

COP11 and COP/MOP1 side event  
Global Challenges Toward Low-Carbon Economy  
-Focus on Country-Specific Scenario Analysis-  
December 3, 2005 Montreal

# **Development of China Carbon Emission Scenarios toward 2050**

Hu Xiulian(huxl@eri.org.cn)  
Energy Research Institute (ERI)

# Background

---

- China is a developing country with high population and relatively low economy development level as a whole.
- Along with the rapid increase of economy, the energy demand grows very fast as well.
- The urbanization process has speed up, but the labor quality is still low and the employment pressure is very high
- The energy resource of China is dominated by coal, while oil shows a increase dependence on import and the exploitation and utilization of renewable and clean energy are still difficult.
- The technologies of energy transformation and utilization are still backward. The energy efficiency is low and the energy-saving potential is large.
- The ecological environment is vulnerable and it is still a big challenge to solve energy-related environment problems and reduce the greenhouse gas emission

# Development strategies and energy-saving goals for China

---

## In the next decades, China will

- Change the mode of economy development, insist on a economical, clean and secure development and achieve the sustainable development.
- Speed up the process of economy structure adjustment and urbanization and promote the coordinate development of urban and rural area.
- Achieve a multiple supply of energy and vigorously develop and utilize the new and renewable energy
- Promote the technology innovation, increase the energy utilization efficiency and increase the labor quality and self-innovation ability.
- Change the consumption style, develop the circular economy, and construct a saving society.
- Enhance the international cooperation, learn the international experiences and establish and improve the policy scheme
- Improve the environment and control the greenhouse gas emission

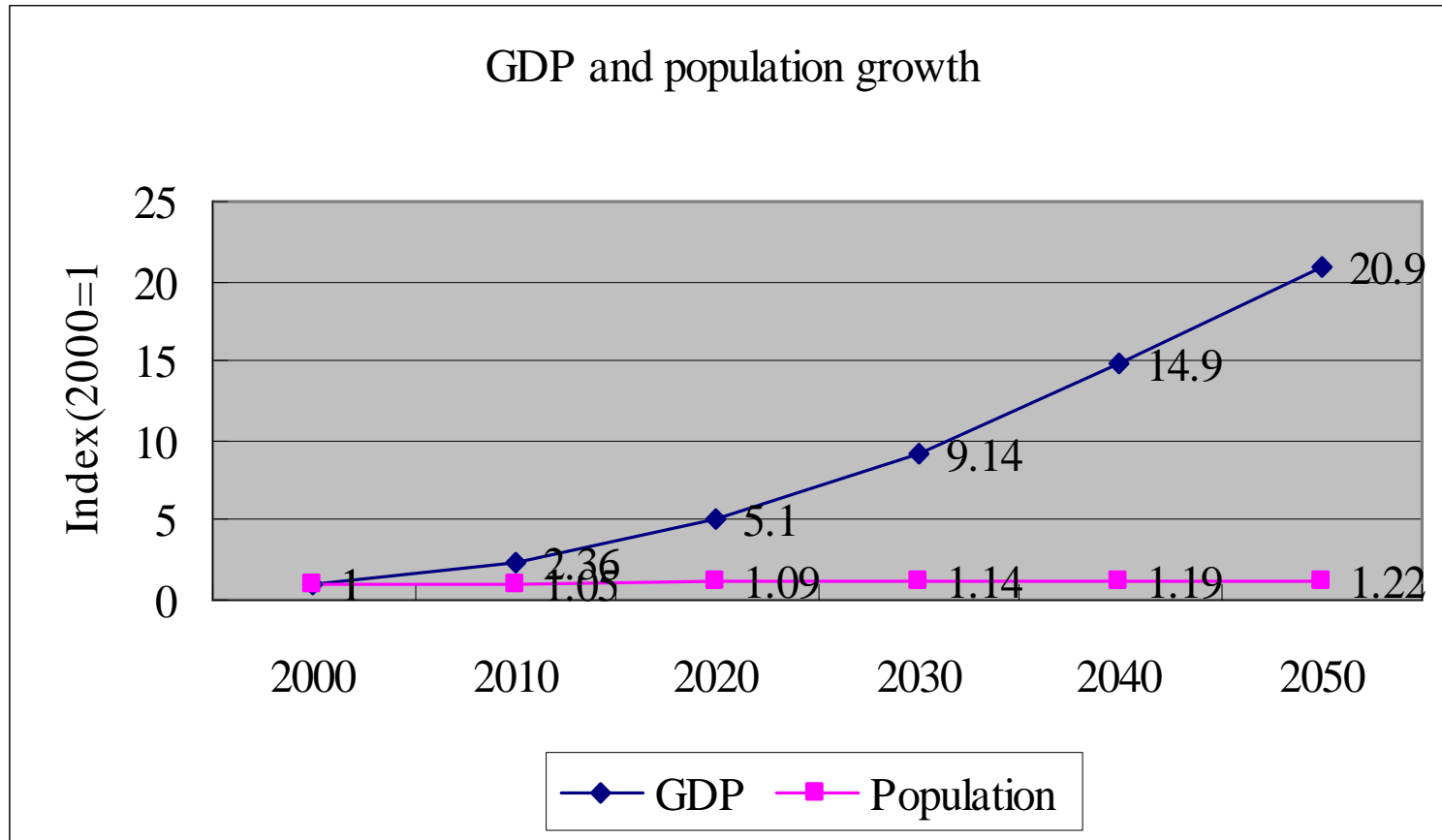
# Development strategies and energy-saving goals for China

---

■ 2000-2020: The Chinese government formulate the society and economy development goal for “eleventh-five-year-plan” period, i.e., the annual increase rate of GDP will maintain 8% from 2005 to 2020; the per capita GDP will double from 2000 to 2010; the per GDP energy consumption will decrease by 20% from 2005 to 2010

■ 2020-2050: The annual GDP increase rate will be around 5%. The energy saving will be strengthened with an annual energy-saving rate of 3%. The clean energy technologies will be utilized broadly, the energy security will be ensured and the sustainable development will be achieved

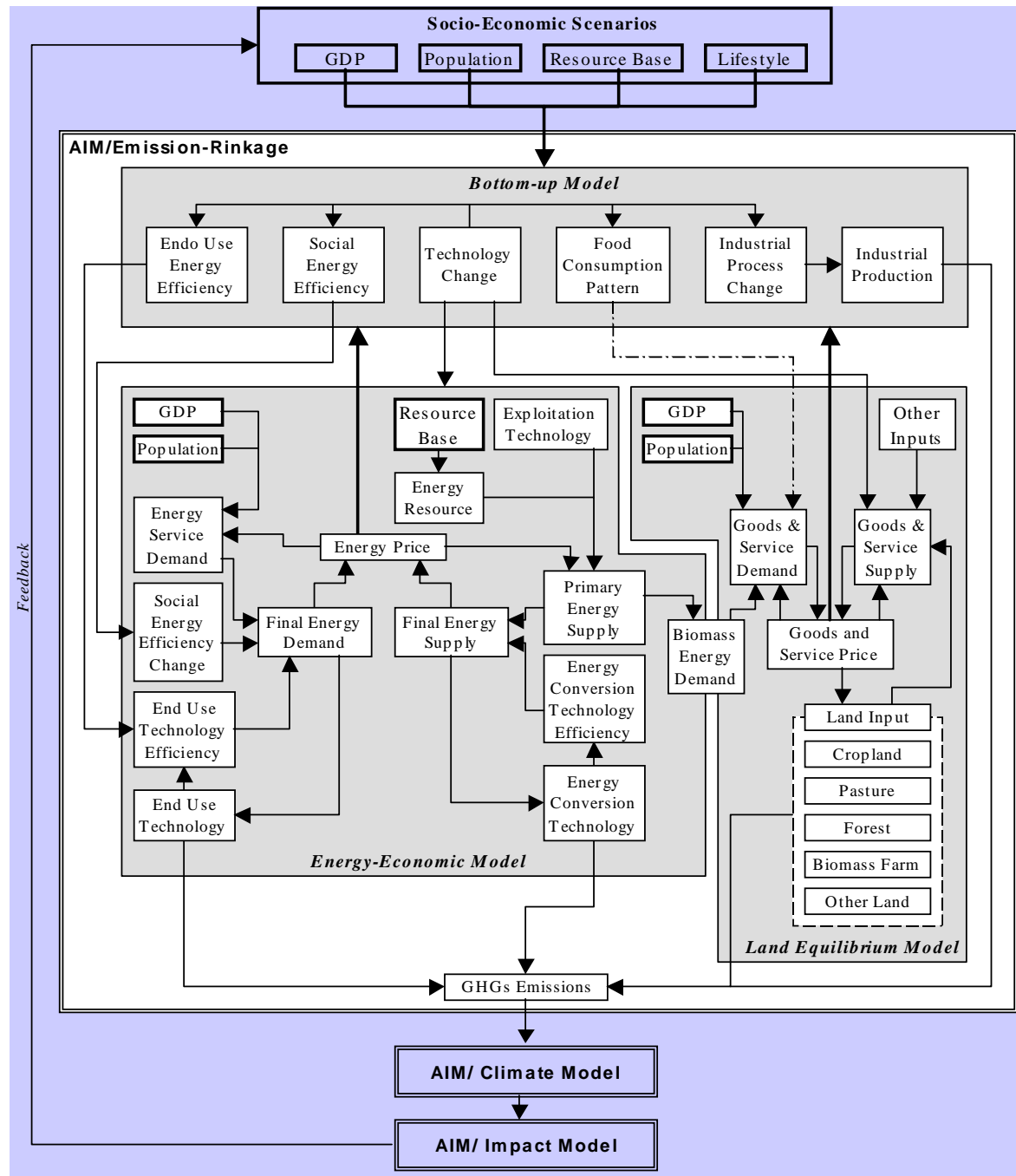
# Economic Growth and Population in 2050



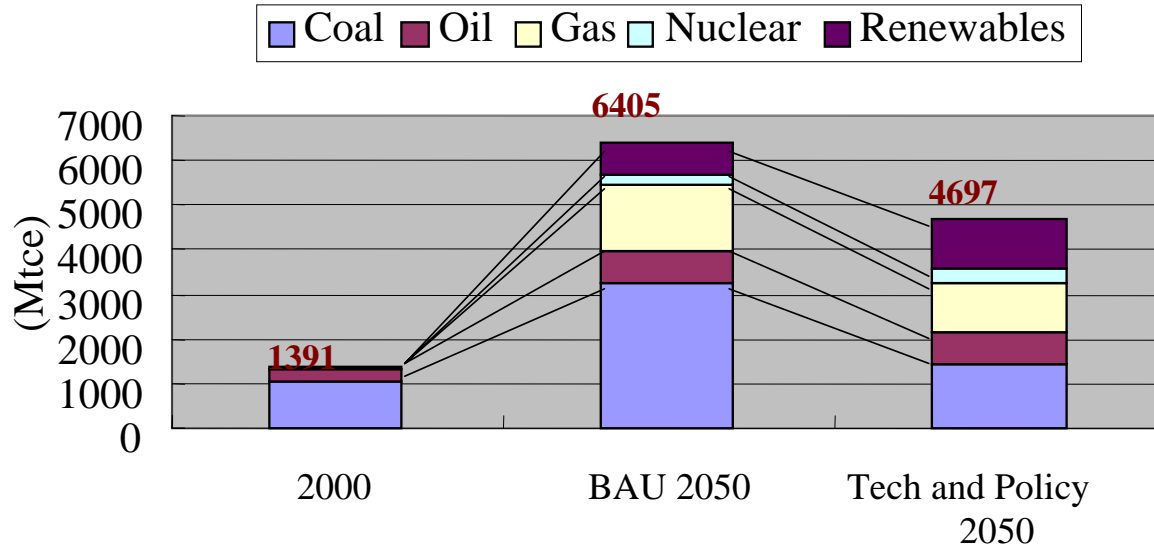
# China: Energy demand and CO<sub>2</sub> emission scenarios

Options	Sector/options	Baseline scenario	Policy and technology scenario
Enhanced Energy Saving	Energy Intensive Products	Annual average energy saving rate 2.7%	Annual average energy saving rate 3.6%
	Building	Annual average energy saving rate 1.9%	Annual average energy saving rate 3.0%
	Transport	Annual average energy saving rate 1.5%	Annual average energy saving rate 2.8%
Renewable energy	Biomass	Annual average reduction rate of cost by 3.7%	Annual average reduction rate of cost by 5.9%
	Hydro	65% of technical potential by 2050	80% of technical potential by 2050
	Solar/wind	0.7yuan/kWh by 2050	0.5Yuan/kWh by 2050
Carbon Capture and Sequestration	Coal fired power plants	4% by 2050	15% by 2050
	Industry	1% by 2050	5% by 2050
Clean coal technology	Power generation	7% by 2050	35% by 2050
	Industry	5% by 2050	15% by 2050
Hydrogen	Power generation	Distributed power generation system by 3% in 2050	Distributed power generation system by 8% in 2050
	Transport	Fuel cell vehicle 5%	Fuel cell vehicle 15%
Transport	Vehicle	Hybrid vehicle diffusion start from 2010, 10% by 2030	Hybrid vehicle diffusion start from 2010, 70% by 2040
Policies	Carbon tax	No	50yuan/t-C in 2010, 200yuan/t-C in 2050
	Subsidy	No	Power from renewable energy 0.4yuan/kWh
	Investment Energy technology R&D	Annual average growth rate 4%	Annual average growth rate 6.2%

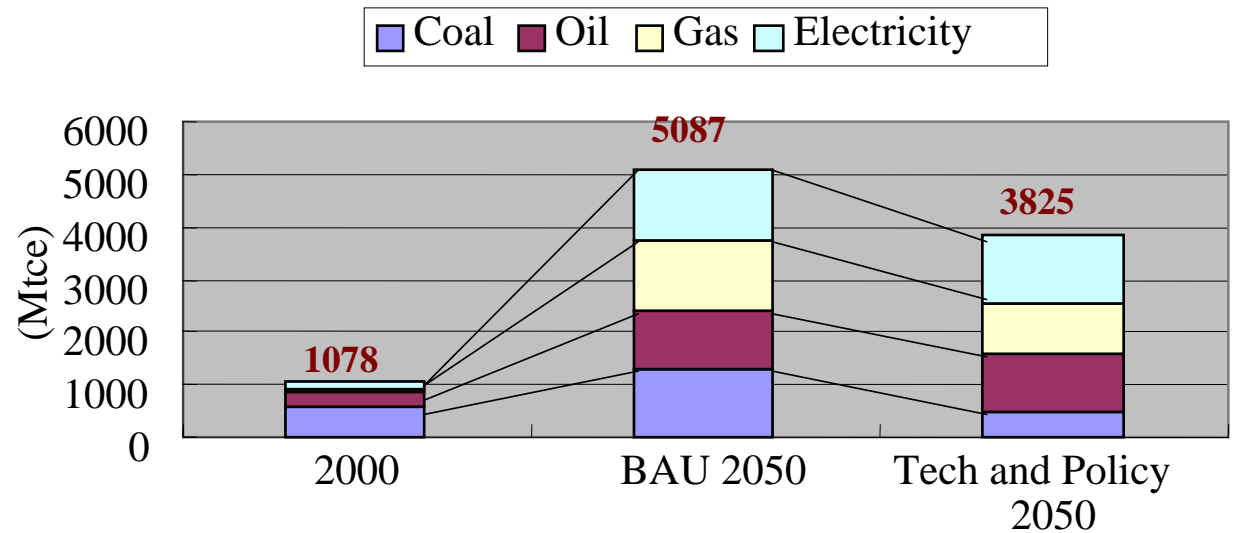
# AIM-Emission Model



## Primary energy demand in China, 2050

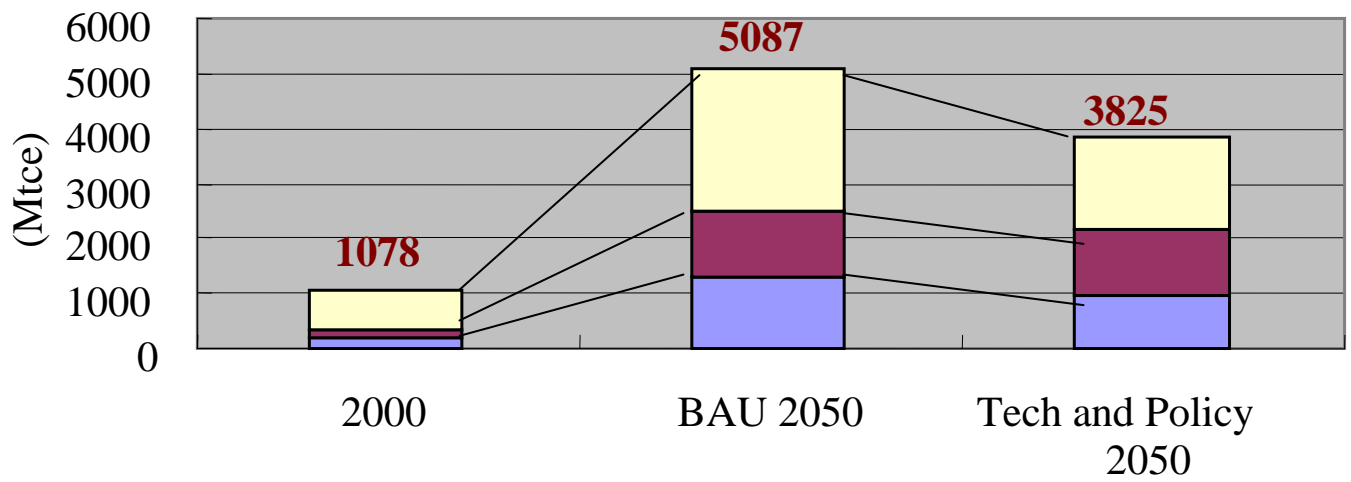


## Final energy demand in China, 2050

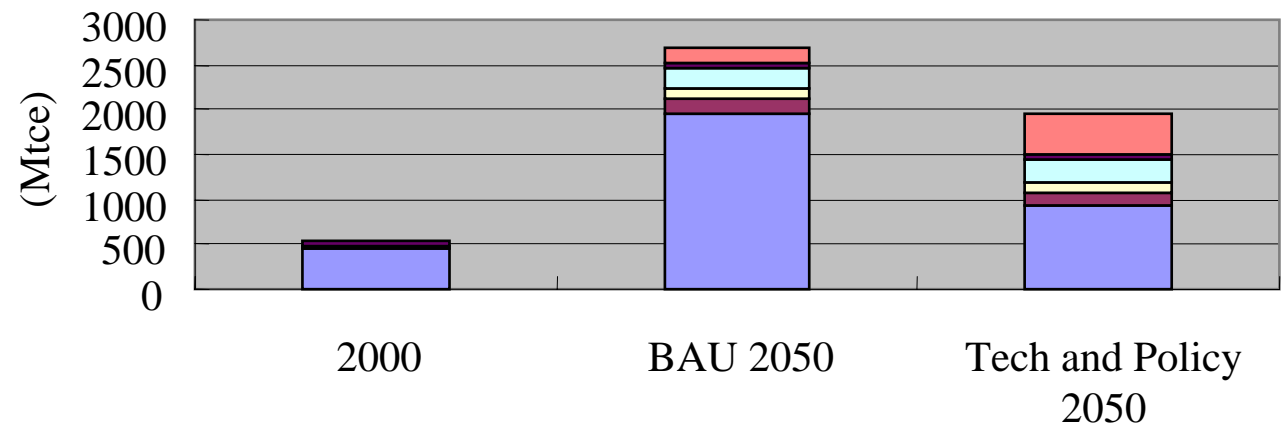


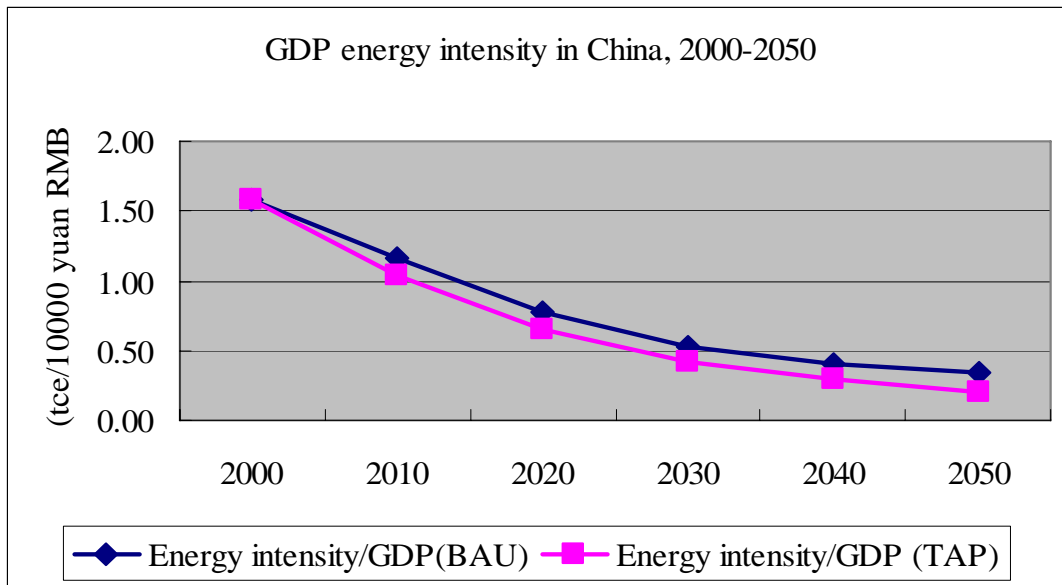


## Final energy use by sector

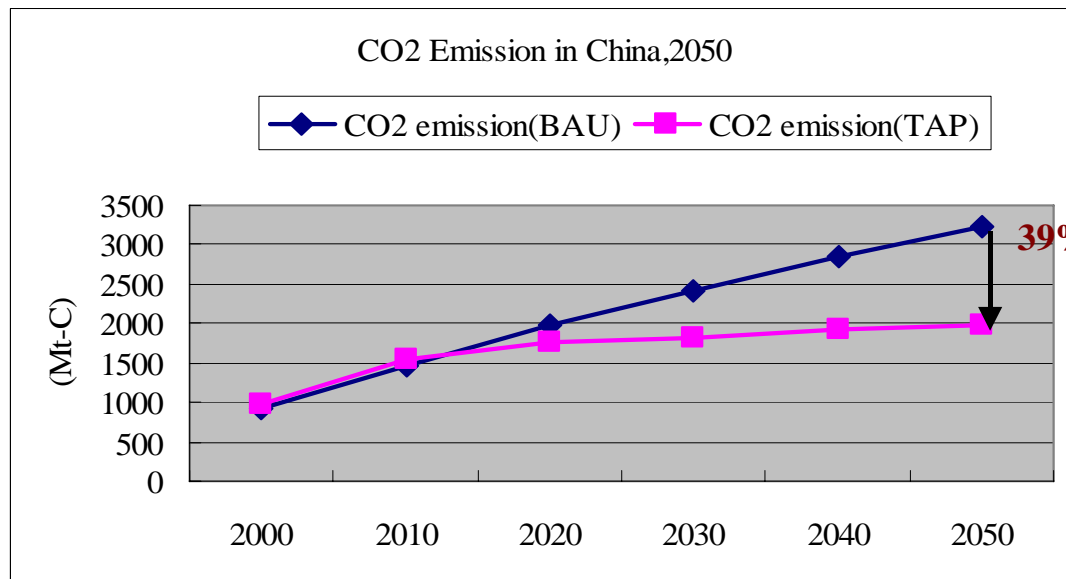


## Energy Use in Power Generation in China, 2050



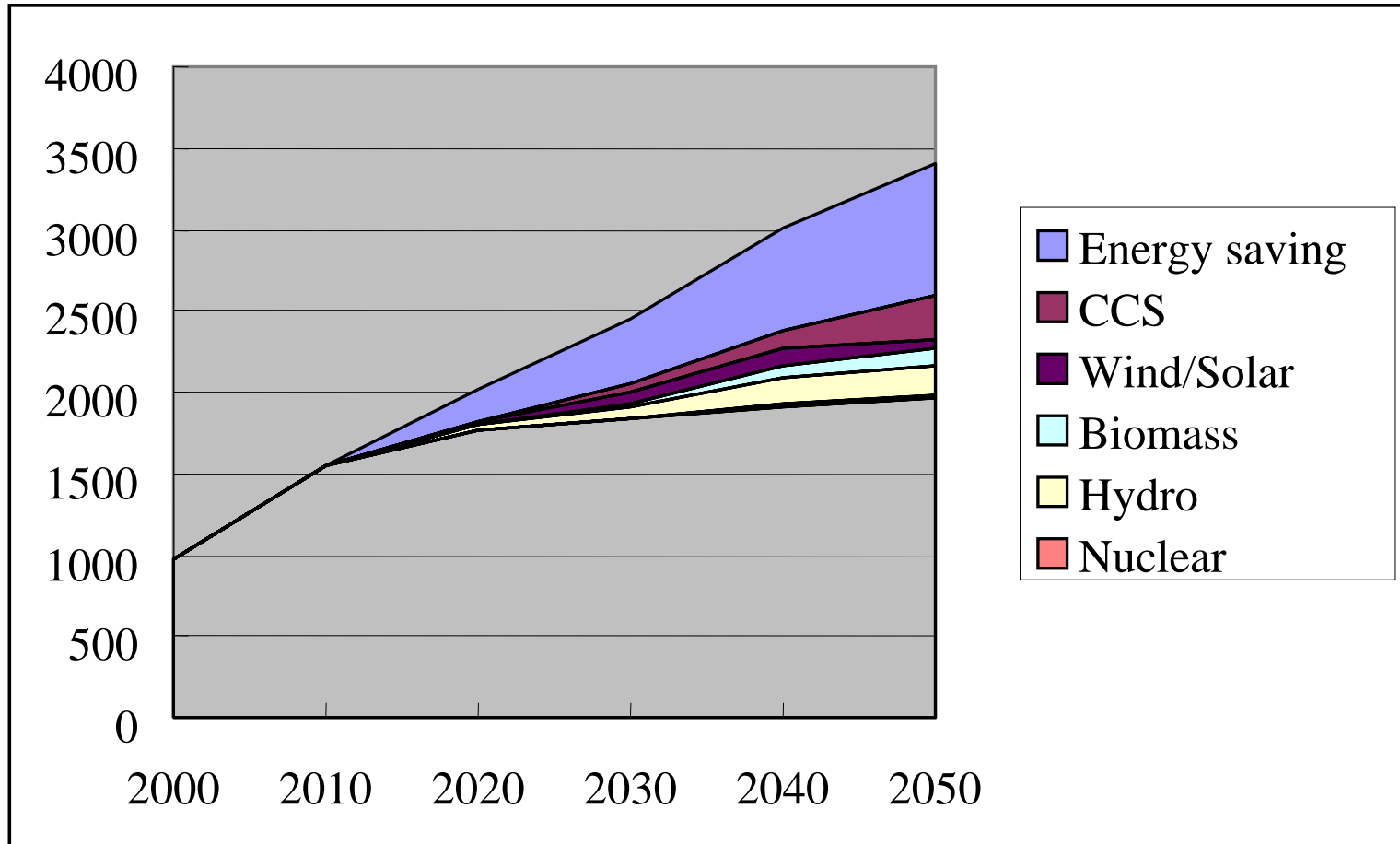


Energy demand will be reduced by 27% (1708Mtce) in 2050 in technology and policy scenario compared with baseline scenario in China.



CO<sub>2</sub> emission will be reduced by 39% (1263Mt-C) in 2050 in technology and policy scenario compared with baseline scenario in China

# CO<sub>2</sub> emission reduction contribution (Mt-C)



# Conclusion

---

- Energy Saving by technology progress and social efficiency improvement is key for future GHG emission reduction
- Technologies including modern renewable energy, advanced nuclear, clean coal+CCS should be emphasized for early R&D
- Fiscal energy policies including energy tax/carbon tax could be a good option