UNFCCC SB in-session workshop on mitigation

China's Efforts in Controlling GHG Emissions in Power Industry

Energy Research Institute
National Development and Reform Commission

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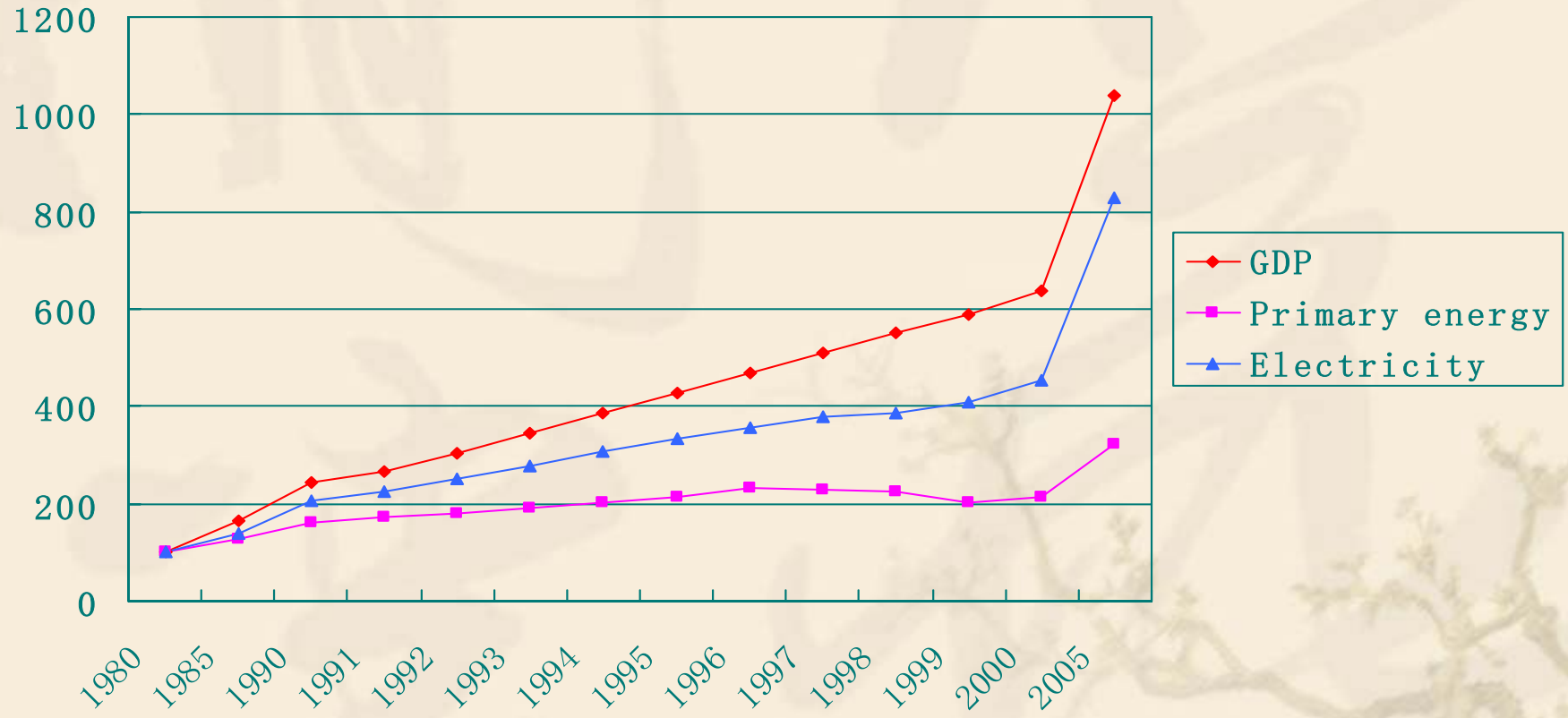
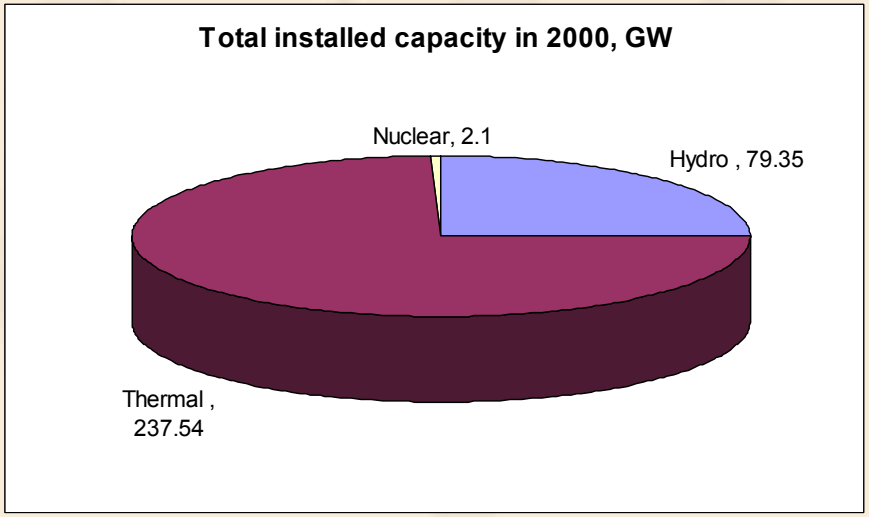
Outline

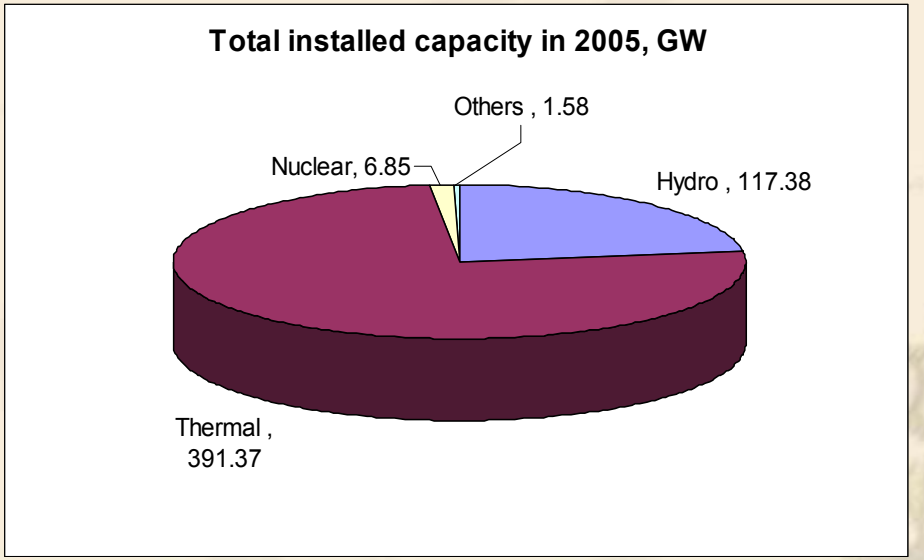
- Power industry development
- Relevant policies and measures
- Challenges and needs

I. Energy and economy

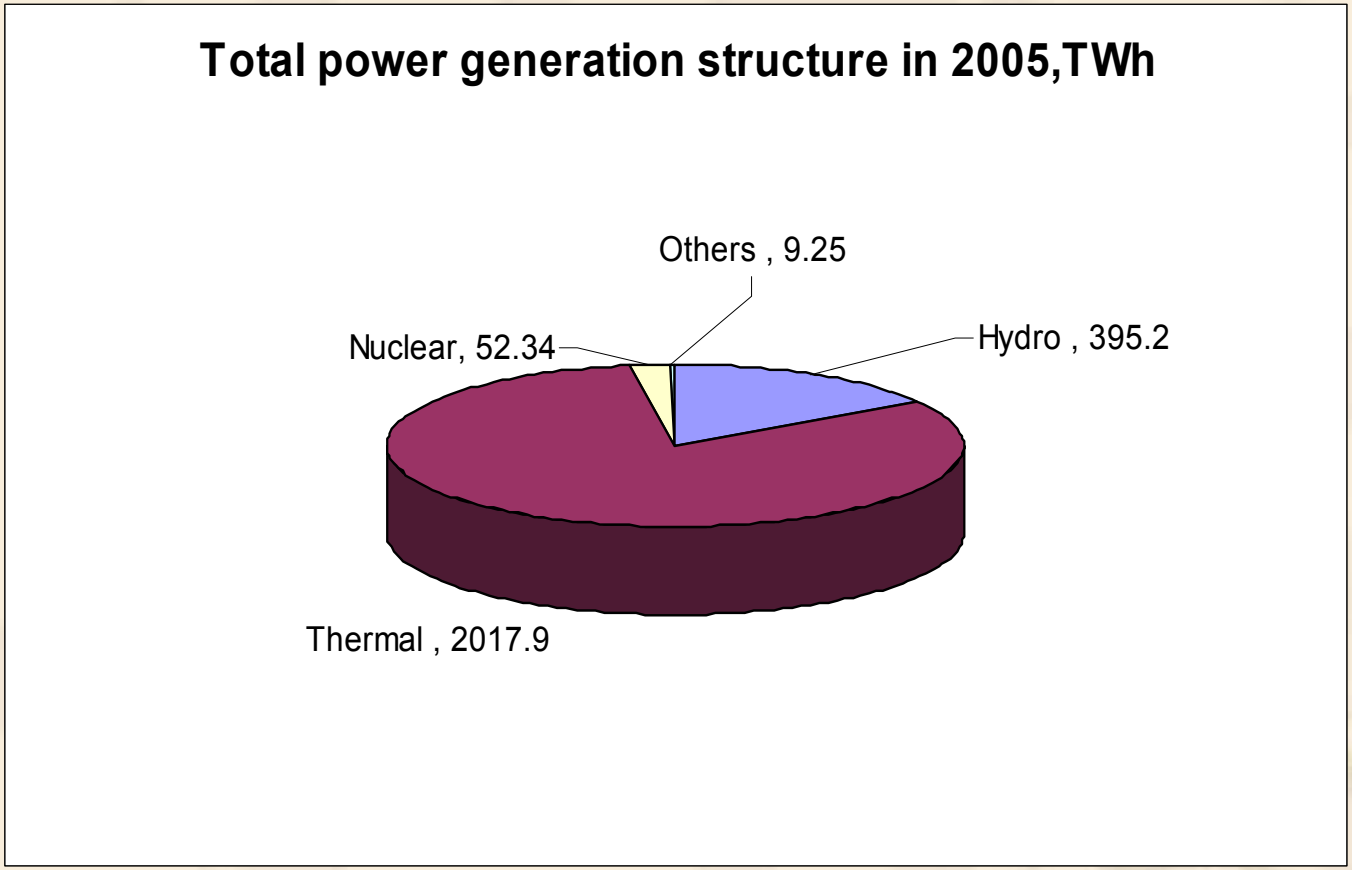


Installed capacity

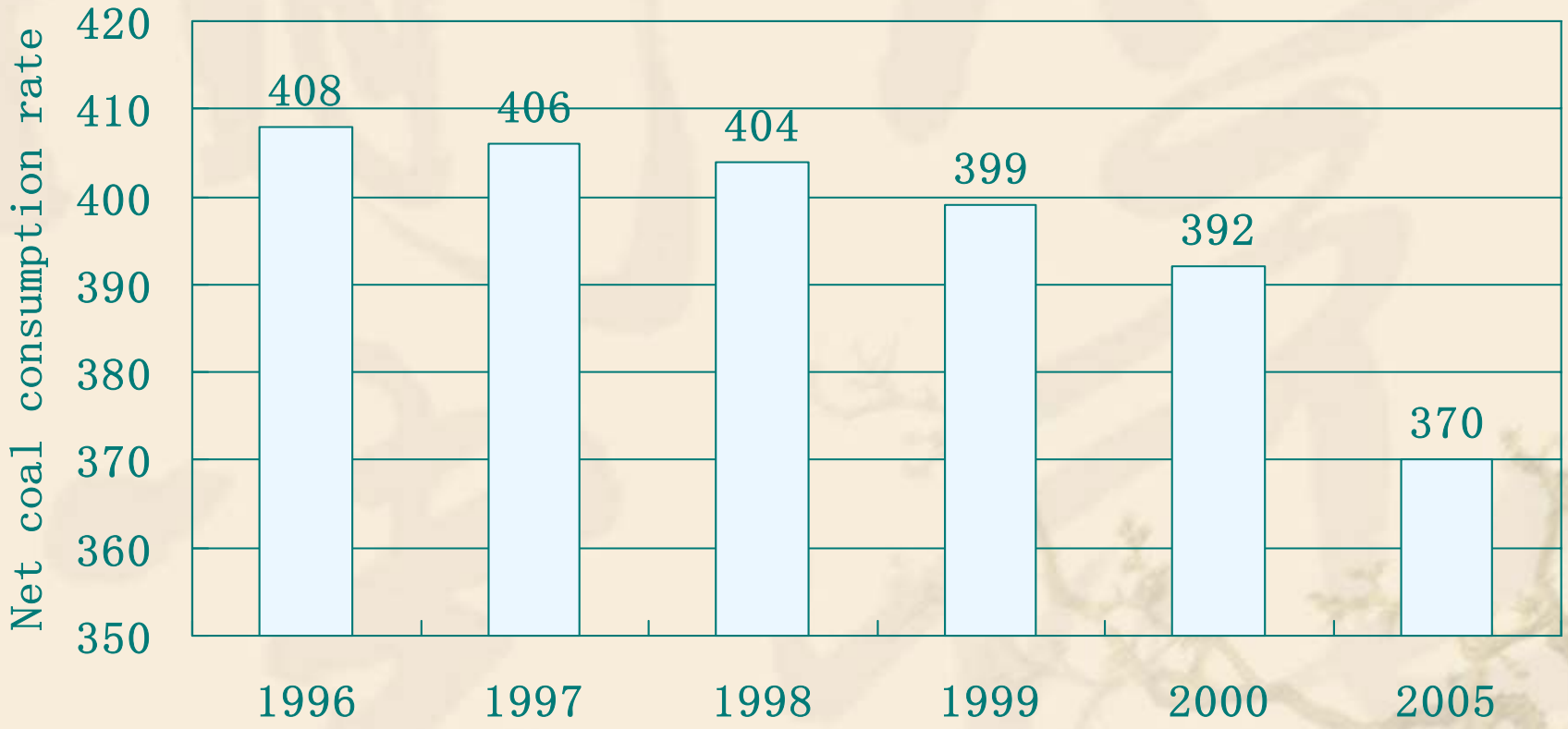




Power generation



Net coal consumption rate of thermal power plants, gce/kWh



Electricity use per capita

- Installed capacity per capita: 0.39 kW, 65%, 1/6-1/10
- Electricity use per capita: 1900 kWh, 70%, <1/10
- Domestic electricity use per capita:216.7 kWh (2005)
  - Urban areas: 182 kWh (2003)
  - Rural areas: 114 kWh (2003)

II. Relevant policies and measures

- Hydropower development as priority
- Promote new and renewable power generation as appropriate
- Optimize thermal power
- Develop nuclear power
- Grid development

Hydropower development

- Between 1995 and 2000，52.2 GW to 79.35GW, annual growth 8.7%
- 2005: hydropower installed capacity reached 117GW, 23% of the total
- 2005: hydropower generation 395.2 TWh, 16% of the total

Major hydropower stations

Three gorges (18.2 GW) Ertan（3.3 GW） Lijiaxia（2 GW ） Xiaolangdi （1.8 GW ） Shuikou （1.4 GW ） Dashaoshan(1.35 GW) Tianshengqiao No. 1 (1.32 GW)	Manwan（1.25 GW ） Wuqiangxi（1.2 GW ） Geheyan（1.2 GW ） Tianshengqiao No. 2（1.2 GW） Yantan （1.2 GW ） Wanjiazhai（1.08 GW）

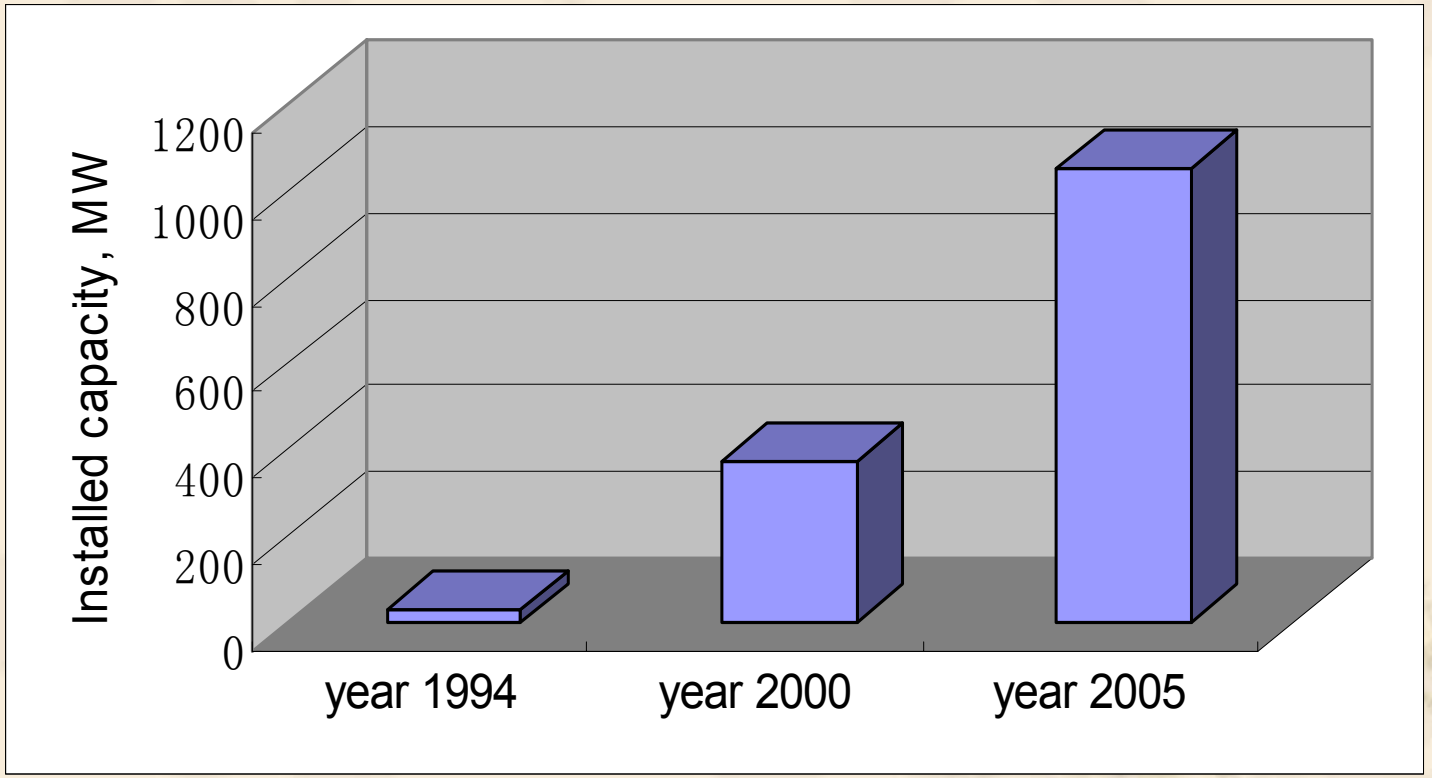
Small hydropower

- 50MW (including 50MW)
- National policy guidance
- Self sustained with national support
- Dual purposes: hydraulic control and power generation
- Local development and consumption
- Electrification in mountain and poverty areas
- 28.5 GW (2002)
- World level: stations, installed capacity and annual electricity generation

Incentive measures

- Hydropower as priority construction project
- Land use special treatment
- Extension of loans
- Tax relief

Wind power development



- Between 1994 and 2000, 26 wind farms, installed capacity 30MW to 375MW
- By the end of 2005, total installed capacity of wind power reached 1056MW, among which:
  - Wind farms 40 (≥6MW), total capacity 1041MW
  - Inner Mongolia: 208.9MW
  - Xinjiang: 133.5MW
  - Liaoning: 126.5MW
  - Ningxia: 112.2MW

Small wind turbines

- Late 1970s: micro and small wind turbines
- 1980s: 50W to 200W
- 100W to 1kW
- Installed micro turbines: over 200,000
- Inner Mongolia, Xinjiang, Qinghai pastureland

Incentive measures

- Allow wind farm connection to grids
- Electricity price from wind power
- Wind power technology and equipment
- Special loans for large scale wind farms
- National plans for domestic manufacturing
- Tariff relief for large turbines over 300kW
- VAT special policy

Optimize thermal power

- Coal fuel dominance: 80%
- Replacing small units with big ones: 13.1 GW
- Share of large generation units: 300MW above units from 22.5% to 34.4%
- Shut down small thermal units: 10GW
- Develop CHP: 16.5 GW to 28.8 GW (1995 to 2000) to 69.8 GW (2005)，annual growth 11.6%

Clean coal technology

- 15MW PFBC-CC pilot installation
- 100MW PFBC-CC demonstration
- 300-400 MW IGCC
- 300 MW CFBC introduction and domestic manufacture

Incentive policies

- Preferential policy toward clean coal power generation technology development and demonstration, July, 2002
- Tariff and import VAT deduction for imported equipment and technology
- Discounted loans for demonstration
- Subsidy for research organizations and manufacturing industry
- Grid price

Develop nuclear power

- 1994: first nuclear power station
- 2000: 2.1 GW in operation, 6.6 GW in construction
- 2005: 7.76 GW, 1.5%; 55.7TWh, 2.25%
- Promote domestic manufacturing of technology and equipment

III. Challenges and needs

- Electricity sector projected to grow significantly to 2020
  - Electrification linked to China's sustainable development priorities
  - Demand 4.3 PWh, 950 GW
  - Per capita electricity use: 2900kWh, USA 1950s, UK 1960s, Spain 1982
  - World average in 2000: 2500kWh
- CO_2 emissions from the electricity sector represent about one third of China's annual energy-related CO_2 emissions and are projected to increase considerably between 2000 and 2020
- Share of hydro and renewable power low, development extend 12%, world average 20%
- Low level of generation technology
  - 50-60 MW unit average
  - Share of sub-critical and super critical units: 30%, super critical Japan 60%
  - Share of gas turbine
  - Coal dominance
  - Unit CO_2, SO_2, NOx emissions

Develop hydropower together with ecological protection

- Hydropower is a key measure towards a low carbon energy structure;
- Together with environmental protection and migration, develop and use hydropower resources in a rational manner;
- Accelerate the development of hydropower and small hydro based on local conditions.

Estimated CO_2 reduction 560Mt by the end of 2010

Improve thermal power

- Develop 600+MW supercritical (ultra-supercritical) units
- Start the IGCC power station project
- Develop natural gas power generation
- Acceleration of the elimination of small coal-fired power generators
- Strengthen power grid construction

Estimated GHG emission reduction: 110 Mt CO_2 by 2010

Develop nuclear power

- Nuclear energy is a key element in national energy strategy;
- Guideline: self-sufficient, international cooperation, technology introduction, domestic built;
- Common technology route and adoption of advanced technologies;
- Achievement of domestic development and production of large scale unit.

Estimated GHG emission reduction: 60Mt CO_2 by 2010

Actively support the development and utilization of wind, solar, geothermal and tidal energy

Together with the development and construction of large scale wind power plants, to:

- Actively develop photovoltaic and solar heating utilization;
- Actively promote the development and utilization of geothermal and tidal energy.

Estimated GHG emission reductions: 70 Mt CO_2 by 2010

Investment and technology needs

- Projected significant capital expenditures on new power plants in China, potentially include CDM projects
  - Renewables
  - Combined heat and power
  - fuel switching : CGTT
  - Replace small units
  - CMM power generation
  - domestic garbage power generation
  - high efficiency and clean coal-fired power generation
  - high efficiency and low loss transmission system
  - demand side management
  - Multi-supply generation plants

Thank you !

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