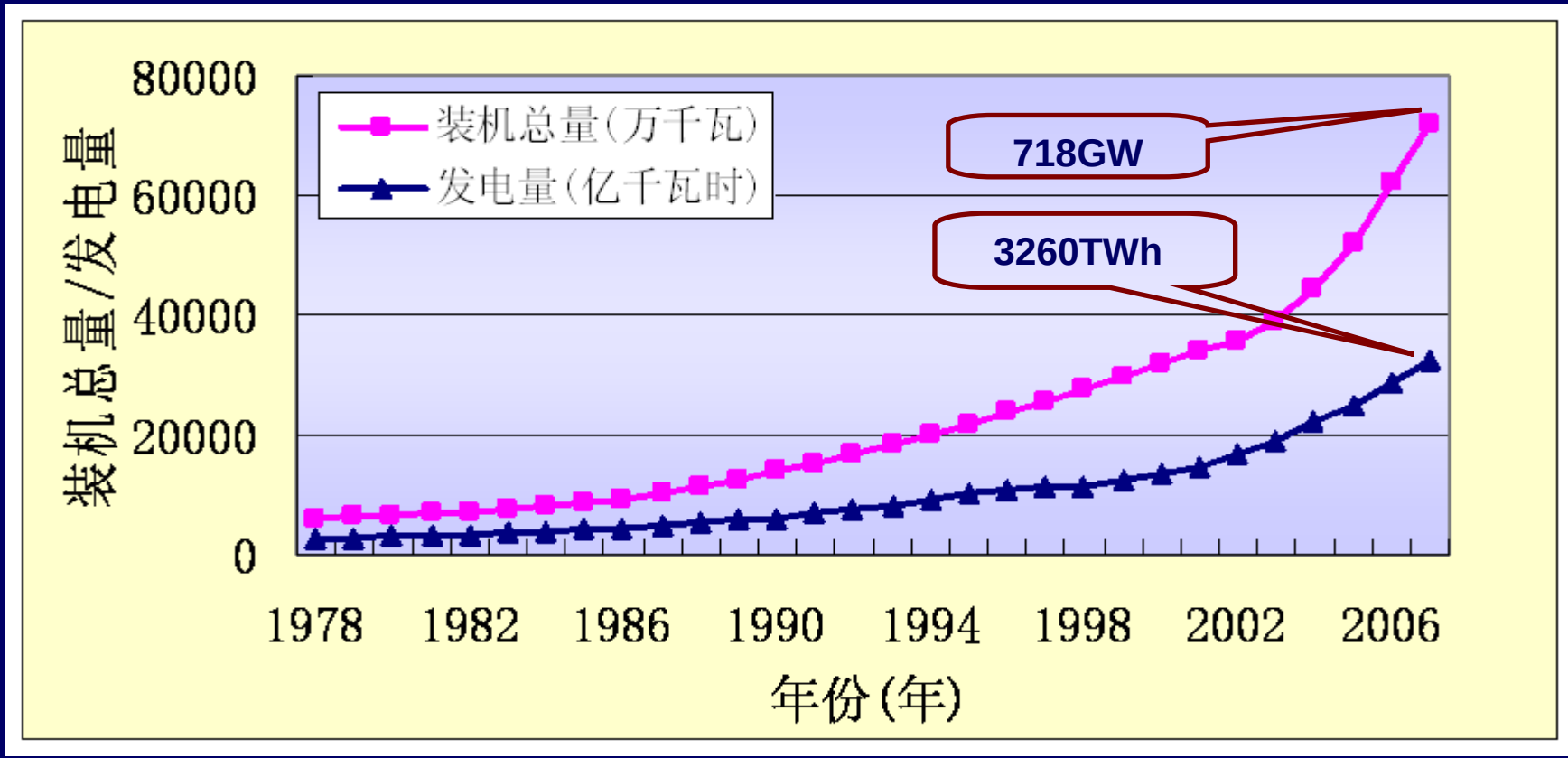
December 17th, 2008

Main Content

1、The development of China's electric power industry.

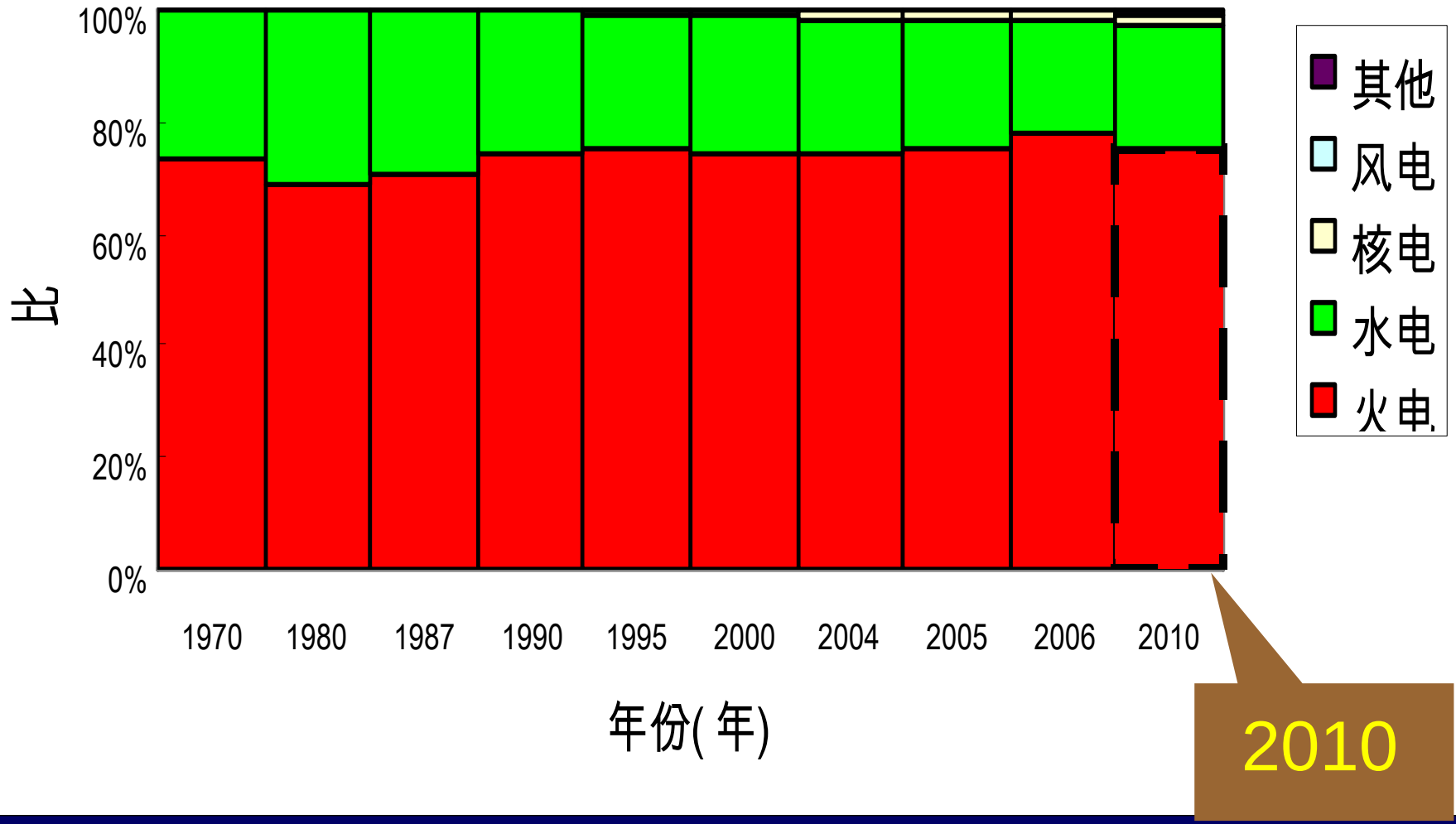
2、 Sulfur dioxide control of thermal power plants in China.

Growth of Installed Capacity and Annual Electricity Generating Output from 1978 to 2007 in China

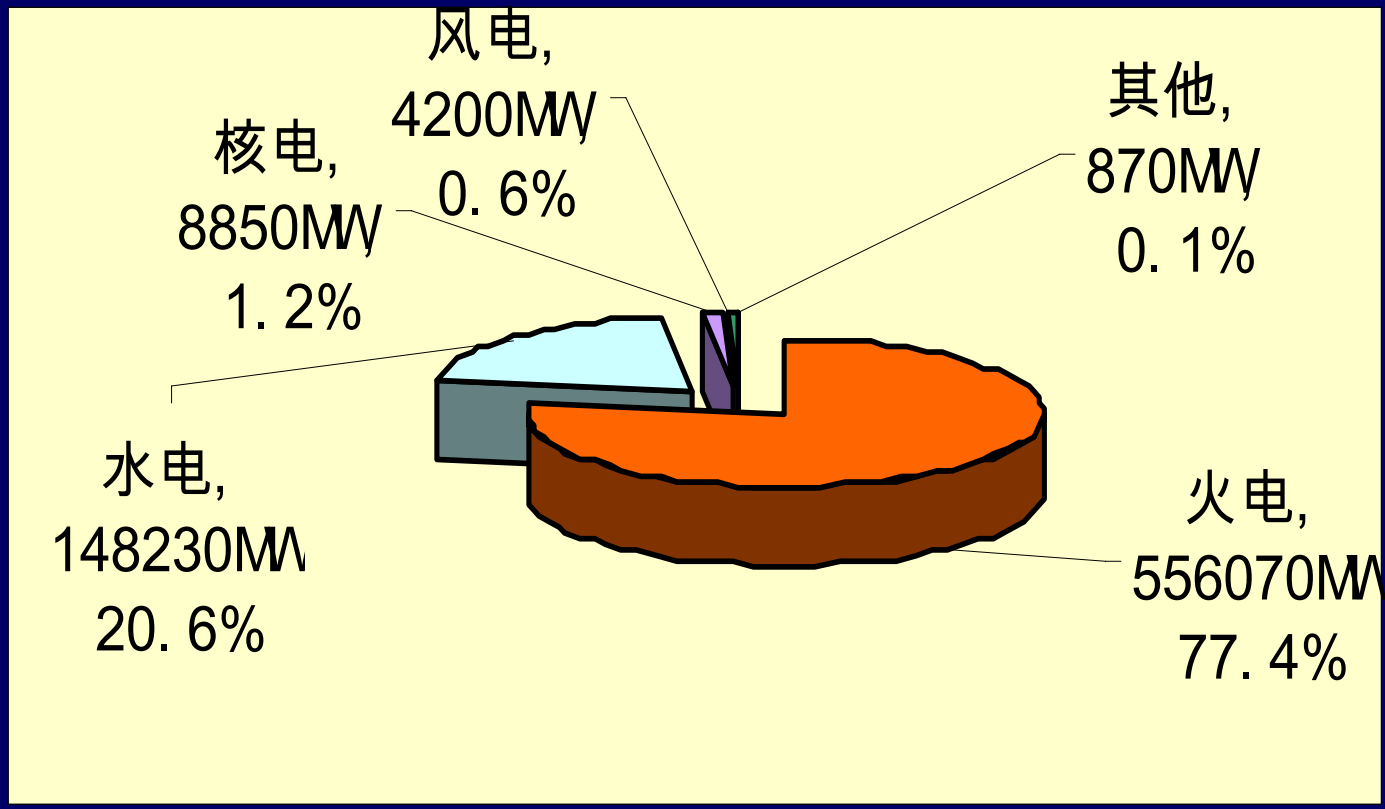


- The national installed capacity (718GW) and electricity generating output (3260TWh) in 2007 have grown by more than 11 times than those in 1978.
- China has been ranked second in the world since 1996 in terms of both installed capacity and annual electricity generating out.

Power Generation Mix in China in Past Years & 2010 Forecast



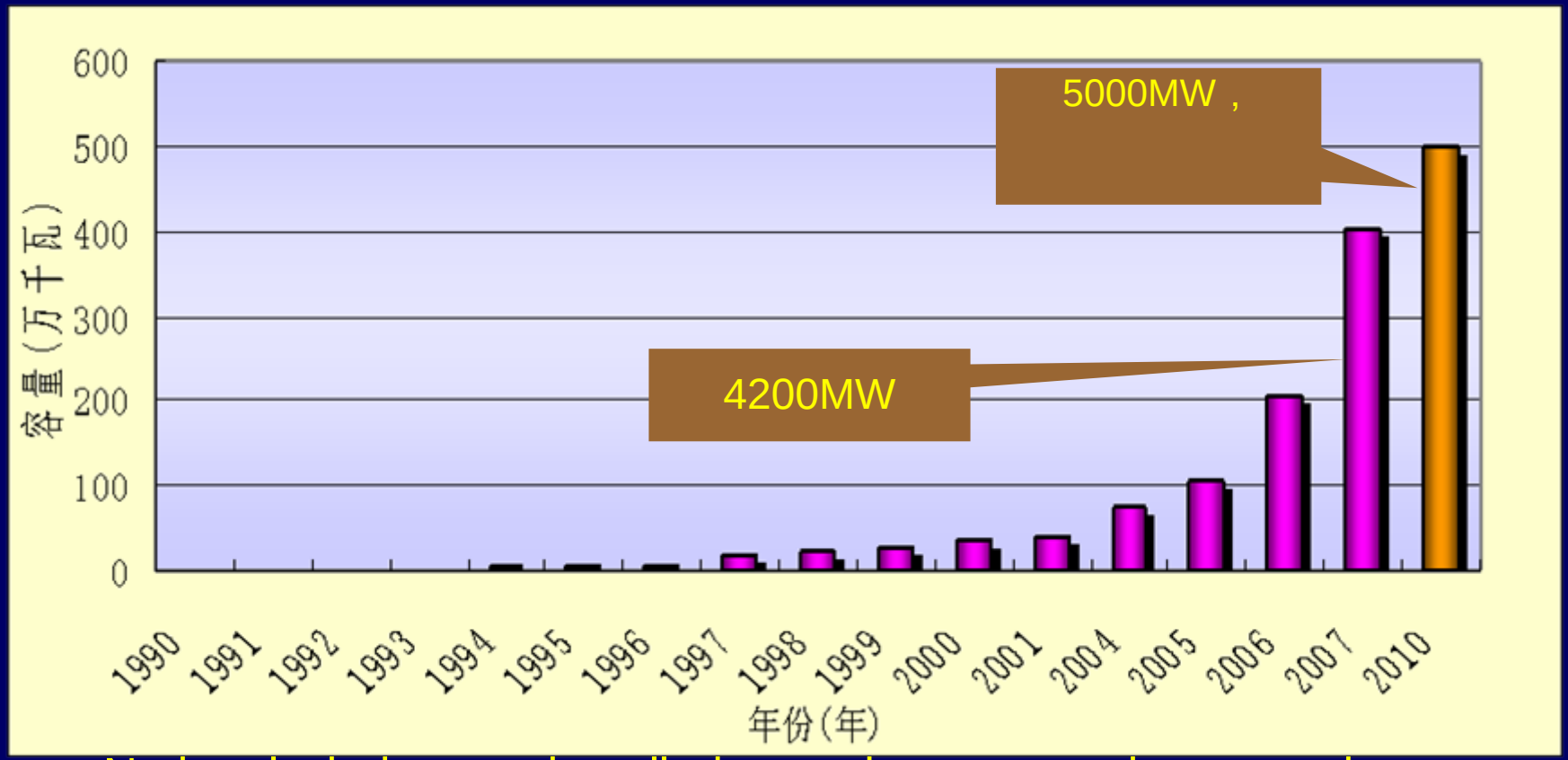
Power Supply In 2007 by Generation Sources



National total installed capacity in China had reached about 770,000MW by the end of Oct. 2008

截至2008年10月底，全国全口径发电装机容量已达7.7亿千瓦左右。

High-speed Growth of Wind Power and Other New Energy Generation

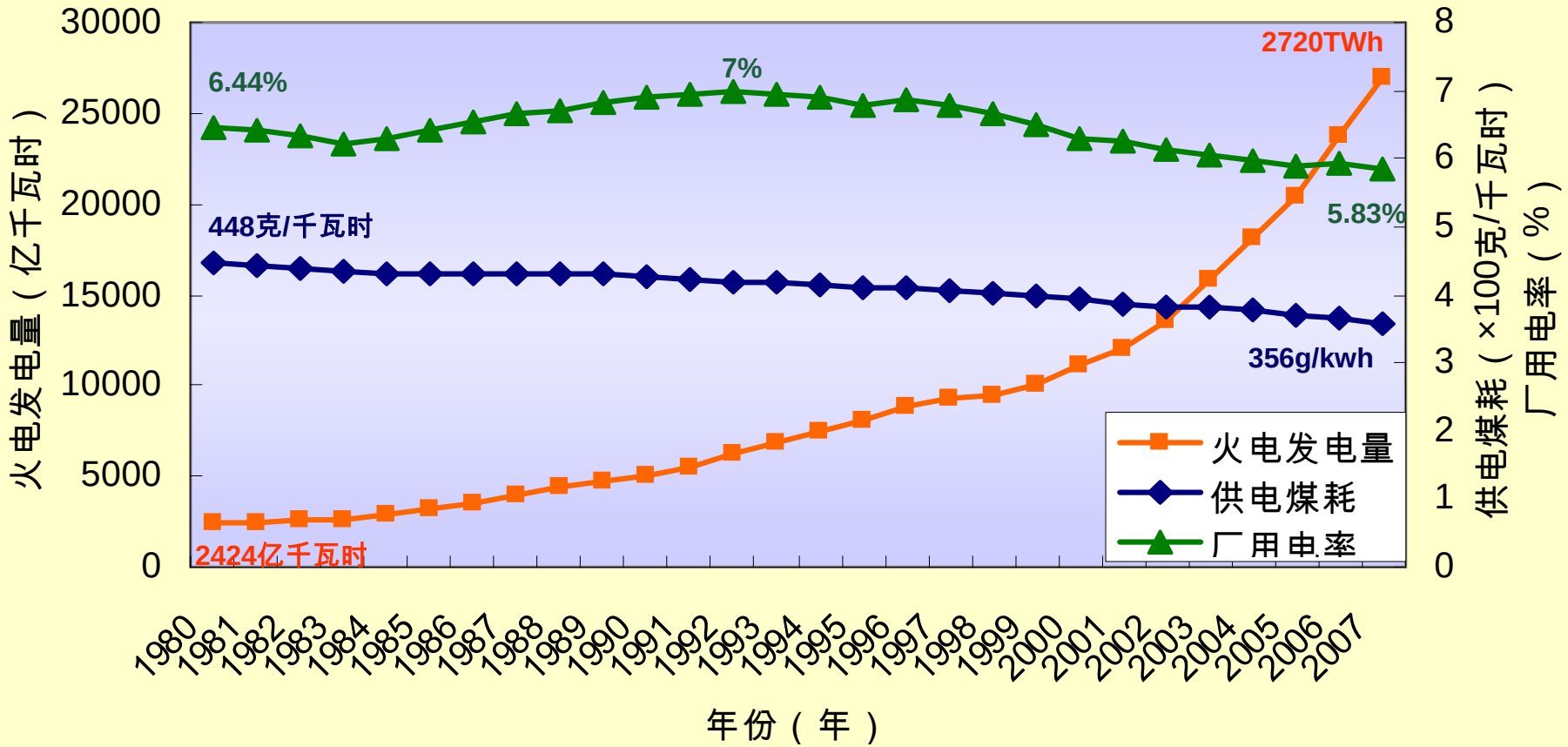


National wind power installed capacity amounted to around 4,200MW in 2007, accounting for 0.6% in the national total, an increase of 102.6% over the previous year. The newly added wind power capacity in 2007 is equivalent to the total wind power capacity installed before.

Achievements of Energy-saving and Emission Control

Status of Net coal consumption and plant service power rate from 1980 to 2007

1980年-2007年供电煤耗和发电厂用电率变化情况



Main Content

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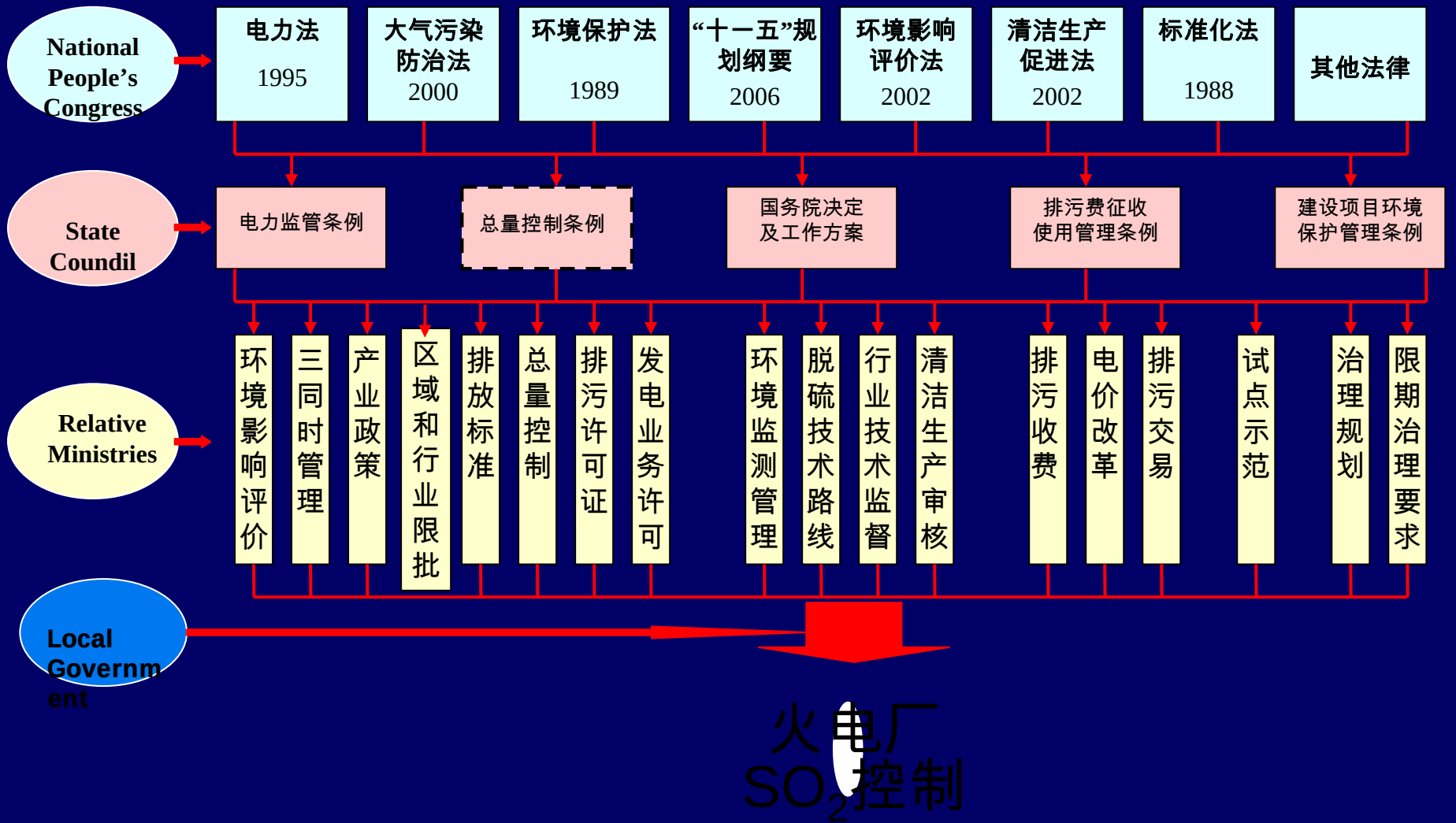
Framework of Laws, Regulations and Policies on Thermal Power Plant Sulfur Dioxide Control in China



The Maximum Allowable Concentration of SO2 Emission by Power Plant Boilers in China

Period	Period 1		Period 2		Period 3
Date of Implement ation	Jan 1 2005	Jan 1 2010	Jan 1 2005	Jan 1 2010	Jan 1 2004
Coal-fired boilers and oil-fired boilers	2100[1)]	1200[1)]	2100 1200[2)]	400 1200[2)]	400 800[3)] 1200[4)]

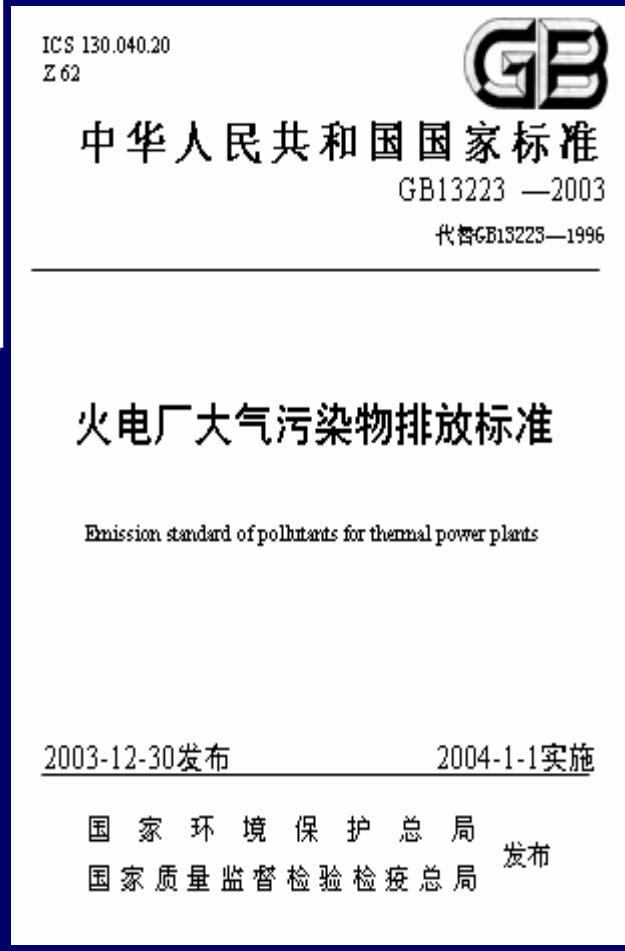
Unit : mg/m^3

注：1) refers to the upper limit of the average SO2 emission concentration of all boilers in a power plant during period 1.

2) this upper limit is applied to the FDG units with Environmental Impact Statement approved before the implementation of this document, and the boilers fueled by ultra-low sulfur coal (the sulfur content on as-received basis of the coal fed to the boiler lower than 0.5%) of mine-mouth power plants in the non dual-controlled area in the West of China.

3) this upper limit is applied to the boilers fueled mainly by gang and etc. (fuel net calorific value as received (qnet,ar) ≤ 12550kJ/kg) of the resources comprehensive utilization thermal power plant.

4) this upper limit is applied to the boilers fueled by ultra-low sulfur coal (the sulfur content on as-received basis of the coal fed to the boiler lower than 0.5%) of mine-mouth power plants in the non dual-controlled area in the West of China.



ICS 130.040.20
Z 62

中华人民共和国国家标准

GB13223 —2003

代替GB13223—1996

火电厂大气污染物排放标准

Emission standard of pollutants for thermal power plants

2003-12-30发布　　2004-1-1实施

国家环境保护总局
国家质量监督检验检疫总局　发布

The Related Economic Policies on SO2 Emission Control

- **Power Tariff Policy** 电价政策
  - **For the FGD units, additional 0.015Yuan RMB per KWh will be added on the power purchase price from the generation company by the power grid**

    对于安装脱硫装置的发电机组，上网电价执行每千瓦时0.015元的脱硫加价政策

The Related Economic Policies on SO2 Emission Control

- **in case the coal used for power generation has an average sulfur contents higher than 2%, but lower than 5%, the respective region may independently work out flue gas desulfurization surcharge standard.**

  -- According to the *Management on coal-fired unit flue gas desulfurization power price and associated facilities operation (Tentative)* jointly,issued by National Development & Reform Commission and National Environment Protection General Administration.

国家发展改革委和原国家环保总局出台《燃煤发电机组脱硫电价及脱硫设施运行管理办法（试行）》规定：煤炭平均含硫量低于0.5%或高于2%的地区，可单独制定脱硫加价标准。

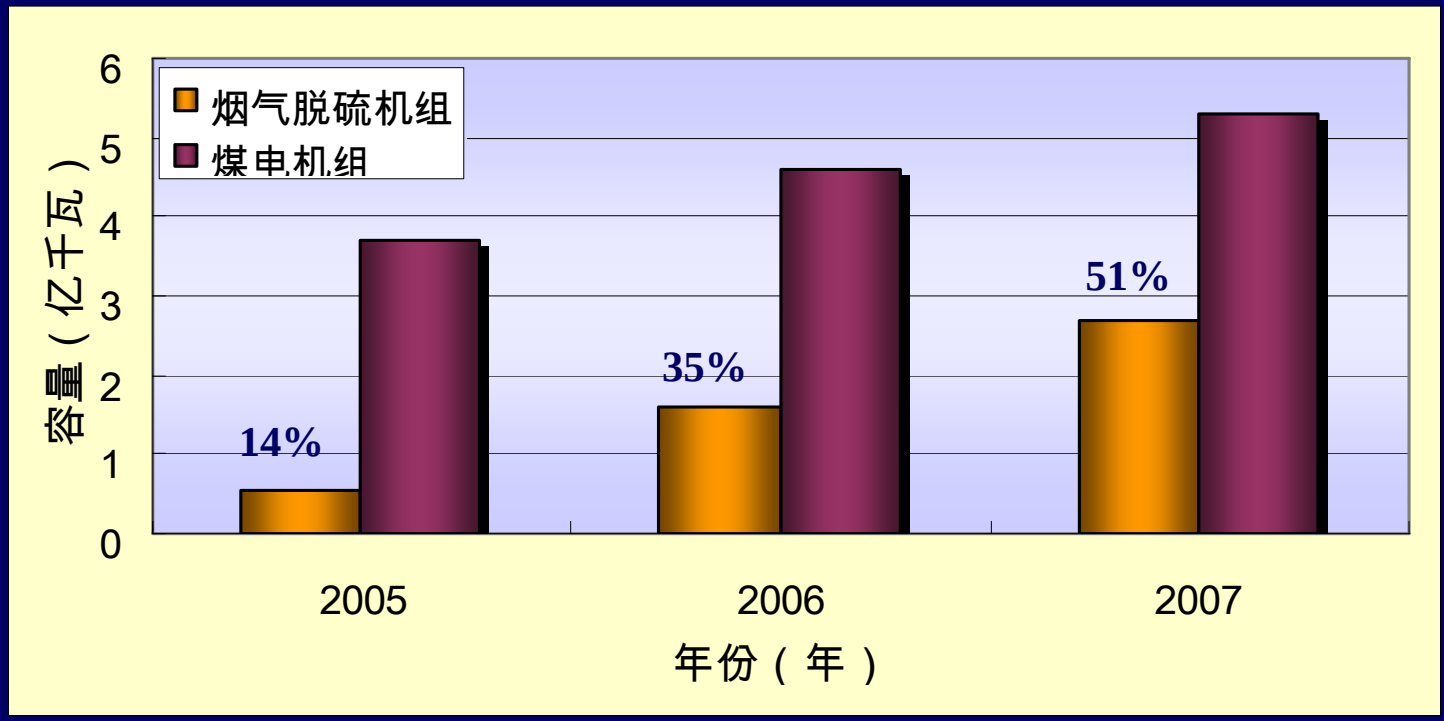
The Correlative Economic Policies for Controlling The Emission of Sulfur Dioxide

- **Policies on Emission Charge** 排污收费政策
  - Currently, 0.63 Yuan RMB will be charged on power generation enterprises for per kilogram SO2 emitted.目前电力企业排放每公斤二氧化硫收费0.63元。
  - in principle of compensating the pollution control cost, the emission charge on the emission enterprises will be increased. Charges for SO2 emission will be increased from 0.63 Yuan RMB per kilogram to 1.26 Yuan RMB per kilogram in the coming three years.

    --According to the *All-round Working Scheme of Energy Saving and Emission Reduction* issued by the State Council.

    国务院《节能减排综合性工作方案》规定：按照补偿治理成本的原则，提高排污单位排污费征收标准，将二氧化硫排污费由每公斤0.63元分三年提高到每公斤1.26元。

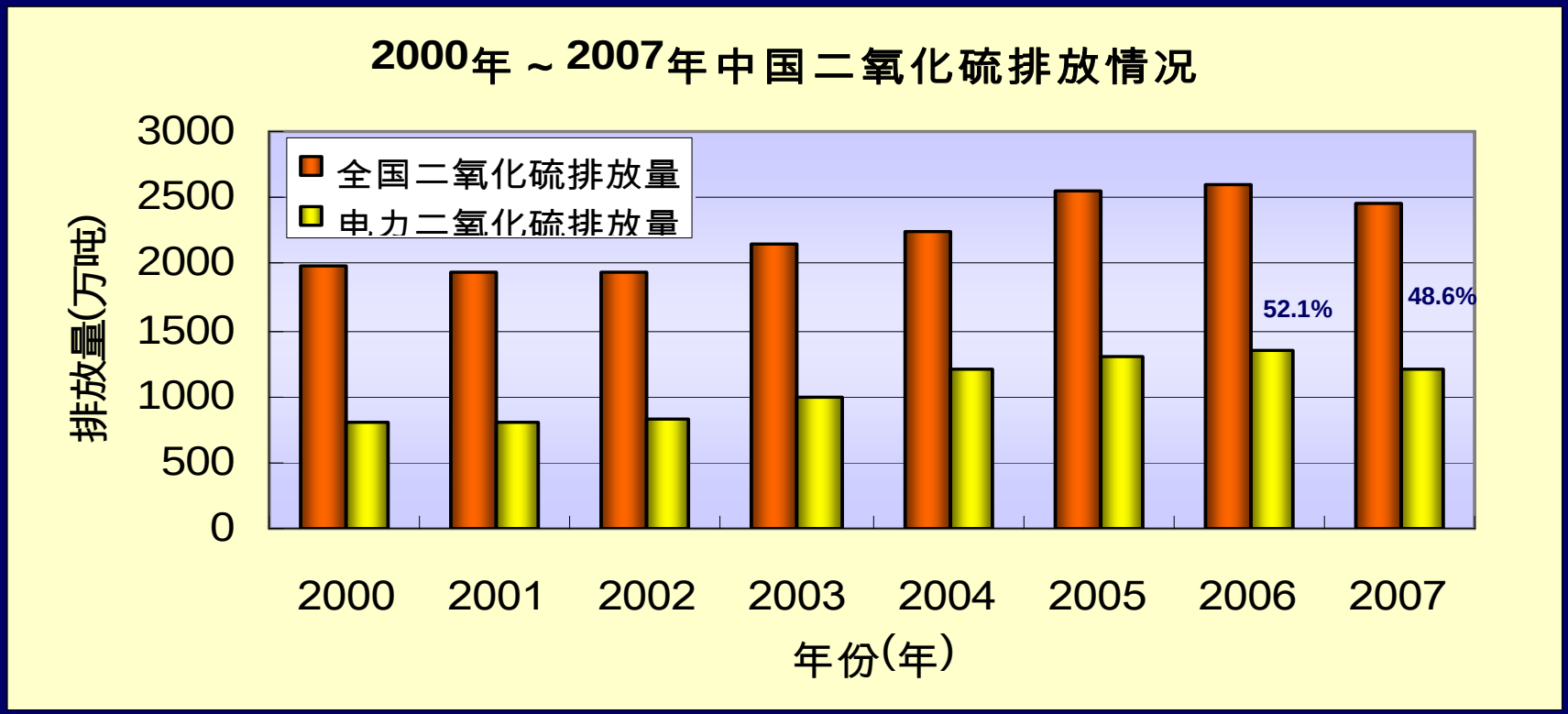
The Development of Coal-fired FGD Units in China



As of the end of 2007, installed capacity of FGD units of national coal-fired power plants reached 266,000MW, accounted for around 50% of the national coal-fired generating capacity. As compared with 2000, FGD units capacity increased by about 53 times.

In the first half of 2008, the newly added FGD capacity put into operation in China totaled 40,600MW. By then, total installed capacity of FGD units in China had been over 300,000MW, around 55% of the national coal-fired generating capacity

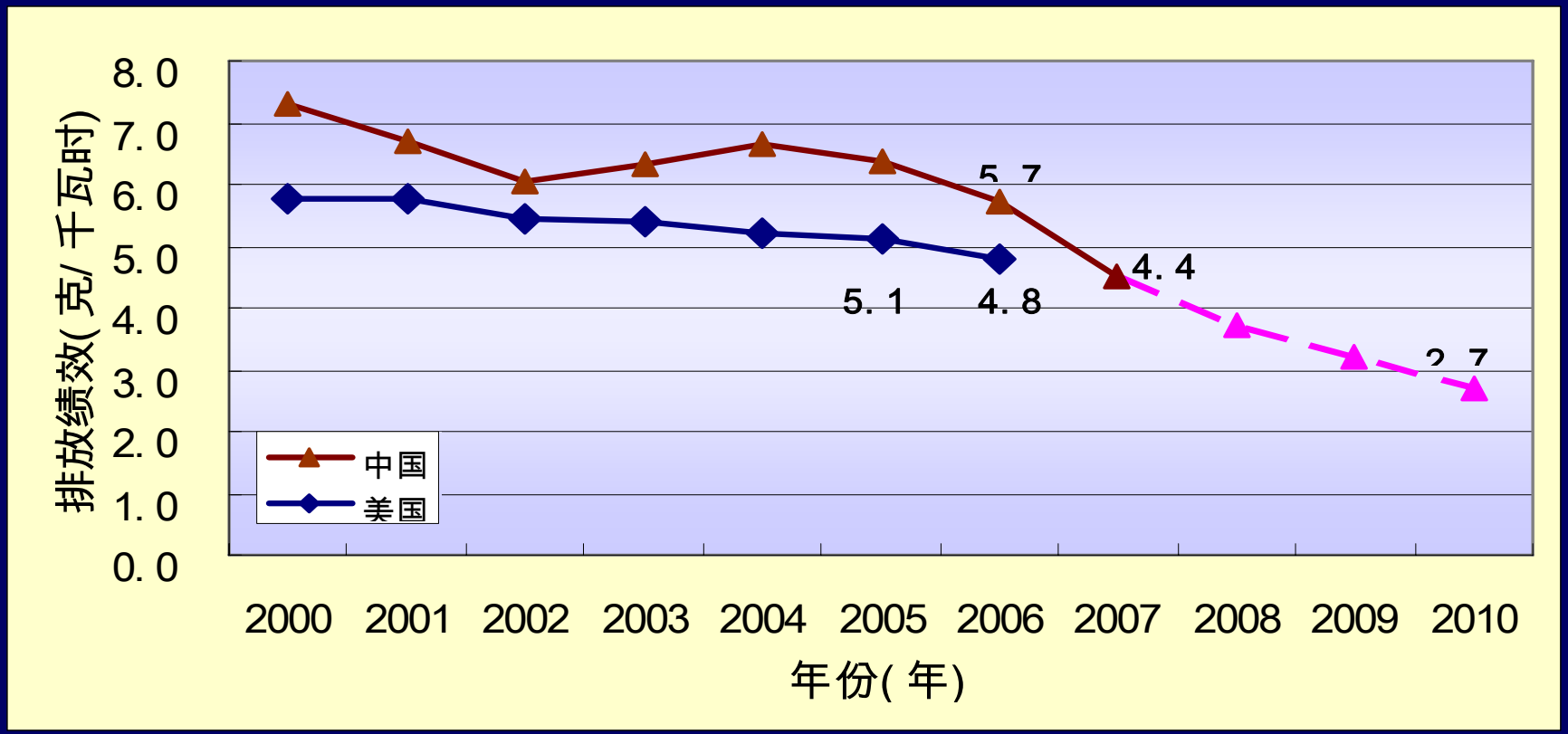
The Current Status of SO2 Emission Control of Thermal Power Plants in China



The national emissions of sulfur dioxide is 24,681,000 tons in 2007, falling by 4.66% compared with last year. The SO2 emissions from power industry fell by 9.1% while the national thermal power generating output growing by 13.8%. In 2007, both the national SO2 emissions and power industry SO2 emissions dropped for the first time in recent years. In the first half of 2008，the national SO2 emissions is 12,133,000 tons, decreased by 3.96 percent as compared with that of the same period in 2007 (12,634,000 tons).

Power Industry SO2 Emission Performance In China

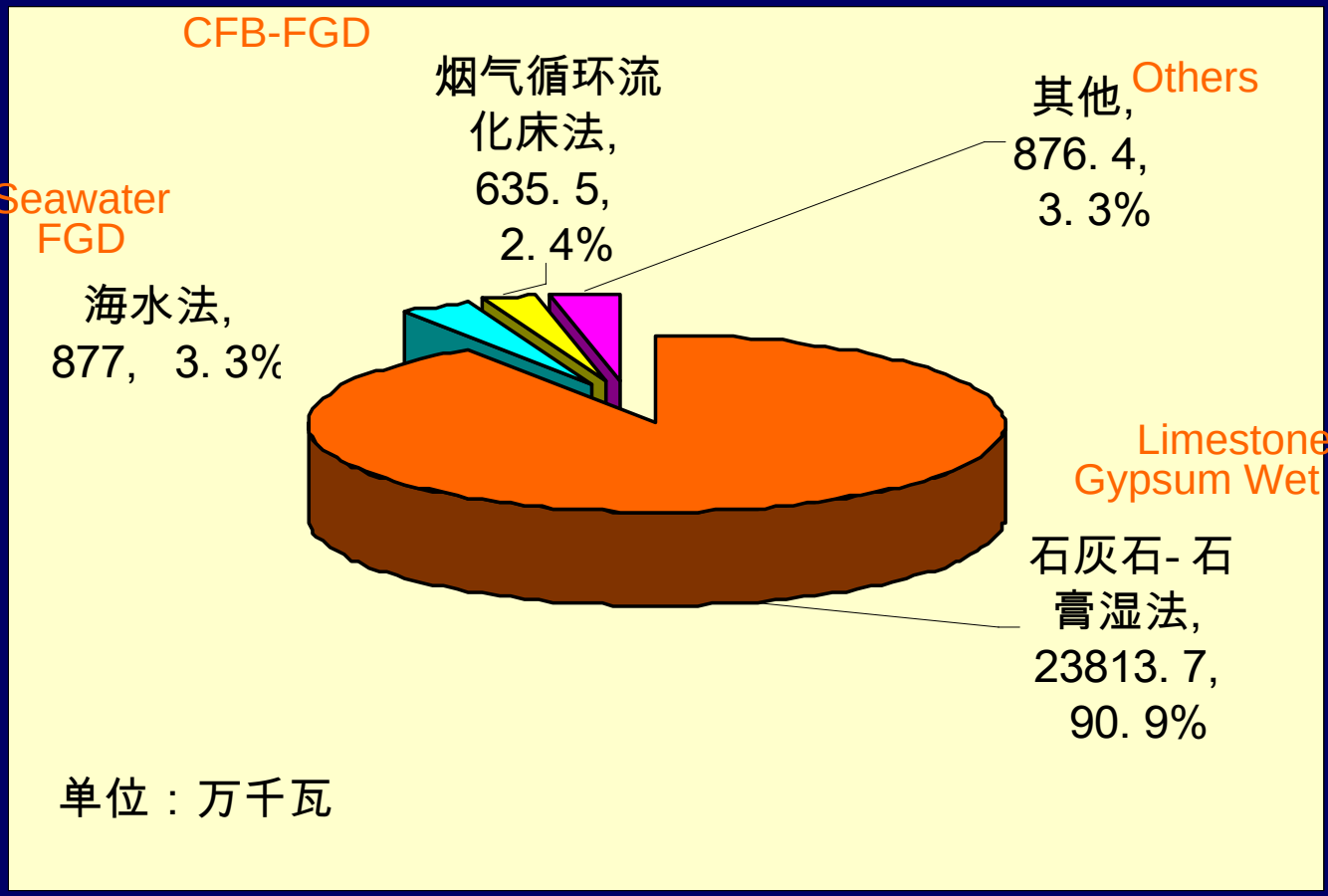
The comparison of power industry SO2 emission performance between China and the United States



Power industry SO2 emission performance remarkably decreased，4.4 g/KWh in 2007, which is lower than the level of the United States in 2006

中国电力二氧化硫排放绩效明显下降，2007年为4.4克/千瓦时，低于美国2006年水平。

The Proportion of FGD Technology Applied in China



Annotate：Data from statistical analysis by CEC at the end of 2007 注：来源于中电联截至2007年底的统计分析

Domestic Technical Capacity

- **Introducing mature and advanced technologies from abroad, undertaking EPC project by specialized domestic company (Technology from Germany, Japan, the United States and other country)**

  引进了成熟先进技术国内专业化公司总承包（主要包括引进德国、日本、美国等国技术）

- **Some domestic desulfurization companies have developed mainstream FGD technologies with their own intellectual property rights**

  部分脱硫公司已拥有自主知识产权的烟气脱硫主流工艺技术

Domestic Technical Capacity

The localization rate of desulfurization equipment in China has reached a high level of 80-90%

脱硫设备国产化率高的已达80 - 90%

Domestic EPC companies' ability of undertaking desulphurization projects can meet the domestic demand of thermal power FGD project (newly built, expanded and retrofit)

烟气脱硫工程总承包能力已基本满足国内火电烟气脱硫工程（新、扩、改）建设的需要

The Plan of SO2 Emission Control during the "11th Five-Year Plan" Period by the end of 2010

Goals and Requirements 目标要求

- Guidelines of the 11th Five-Year Plan十一五规划纲要

  - Total SO2 emission will be cut down by 10% from 25.49 million tons to 22.95 million tons, of which:
    排放总量削减10%，由2549万吨减少到2295万吨，其中
  - Power industry SO2 emission will decrease to 9.517million tons (from 13 million tons), the proportion of which in the national total SO2 emission will drop from 51% to 41%.
    电力（由1300万吨）下降为951.7万吨,比例由51%将降到41%

The Plan of SO2 Emission Control during the “11th Five-Year Plan” Period by the end of 2010

- State "11th Five-Year Plan " of acid rain and SO2 pollution control

  国家酸雨和二氧化硫污染防治“十一五”规划

  - By 2010, national total SO2 emissions will be reduced by 10% than that in 2005, aiming at 22,944,000 tons or less.

    到2010 年，全国二氧化硫排放总量比2005 年减少10%，控制在2294.4 万吨以内
  - The thermal power industry SO2 emissions will be controlled at less than 10,000,000 tons 火电行业二氧化硫排放量控制在1000 万吨以内

The Plan of SO2 Emission Control during the “11th Five-Year Plan” Period by the end of 2010

- **SO2 emission intensity per unit electricity generated will be reduced by 50% than that in 2005**

  单位发电量二氧化硫排放强度比2005 年降低50%

- **By 2020, the national SO2 emissions will remarkably decline on the basis of 2010**

  到2020年，全国二氧化硫排放总量在2010 年的基础上明显下降

The Plan of SO2 Emission Control during the “11th Five-Year Plan” Period by the end of 2010

- **Goal Breakdown:总量分配**

  Former State Environmental Protection Administration signed *Liability Claims of the National Total SO2 Emission Reduction Goal during the “11th Five-Year Plan” Period* with local governments of 31 provinces, autonomous regions and municipalities, the State Grid Corporation and the five big power generation groups as well, in which the total SO2 emission reduction amount was break down to provinces (autonomous regions and municipalities) and electric power corporations, thus to ensure the achievement the goal of reducing 10% of national total SO2 emission by 2010 provided in the Guidelines of the “11th Five-Year Plan”.**总量分配：原国家环保总局与31个省、自治区、直辖市以及国家电网公司和五大发电集团签订了《“十一五”二氧化硫总量削减目标责任书》，将二氧化硫削减量分解到各省（区、市）和电力集团公司，以确保《“十一五”规划纲要》提出的到2010年，二氧化硫排放总量削减10%的目标的顺利实现。**

The Plan of SO2 Emission Control during the "11th Five-Year Plan" Period by the end of 2010

- **Planned Measures**规划措施
  - During the "11th Five-Year Plan" period, 355GW of coal-fired generating units equipped with FGD will be put into operation , including:
    "十一五"期间投运脱硫机组3．55亿千瓦，其中：
  - 188GW of FGD units to be commissioned in the newly built coal-fired power plants ：新建燃煤电厂同步投运脱硫机组1．88亿千瓦；
  - 167GW of FGD units to be commissioned in the existing coal-fired power plants, reducing the SO2 emissions by 5.9 million tons.现有燃煤电厂投运脱硫机组1．67亿千瓦，形成削减二氧化硫能力590万吨；
  - 50GW of small thermal power units will be phased out.关停小机组5000万千瓦。

The Plan of SO2 Emission Control during the "11th Five-Year Plan" Period by the end of 2010

Emissions Forecast 排放预测

- Power industry SO2 emission aims at about 8.62 million tons (less than the targeted 9.571 million tons), decreasing by around 33% on the basis of 2005

  电力二氧化硫排放量约862万吨（小于951.7万吨的目标），在2005年的基础上减少约33%；

- FGD capacity will account for 60% of the total coal-fired installed capacity (much higher than the level of the United States in 2005);

  烟气脱硫占煤电装机总量的60%（远远高于美国2005年水平）；

- SO2 emission performance of all thermal power plants will drop from 6.4g/KWh in 2005 to 2.7g/KWh, decreased by 57.8%.

  全部火电厂二氧化硫排放绩效指标由2005年的6.4g/kw.h下降到2.7g/kw.h，下降57.8%。

谢 谢

THANK YOU