Modelling Studies in China and Expectation on AIM

Hu Xiulian, Jiang Kejun

Energy Research Institute, China

Using modeling tools

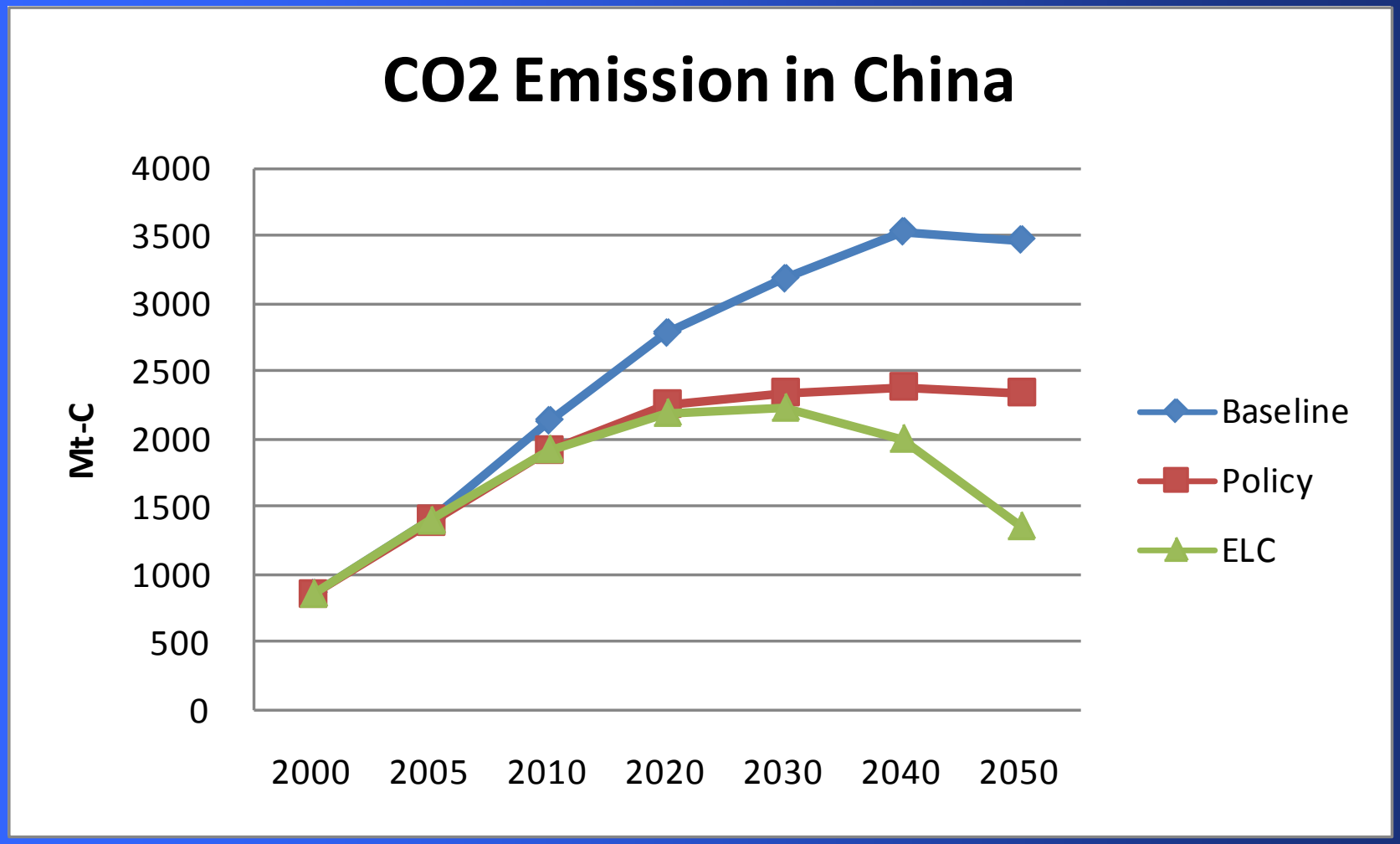
- Scenarios: pathways, targets (intensity and absolute)
- Cost analysis: wide range of cost analysis
- Multi-development targets analysis
- Benefit analysis by taking low carbon economy
- Co-benefit analysis (GHGs, local pollutions, water pollutions, and others)
- Integrated analysis

Studies in 2009

- CCICED low carbon scenarios: variety of GDP
- Chinese Academy of Engineering: 2050 Energy Strategy, energy ceiling.
- Technology Roadmap
- Policy roadmap: 2010-2030-2050
- Political roadmap: international collaboration
- Co-benefit scenario
- Low Carbon Scenario in Province and Cities: Guangdong, Hongkong, Jilin, Jilin City, Baoding, Shanghai, Beijing, Shijiazhuang, Shenyang, Hainan
- Global 2degree scenario: just started
- AEEMF: Asian Scenarios
- Carbon tax:
- Sector based approach analysis: case study for power generation in China
- Technology transfer

What we are doing

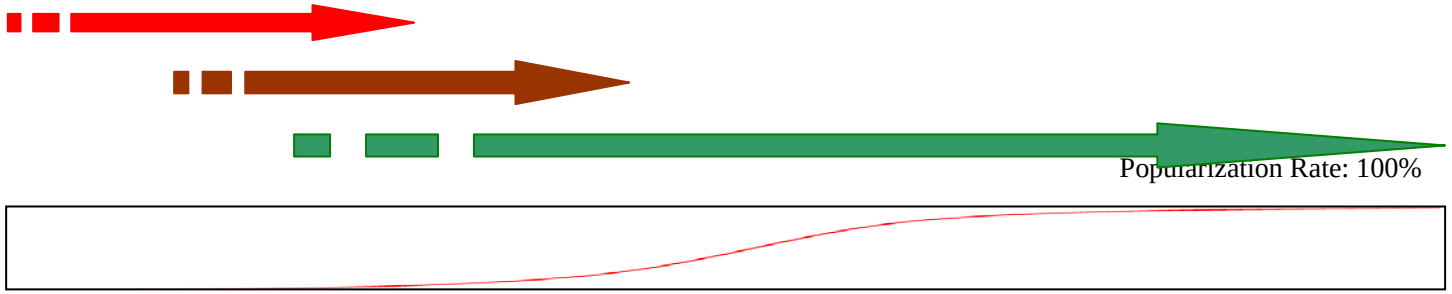
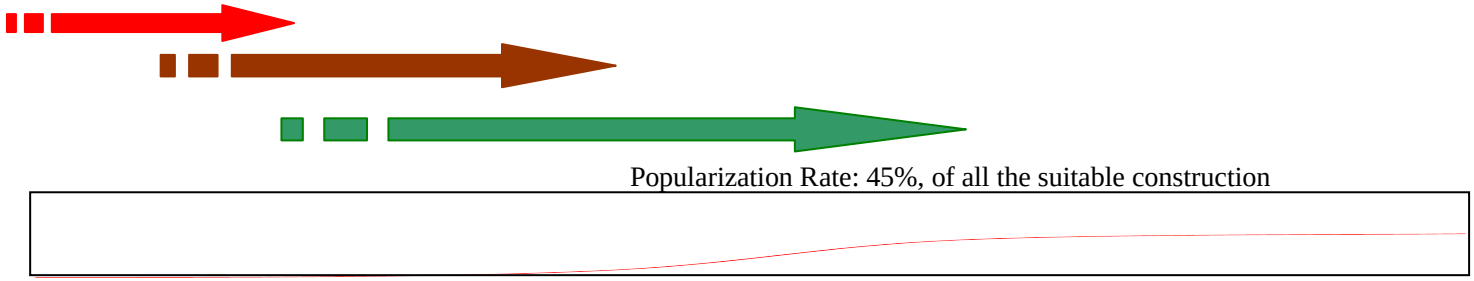
- Low carbon scenario up to 2050 for China
- Technology roadmap up to 2050
- Policy roadmap for deep cut in 2050
- Political roadmap for Climate change in China and the world
- Low carbon development for cities and provinces (more than 10 cities and provinces)
- Cost and benefit analysis
- Technology solution

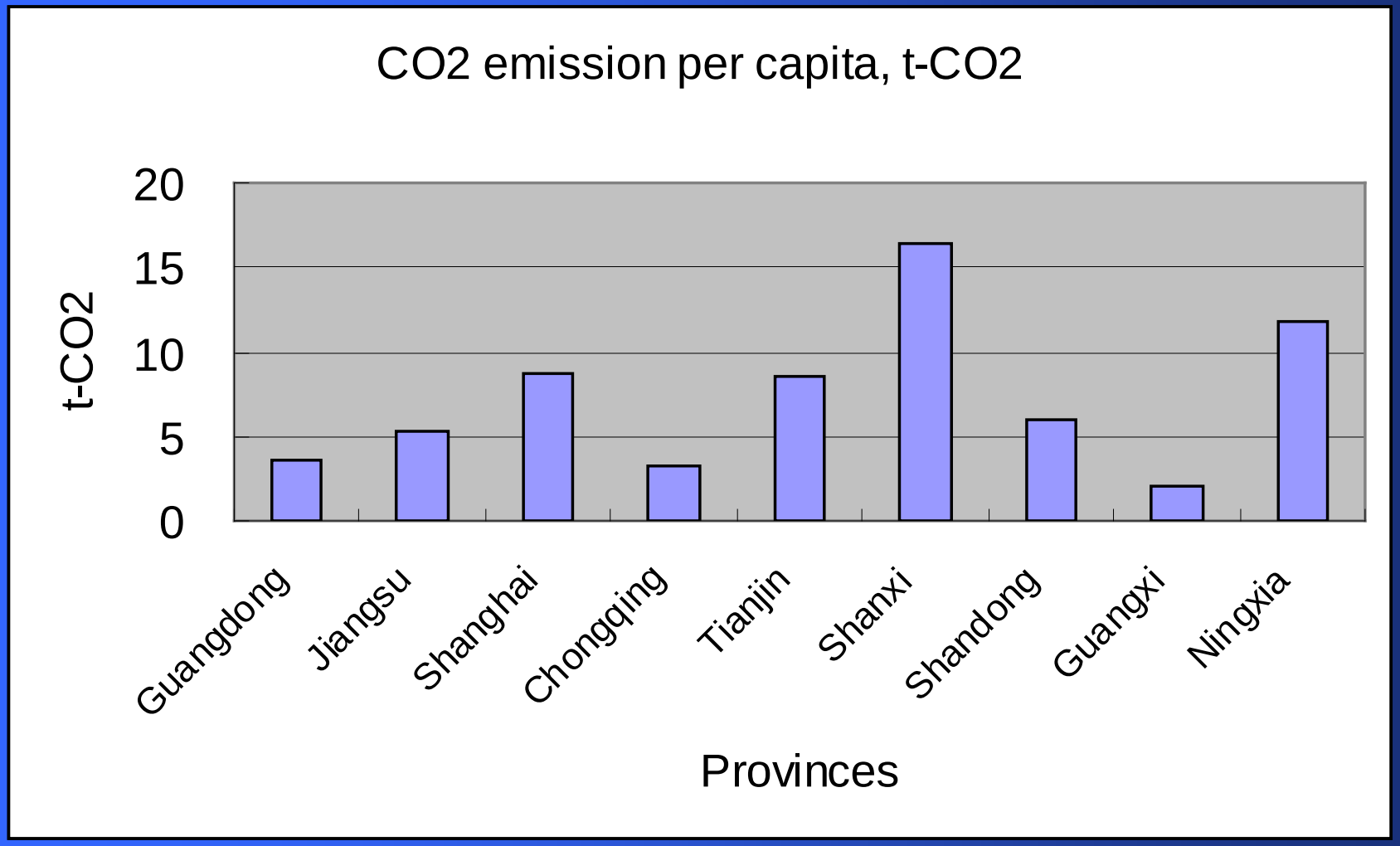

CO2 Emission in China
Mt-C
4000
3500
3000
2500
2000
1500
1000
500
0
2000
2005
2010
2020
2030
2040
2050
Baseline
Policy
ELC

28 key technologies in the enhanced low carbon scenario in China

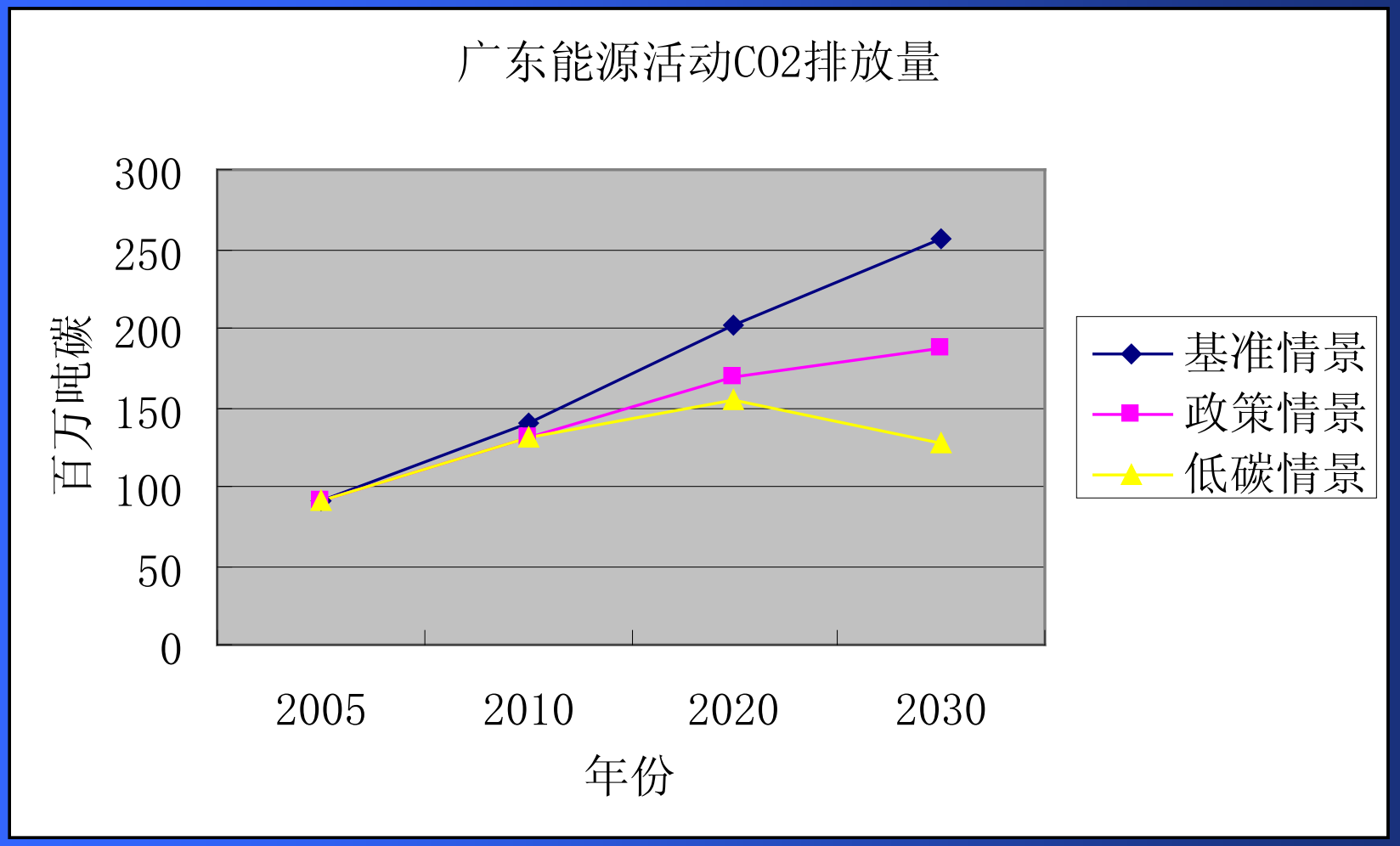
No.	Sector	Technology	Description	Note
1	Industry technology	High energy efficiency equipment	High efficiency furnace, kiln, waste heat recovery system, high efficiency process technologies, advanced electric motor	Nearly in market
2		New manufacture process technology for cement and steel		
3		CCS	In cement, steel making, refinery, ethylene manufacture	
4	Transport	Super high efficiency diesel vehicle	Advanced diesel hybrid engine	
5		Electric car		
6		Fuel cell car		
7		High efficiency aircraft	30% higher energy efficiency	
8		Bio-fuel aircraft		
9	Building	Super high efficiency air-conditioner	With COP>7	
10		LED lighting		
11		In house renewable energy system	Solar PV/Wind/Solar hot water and space heating	
12		Heat pumps		Mature
13		High isolation building		Mature
14		High efficiency electric appliance		Mature before 2030
15	Power generation	IGCC/Poly-Generation	With efficiency above 55%	
16		IGCC/Fuel cell	With efficiency above 60%	
17		On shore Wind		Mature
18		Off shore wind		Mature before 2020
19		Solar PV		
20		Solar Thermal		
21		4^{th} Generation Nuclear		
22		Advanced NGCC	With efficiency above 65%	
23		Biomass IGCC		
24		CCS in power generation		
25	Alternative fuels	Second generation bio-ethanol		
26		Bio-diesel	Vehicles, ships, vessels	
27	Grid	Smart grid		
28	Circulating tecnologies	Recycle, reuse, reducing material use		

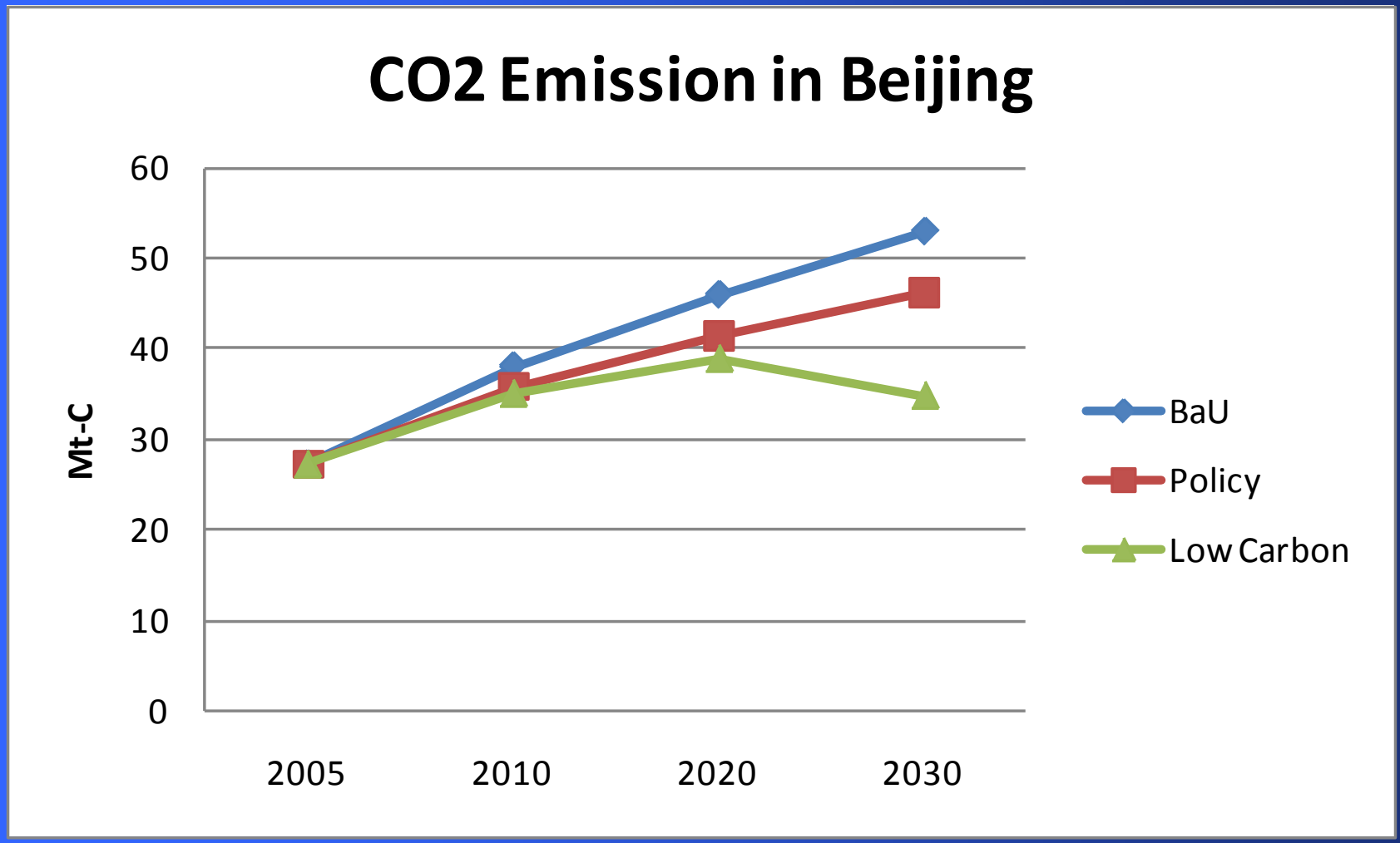
Technology Roadmap

Ultra performance air-conditioning	
Advanced Solar Water heater/ heating	

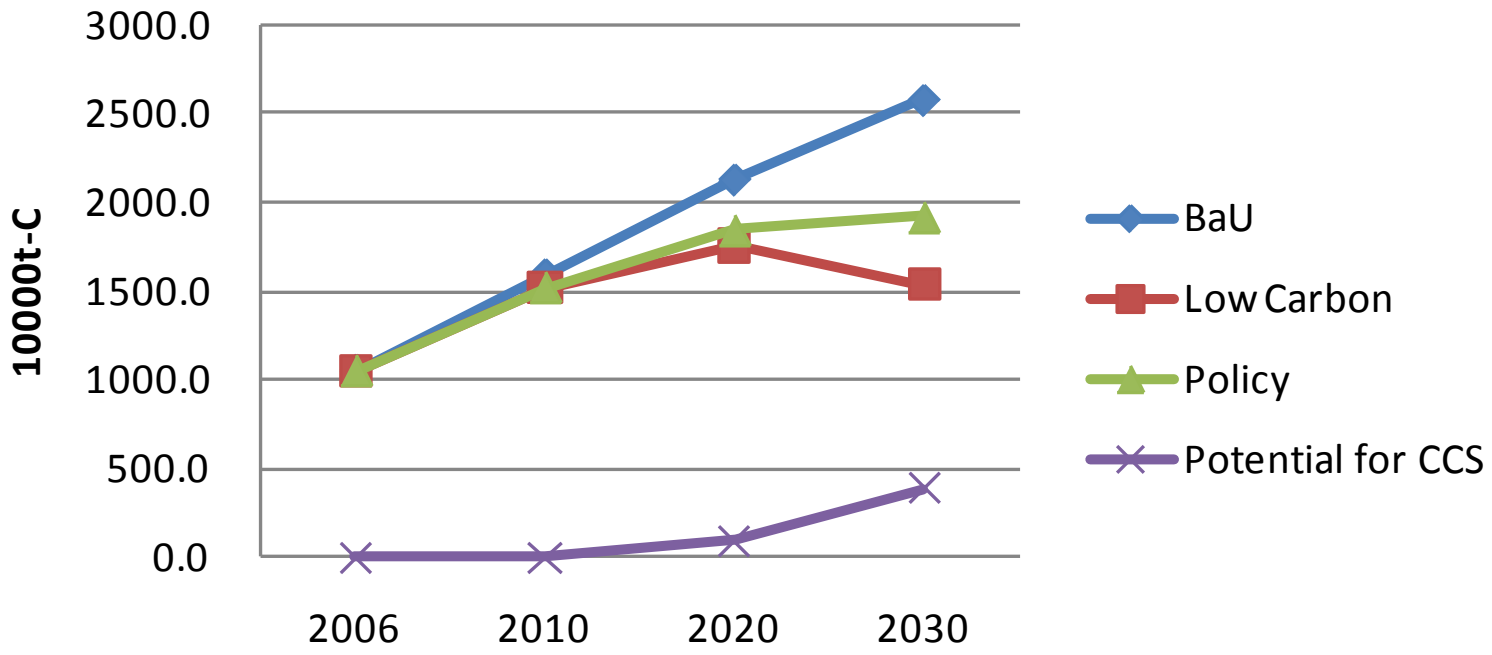

CO2 emission per capita, t-CO2
t-CO2
20
15
10
5
0
Guangdong
Jiangsu
Shanghai
Chongqing
Tianjin
Shanxi
Shandong
Guangxi
Ningxia
Provinces

CO2 emission from energy activities in Guang Dong, mt-C




CO2 Emission in Beijing
Mt-C
60
50
40
30
20
10
0
2005
2010
2020
2030
BaU
Policy
Low Carbon

CO2 Emission from energy use: Jilin City



What is happening now on policy

- Negotiation in COPs, Copenhagen and after that
- 12th Five Year Plan on Energy, Climate change
- Low Carbon Development Planning and Strategy
- National long-term energy plan

Negotiation

- Targets? By 2020, 2030 or 2050? Intensity or absolute targets?
- Commitment: domestic targets or actions, MRV, sector based approach
- Cost and benefit?
- Technology transfer needs?

Domestic climate change strategy

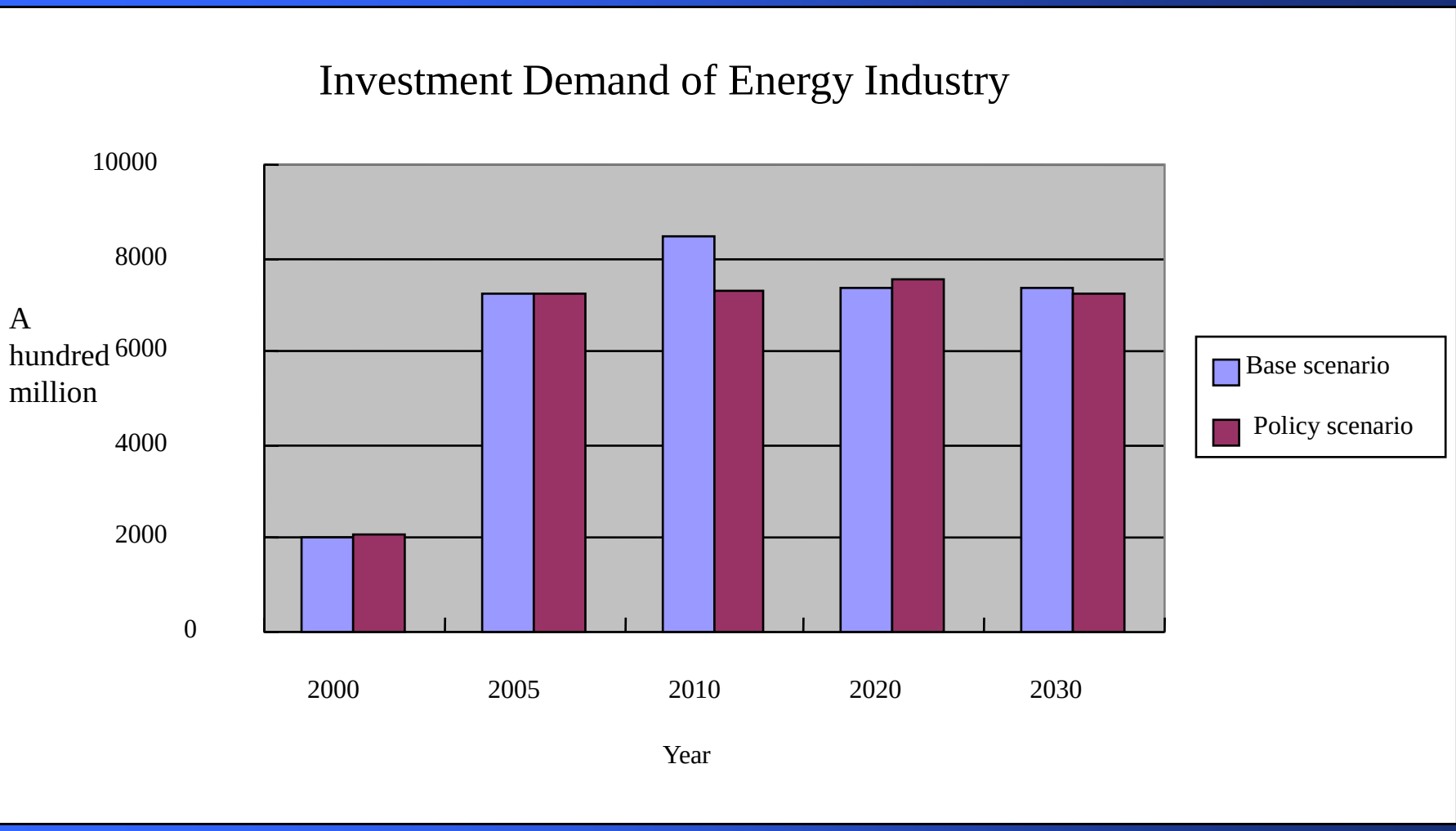
- What is the targets of GHG in China? Short-term and long-term?
- Key policies and countermeasures for low carbon future
- Long-term Energy and emission pathways?
- Economy development pattern?
- Technology R&D strategy? What kind of technologies?
- Near-term action and policies? Cost and benefit of these near-term policies?

Expectation on AIM

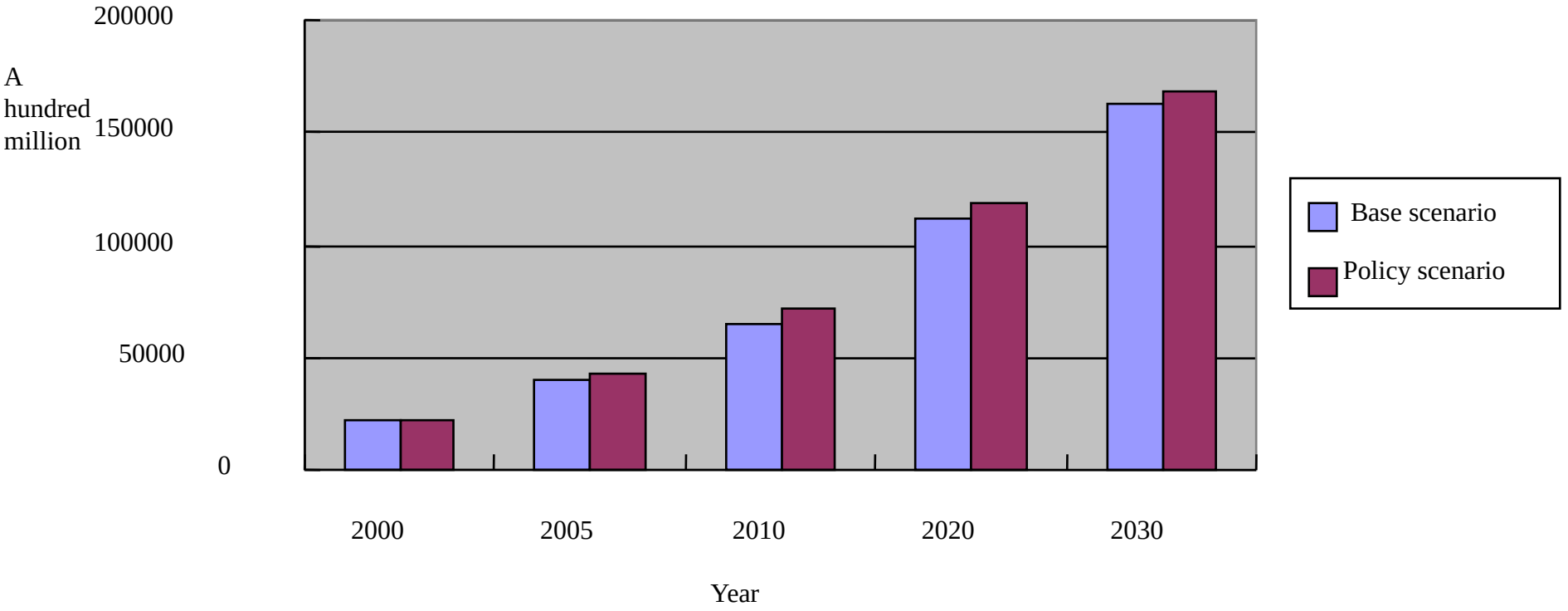
- Other countries' scenario, effort
- Regional leading scenario: technology leading, lowering cost curve
- Cost analysis: some new ideas like I/O table for Chiga
- New methodology
- Understand what happen in other Developing Countries in Asia, such as Indonesia, Cambodia etc.

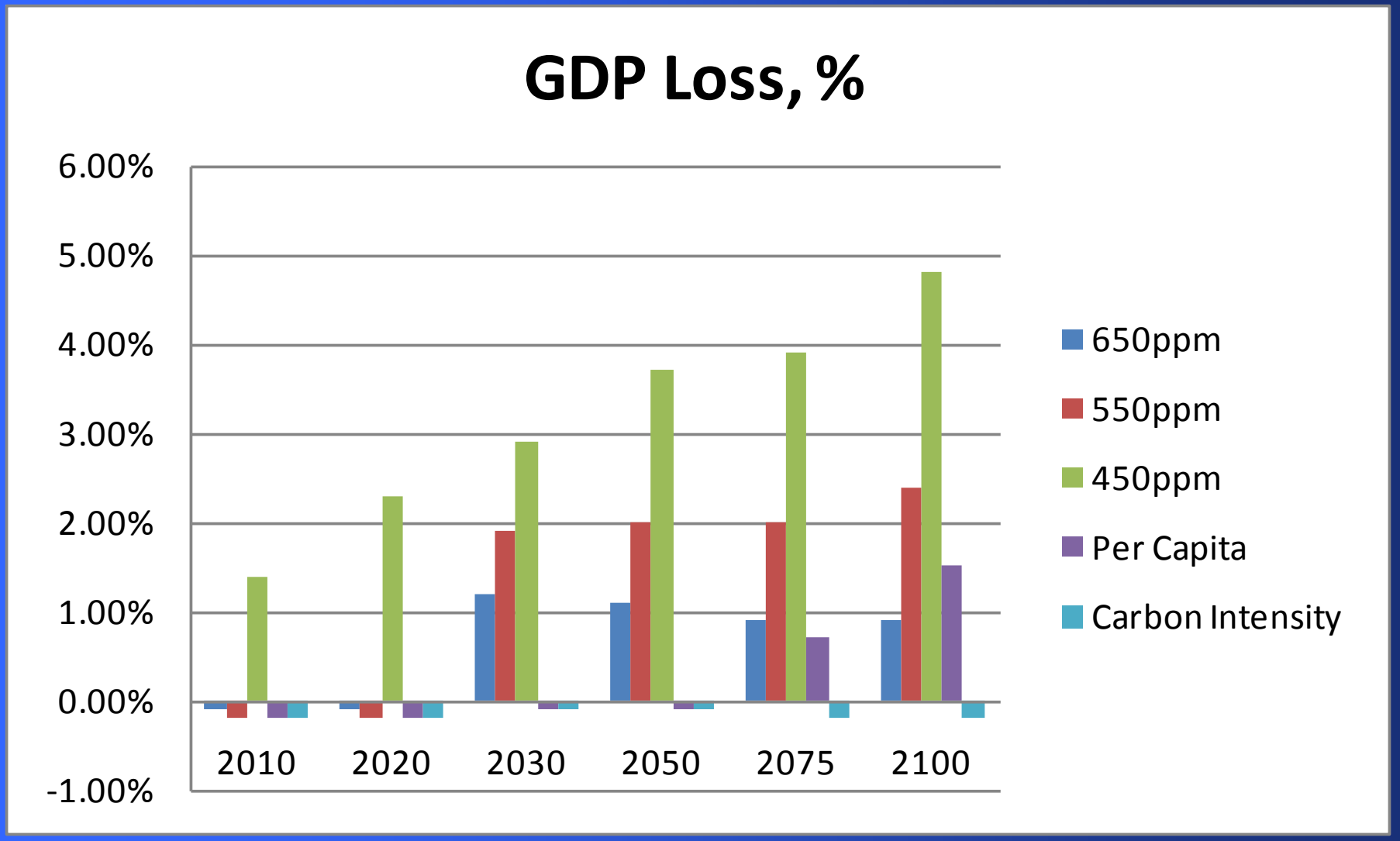
Modeling in 2010

- 2 degree scenario
- Environment target and cost-benefit analysis: significant improvement of local environment in 2020
- Policy road map: linking with 12th five year plan, and 13th Five Year Plan
- Cost analysis for deep cut in 2050
- City low carbon development study
- Asian Scenario Study
- Global scenario study
- Copenhagen+5, and +10 related studies

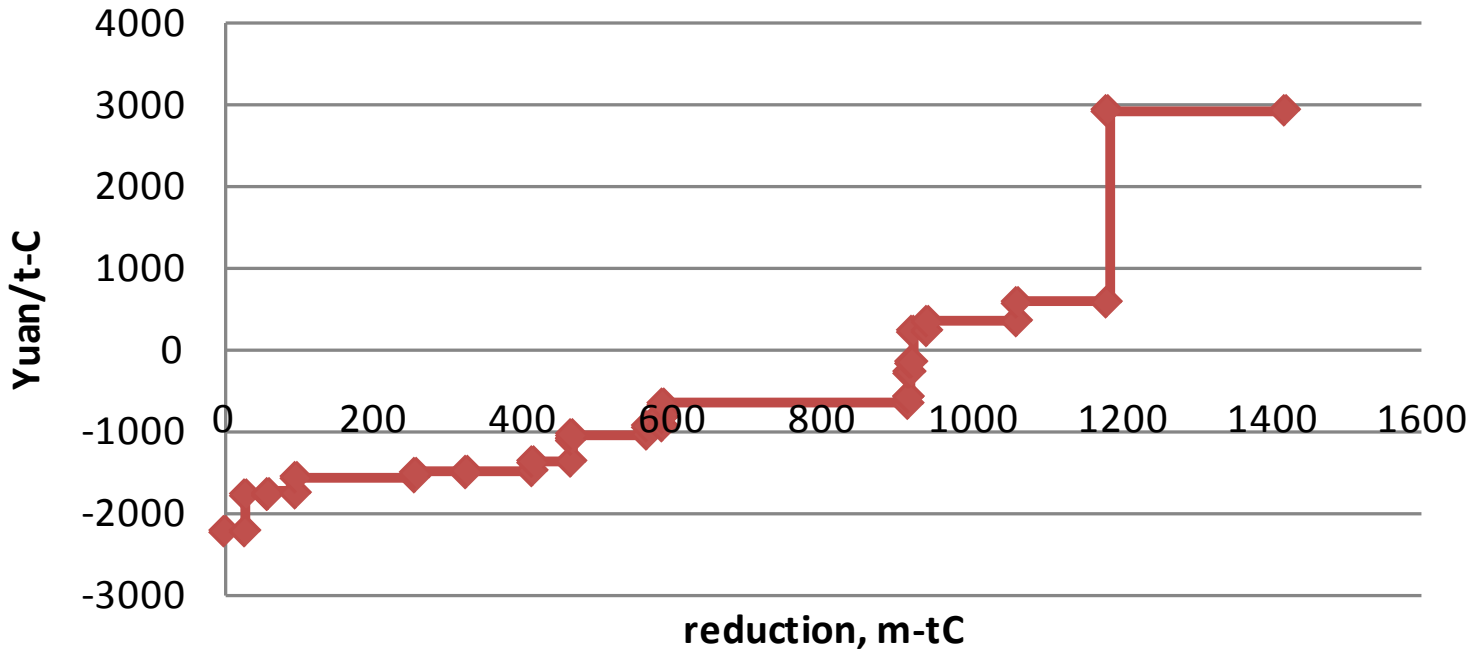

Investment Demand of Energy Industry
10000
8000
6000
4000
2000
0
A hundred million
2000
2005
2010
2020
2030
Year
Base scenario
Policy scenario

National Energy Expenses




GDP Loss, %
6.00%
5.00%
4.00%
3.00%
2.00%
1.00%
0.00%
-1.00%
2010
2020
2030
2050
2075
2100
650ppm
550ppm
450ppm
Per Capita
Carbon Intensity

Cost curve in power generation in China, 2050




bjhev.com


MICHELIN
BYD
F3DM


BLUEBIRD


杰勋