Workshop on Tranboundary Air Pollution in North-East Asia

National activities to Curb SO_2 Emissions in China

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Outline

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- Coal-fired Power Plants and SO_2 Emissions in PRC
- New SO_2 Emission Standard for Power Plant
- Action Plan in Power Sector for 2010-2015
- Summary

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Introduction

- The PRC, with the most energy consumption in Asia, has the biggest power generation capacity of coal-fired power plants.
- Total power generation capacity reached 962 GW in 2010, among which 650 GW (67.6%) from coal-fired power plants.
- New power plants use higher technical parameters and larger capacity (units with capacity of 300 MW or more >91%).
- 21 ultra-supercritical units with a total capacity of 1 GW have been put into operation in China.

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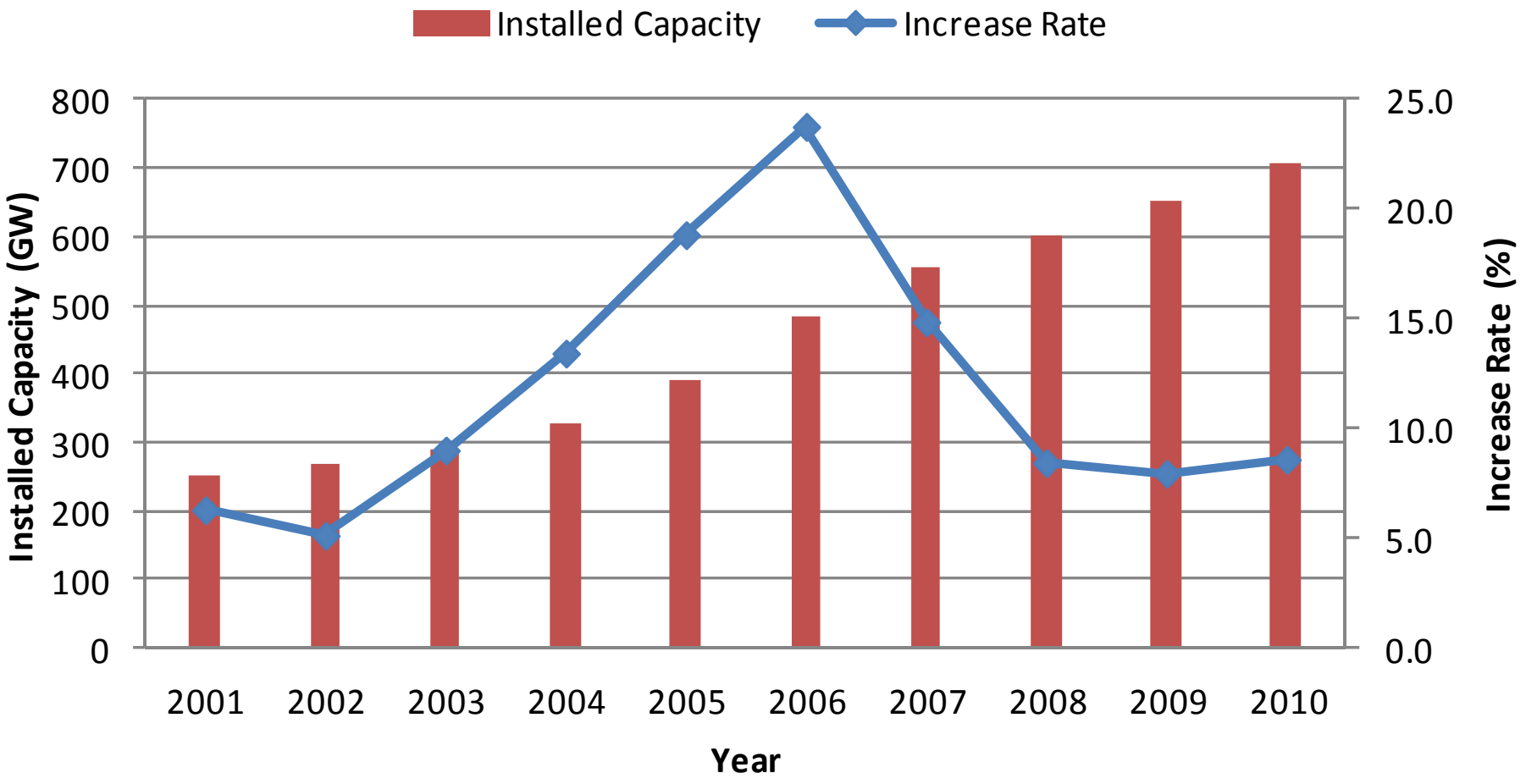
Thermal Power Plants in the PRC



Renewable Energy in the PRC

- In 2009, China's installed hydropower capacity reached 196 GW, ranking first in the world, accounting for 22.46% of total capacity;
- In 2009, installed nuclear power capacity reached 9 GW, or about 1% of total world capacity;
- In 2009, installed and connected to the grid wind power capacity reached 17.6 GW, accounting for 2% of the world total capacity.

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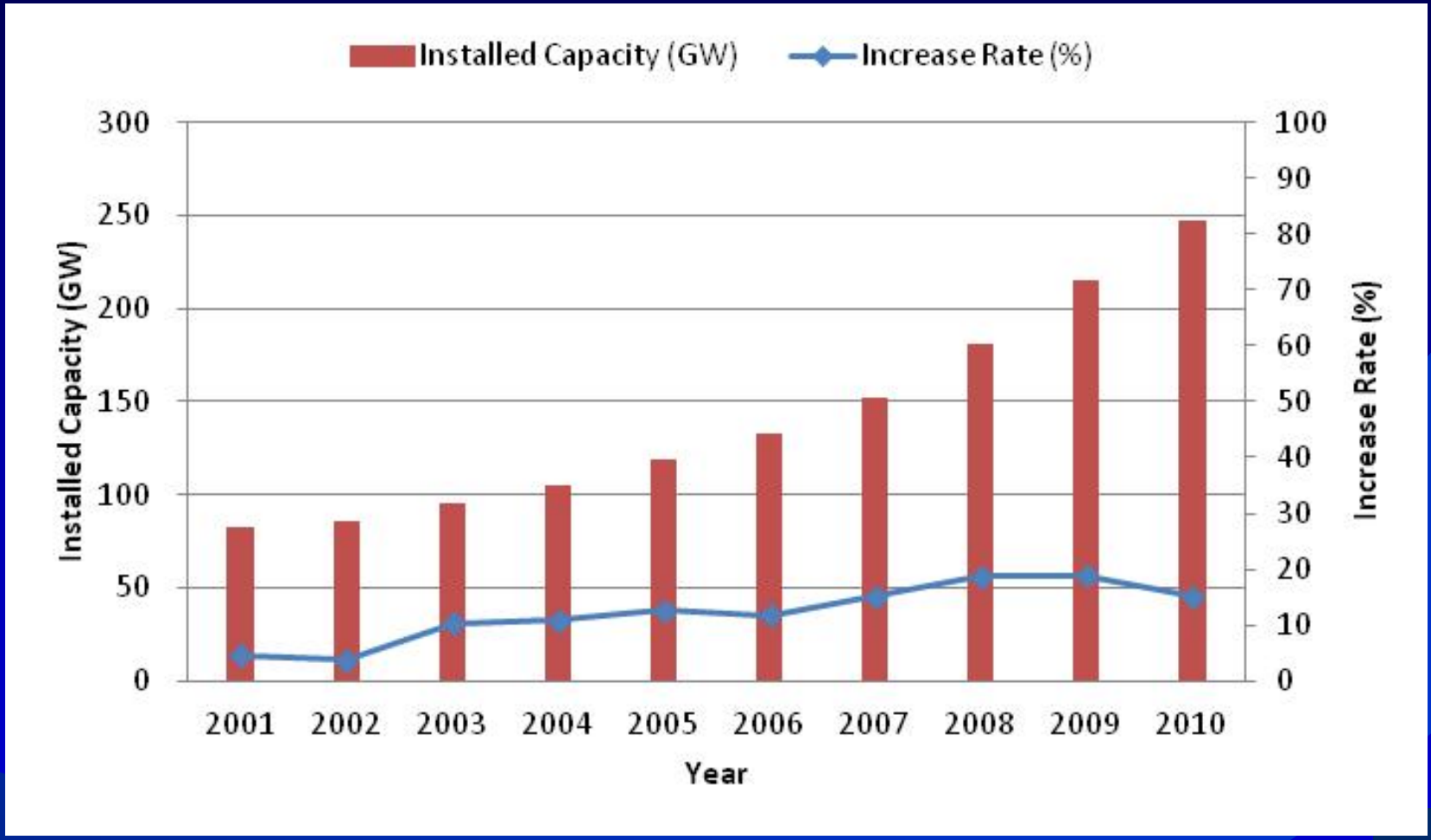
Renewable Energy in the PRC



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SO_2 Emission Limit

- The updated "Emission Standard of Air Pollutants for Thermal Power Plants" (GB 13223-2011) will become effective to replace the old standard on 1 January 2012.

Pollutant	Unit	New Plant	Existing Plant	Special Limits
SO_2	mg/Nm^3	100 (200)	200 (400)	50

Note: The limits in bracket are applicable for power plants located in Guangxi, Chongqing, Sichuan and Guizhou.

Special limits will be regulated by State Council.

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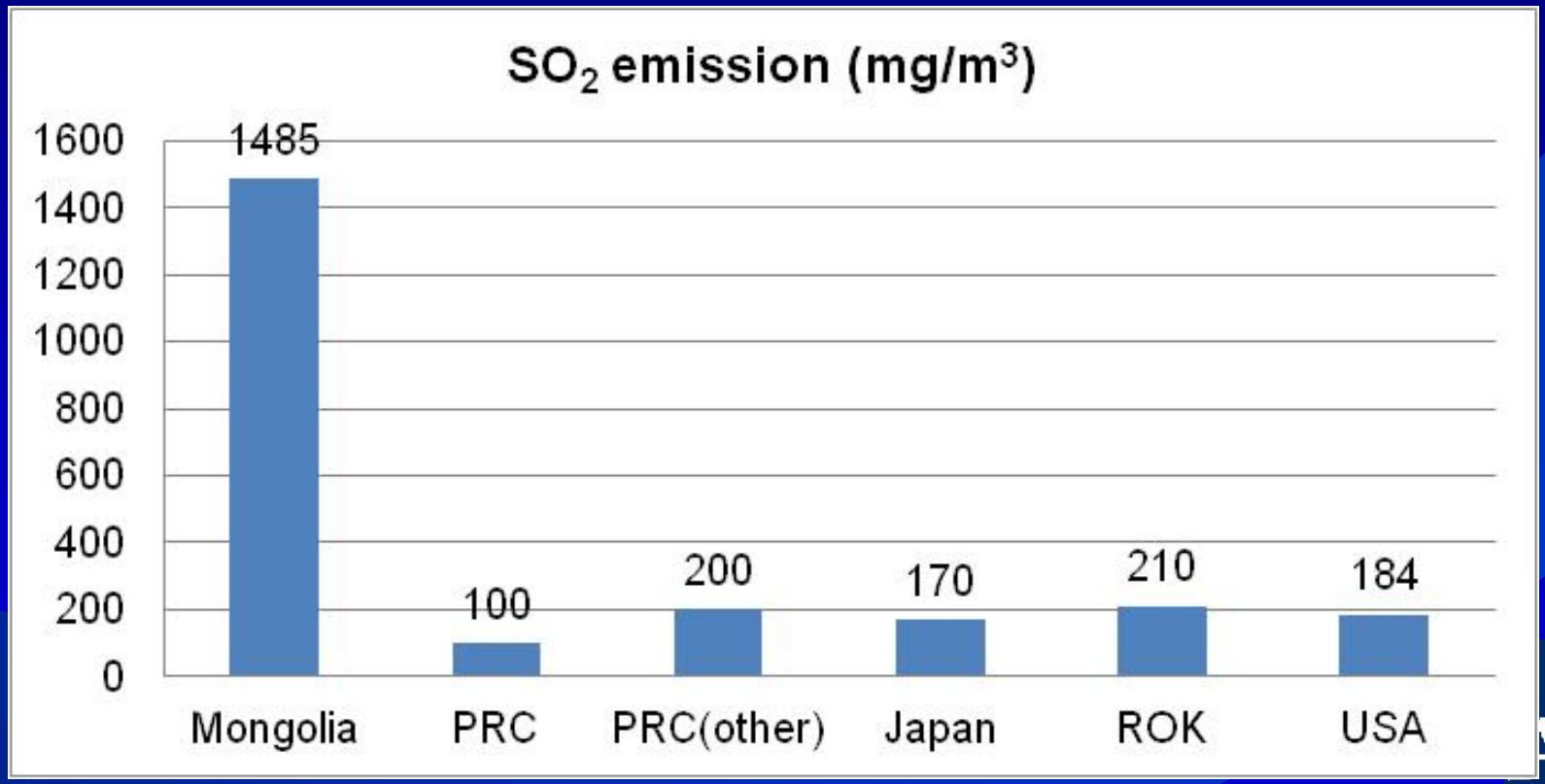
SO_2 Emission Limit

- Comparison of new emission limits with past standards in table below:

Pollutant	Unit	1996	2003	2011
SO_2	mg/Nm^3	700 1200	400 800	100 200

SO_2 Emission Limits Comparison

- Comparisons of SO_2 emission standards for coal-fired power plants among some selected countries:



Activities to Control SO_2 Emission

- Reduce energy/carbon intensity and SO_2 emissions is one of the major targets of the national strategy.
- In 2010, the fossil fuel based power plants contributed to 73.4% in the total installed power generation capacity, and produced 80.8% of total power generation.
- Meanwhile, the non-fossil based power plants have 26.6% share in the total installed power generation capacity and 19.2% share in the total power generation.

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Activities to Control SO_2 Emission

- The energy-efficient power generating units with high capacity represented by 600-1,000 MW supercritical power generation units with FGD will be mainly developed and installed.
- Small inefficient and polluting power plants were replaced with large-sized efficient plants.
- By the end of 2010, the power generation units with 200 MW and below capacity still had a total capacity of about 180 GW.

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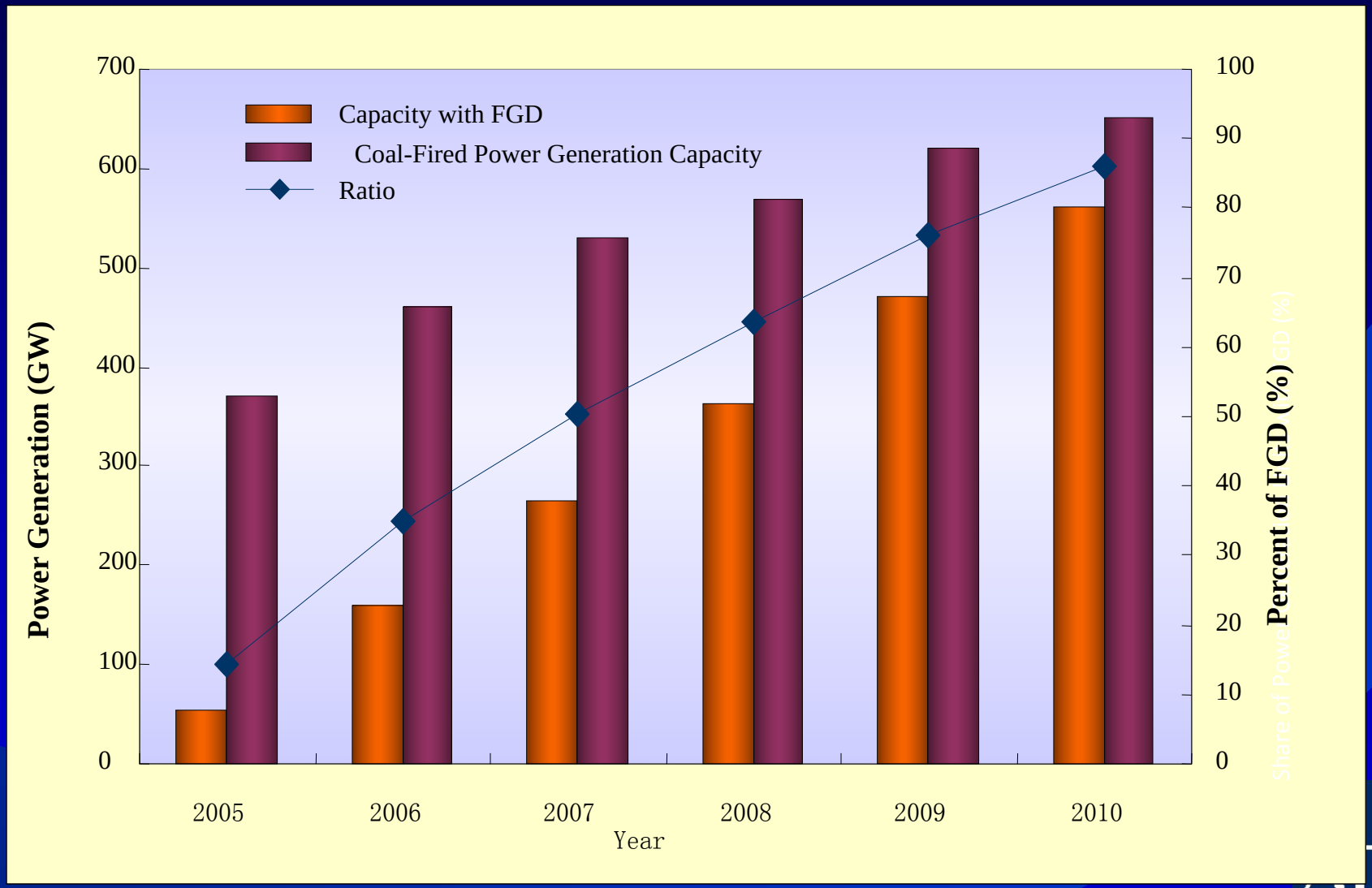
Activities to Control SO_2 Emission

- Efficient and environment-friendly 300 MW CHP units have been widely, with which many small, inefficient and polluting coal-fired heating boilers have been replaced.
- IGCC, as the national key scientific and technological development project, were under construction.

Results of SO_2 Emission Control

- During the 11th FYP, SO_2 emission of the electric power industry continued to decline.
- By the end of 2010, the operating power generation units with FGD had exceeded 560 GW, which accounts for 86% of the coal power units.
- Total cost for rehabilitating FGD reached 43.8 billion RMB during 11 FYP.
- Annual FGD capacity has reached 12.9 million tons of SO_2.

FGD Installation Capacity Increased



SO_2 Emissions Control Policies

- In accordance with the 11th FYP, decrease:
  - annual national SO2 emission from 25.5 million tons in 2005 to 22.9 million tons in 2010 (10% decrease)
  - power sector from 13.5 million in 2005 to 9.5 million tons in 2010 (29% decrease)
- Master Program for Energy Conservation and Emissions Reductions during 12th Five Year sets new targets:
  - annual national SO2 emission will be decreased from 22.7 million tons in 2010 to 20.7 million tons in 2015 (8% decrease).
  - annual SO2 emission in power sector will be decreased from 9.26 million in 2010 to 8 million tons in 2015 (13% decrease).

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SO_2 Emissions

- The share of SO_2 emission from power sector dropped by 8.6% (51.0% to 42.4%) from 2005 to 2010
- SO_2 emissions index dropped from 6.4 g/kWh in 2005 to 2.7 g/kWh, or 58% reduction

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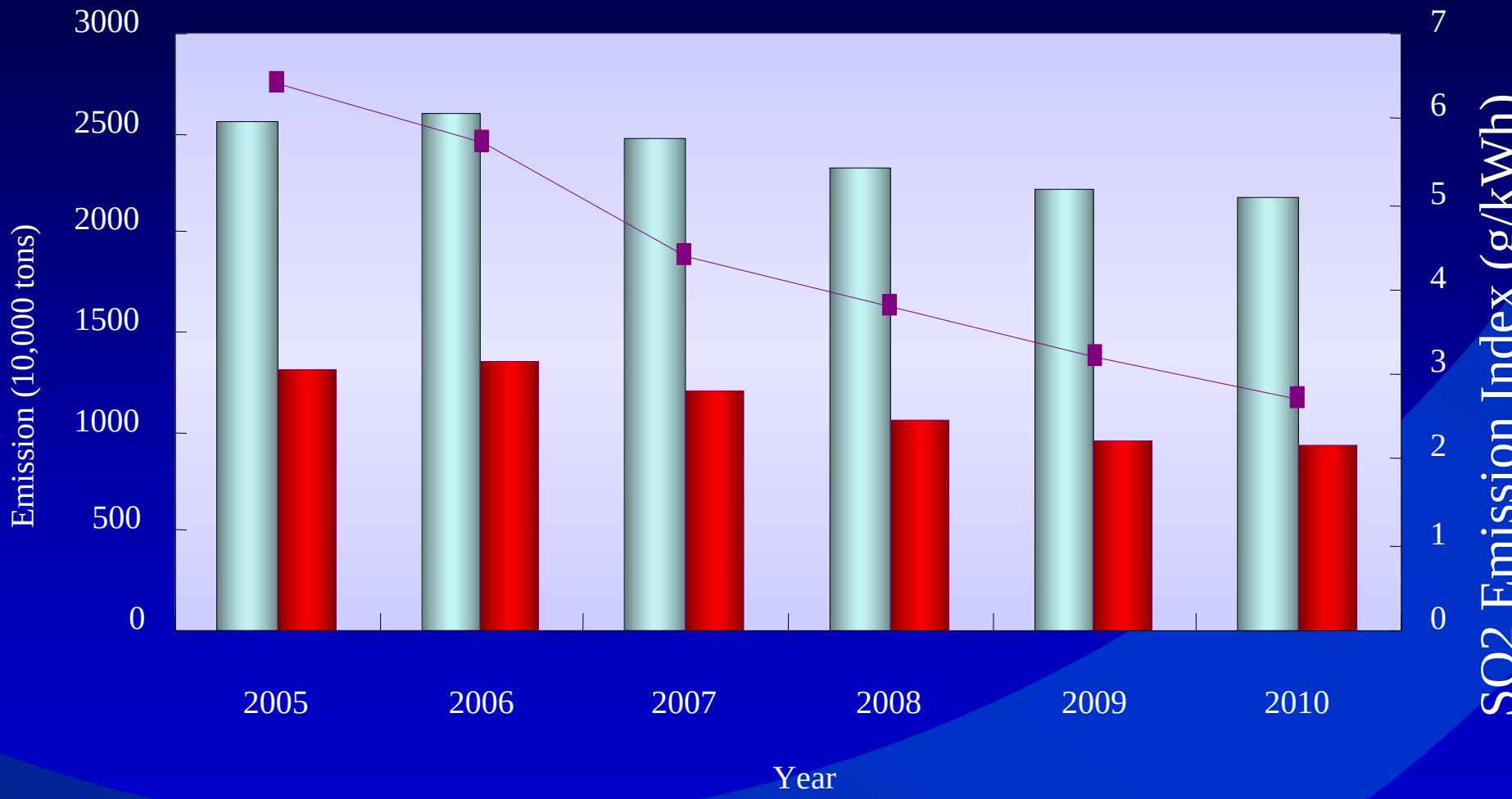
SO_2 Emissions Trends



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Action Plan during the 12th Five-year Plan Period (2011 -2015)

SO_2 Emission Control Targets During 12th FYP

- More stringent emission standard will be effective from January 2012
- SO_2 emission limit for new plants will be reduced from current 400 mg/m^3 to 100 mg/m^3;
- For existing plants, SO_2 emission limit will be reduced from 800 mg/m^3 to 200 mg/m^3.
- All coal-fired power plants must install FGD to meet the new SO2 emission limits.
- About 80% of the coal-fired units equipped with FGD also need to upgrade FGD to meet the SO2 emission limits.
- Estimated cost for meeting new SO_2 limits: 65 billion RMB.

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Pollutant Emission Control- SO_2 During 12th FYP

- O&M of existing power generation units with FGD must be improved to comply new emission standards;
- Installed capacity with desulphurization will reach 930 GW by 2015;
- FGD capacity will reach 21 million tons of SO_2 per year;
- The overall annual SO_2 emissions will be controlled to around 8 million tons from power sector; and
- SO_2 emission index will decline to 1.8 g/kWh.

Activities to Control SO_2 Emission During 12 FYP

- The new non-fossil fuel power generation capacity will reach 220 GW which includes 110 GW of hydropower, 33.15 GW of nuclear power, and 75 GW power from wind power and solar energy.
- Compared to 2010, the newly-built power generation of non-fossil fuel in 2015 will be about 690 billion kWh, saving 195 million tons of standard coal and reducing about 3.3 million tons of SO_2.

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Activities to Control SO_2 Emission During 12th FYP

- Generating units with capacity of 600 MW and over will reach 50% by 2015.
- To improve the energy efficiency and mitigate emissions, technology upgrades will be adopted for the operating power generation units with a total capacity of 30 GW.
- Small, inefficient and polluting power plants will be replaced with large-sized efficient thermal plants equipped with modern emission control devices.

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Activities to Control SO_2 Emission During 12th FYP

- Average coal consumption for thermal power plants will be down to 325 g/kWh by 2015 from 333 g/kWh in 2010 (declining by 8 g/kWh);
- This efficiency improvement will save 35.23 million tons of standard coal, reduce approximately 9.5 million tons of CO_2 emissions, reduce about 0.6 million tons of SO_2 emission.

Activities to Control SO_2 Emission During 12th FYP

- CHP will be further promoted to replace inefficient and polluting coal-fired heat-only-boilers for district heating systems.
- As the national key scientific and technological development project, more IGCC units will be constructed.

Summary

- China has done a lot in controlling SO_2 emissions in the past few years;
- New emission standards will be effectively early next year and SO_2 emissions from coal-fired power plants will be further reduced;
- China has set ambitious targets to reduce SO_2 emission for the next five years; and
- Energy efficiency improvement in power sector will continue in China and CO_2 emission intensity will also continue decreasing.

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Thank you!