

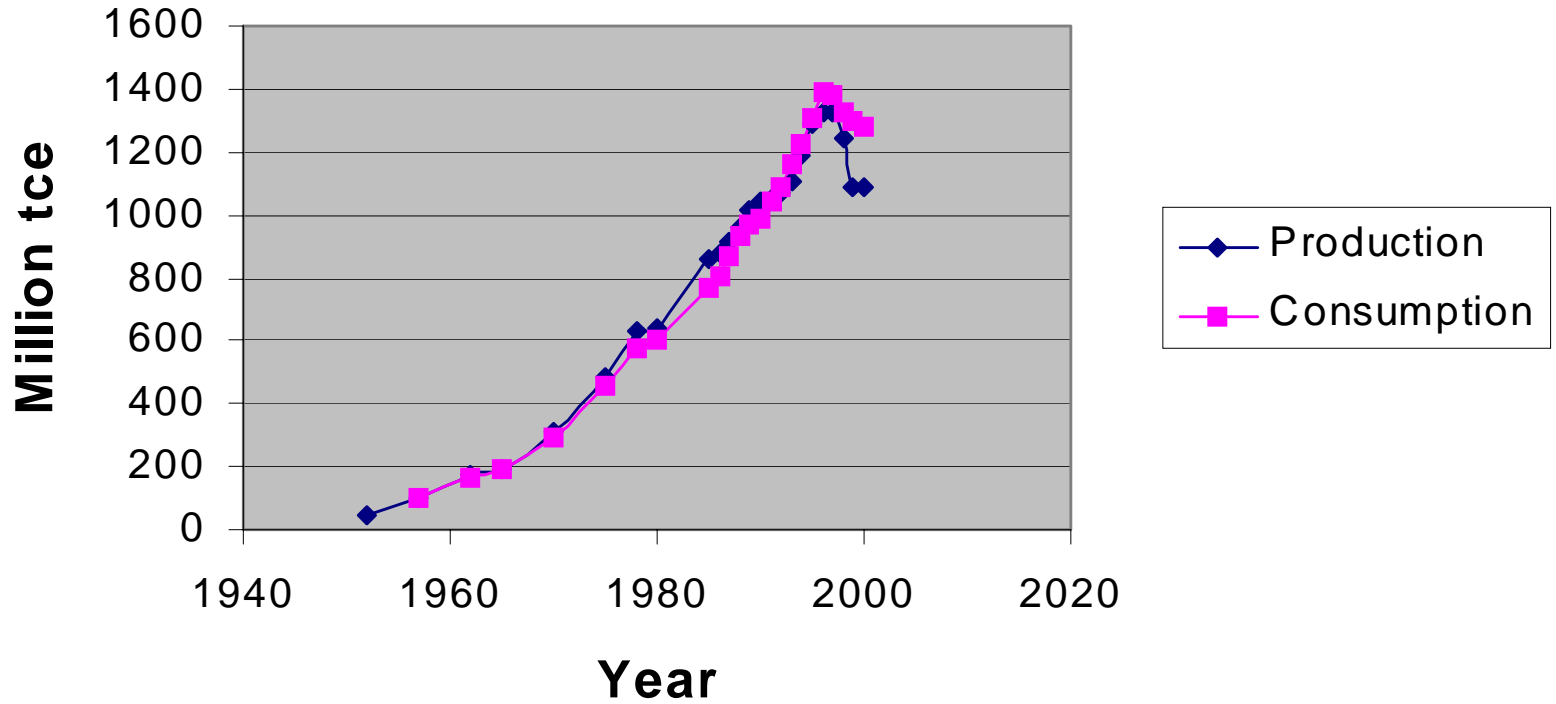
How to model the future scenario for China with a Dynamic Economy

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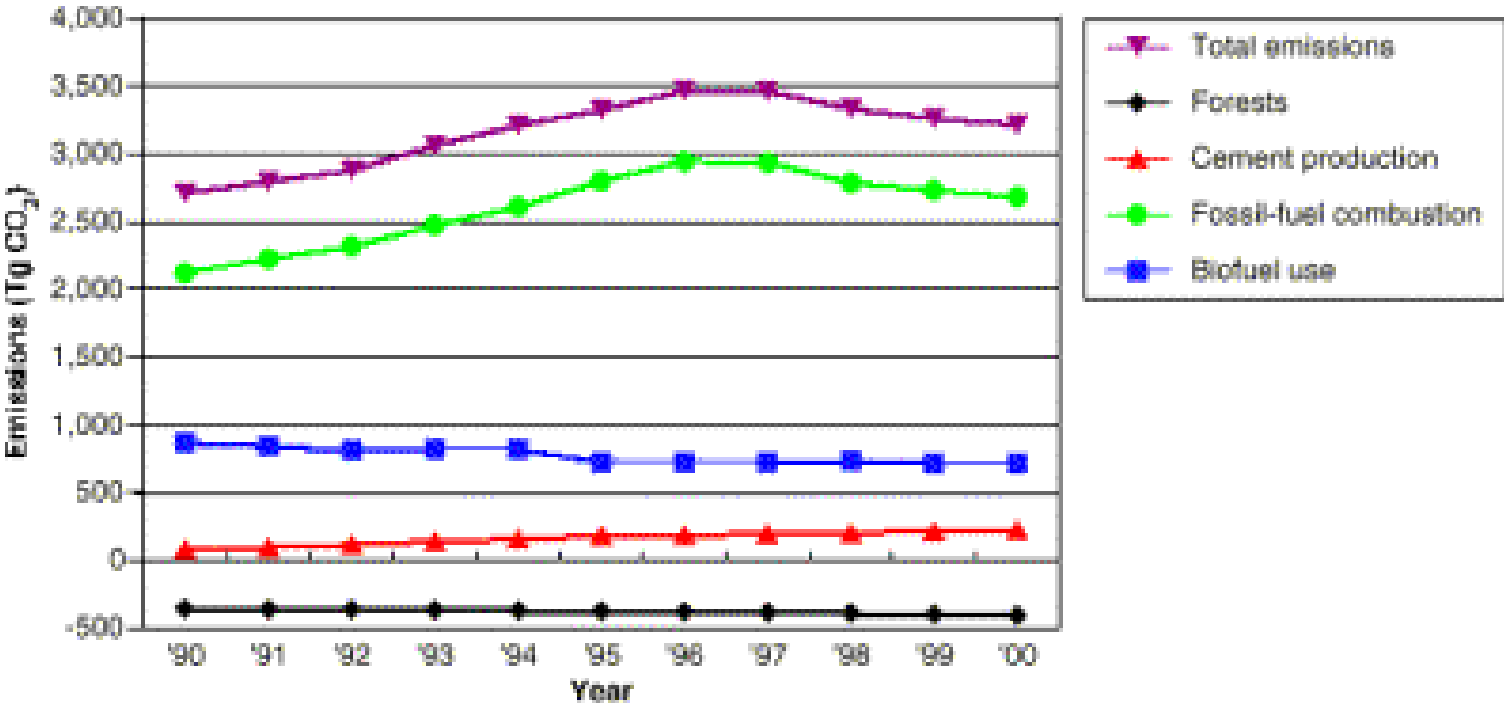
Energy Research Institute, China

**Workshop on GHG Stabilization Scenarios
Tsukuba, Japan on January 22-23, 2004**

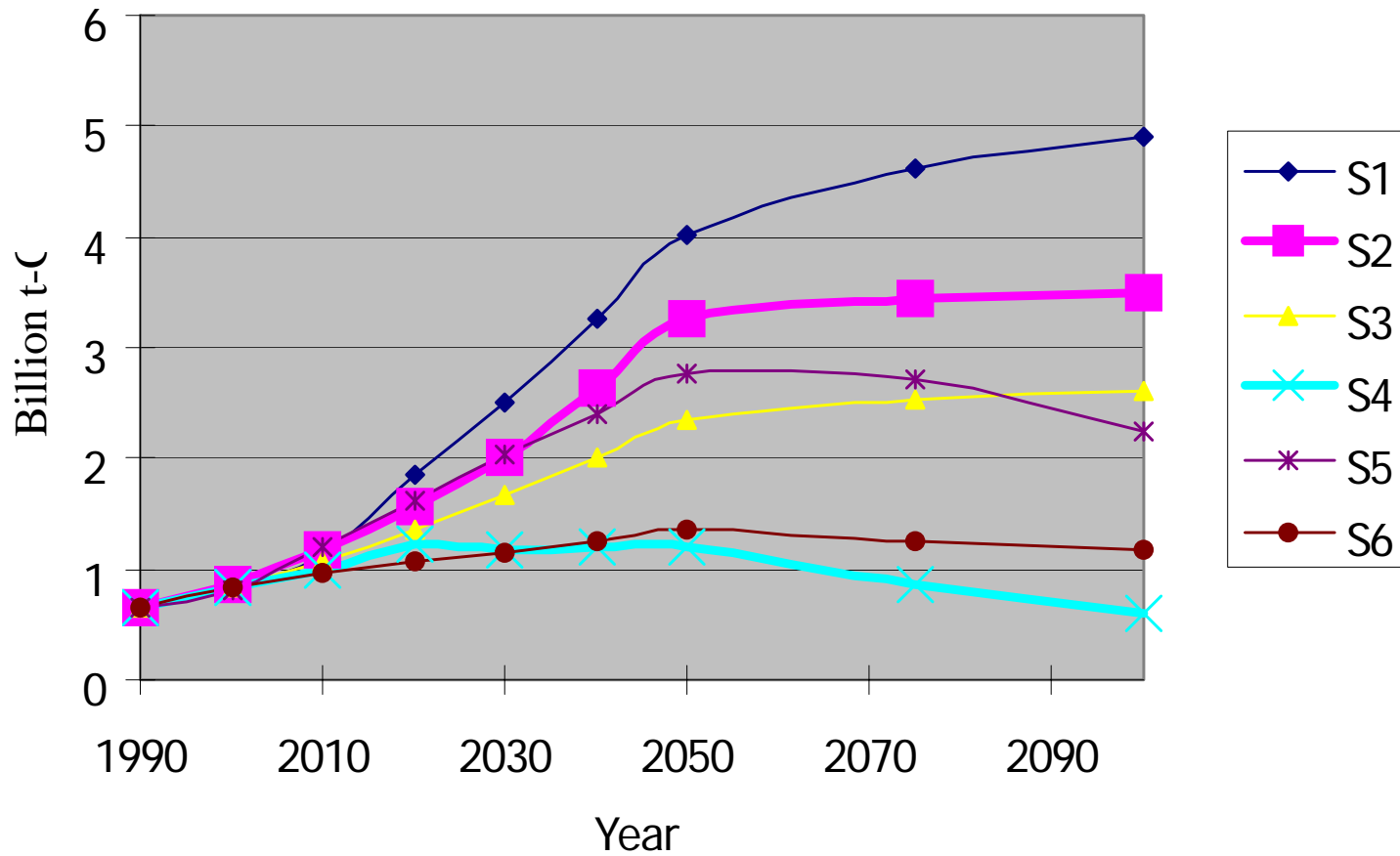
Energy Production and Consumption in China



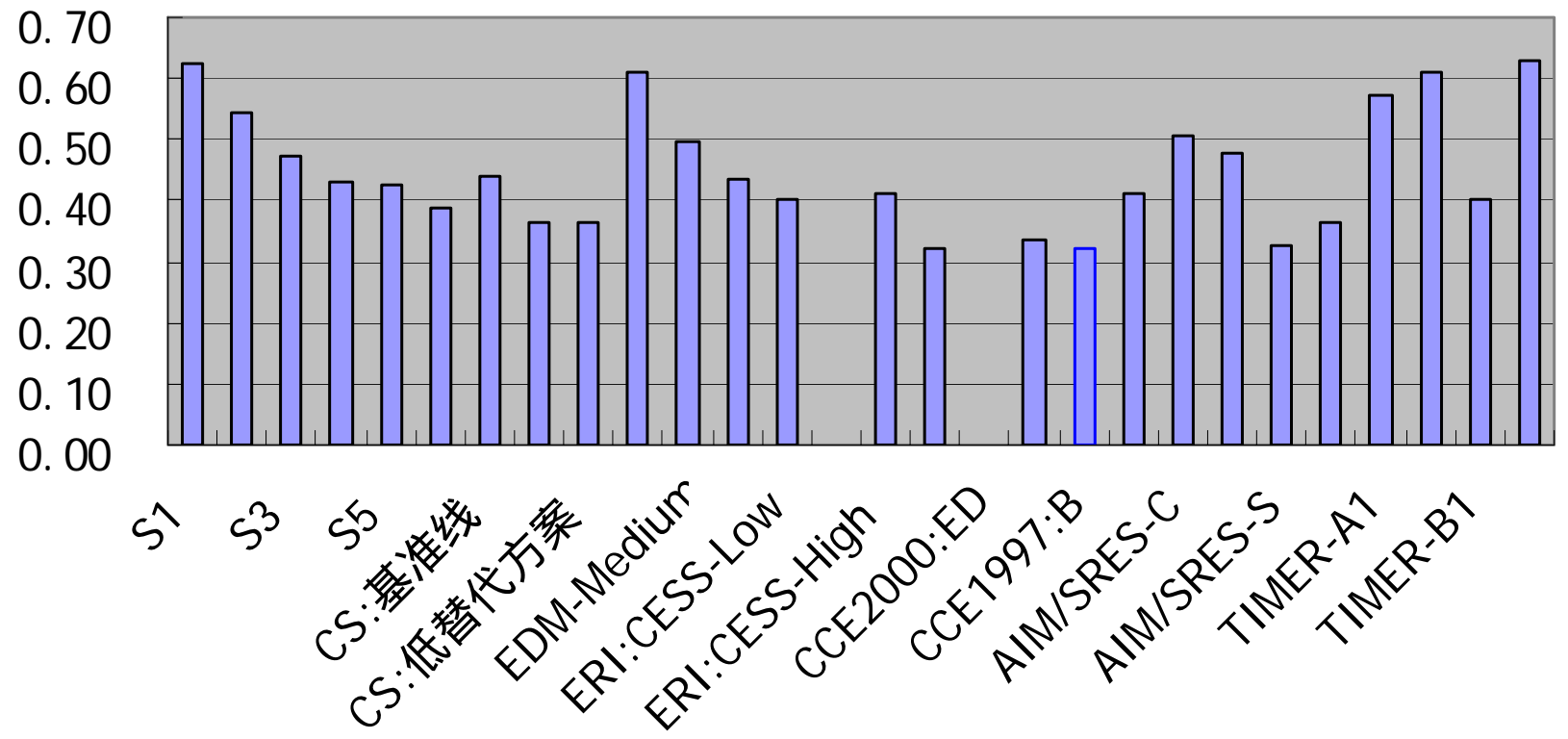
CO2 emission in China



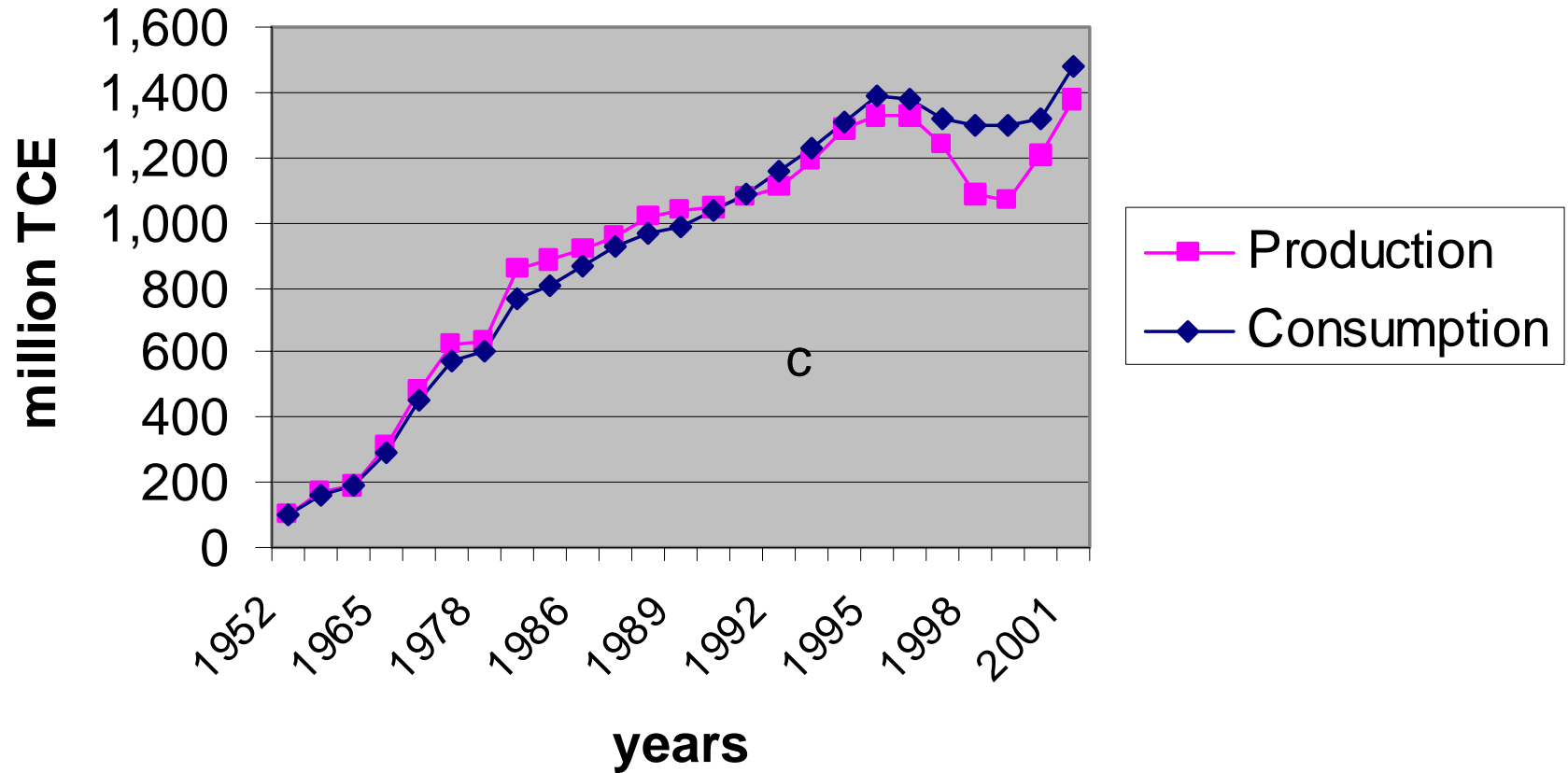
CO2 Emission in China



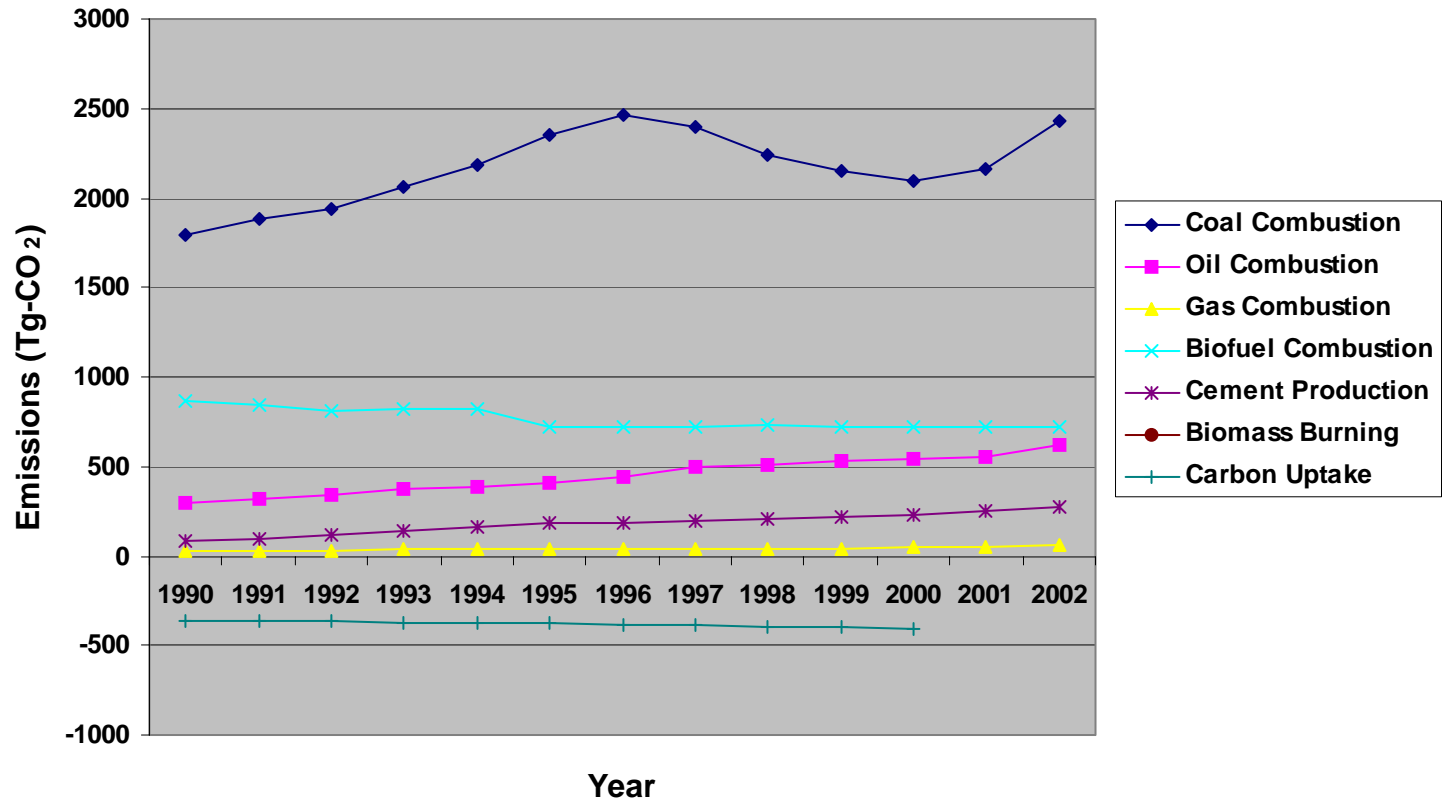
Primary Energy Elasticity



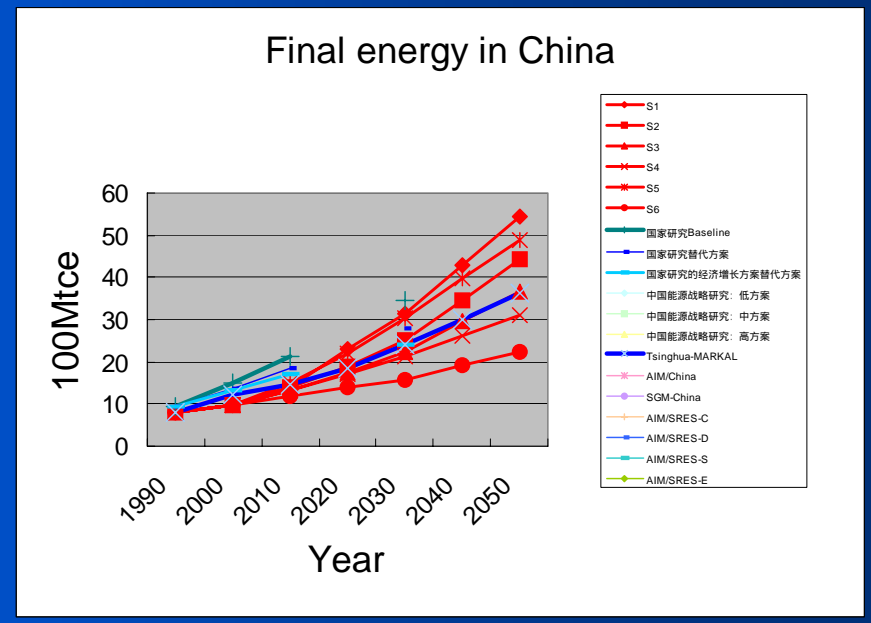
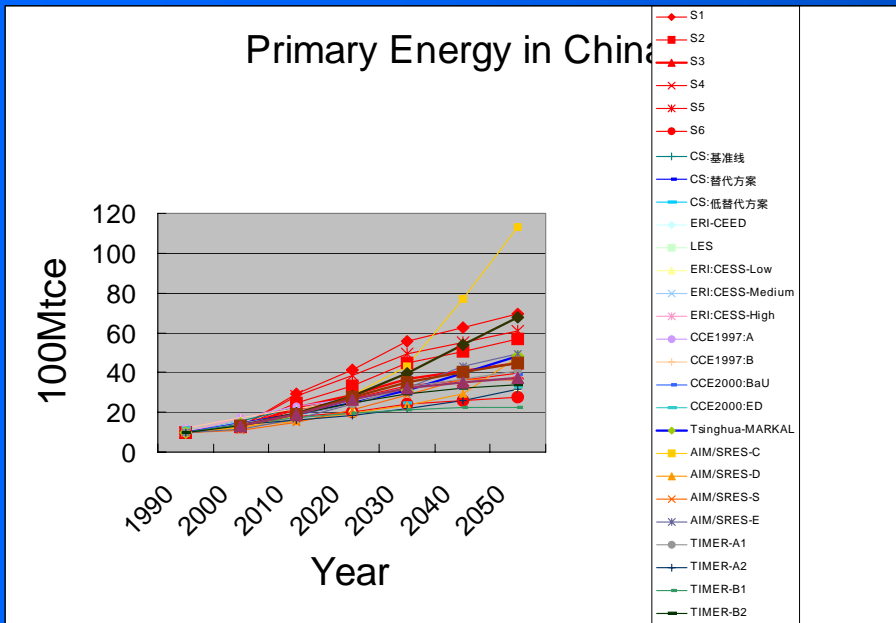
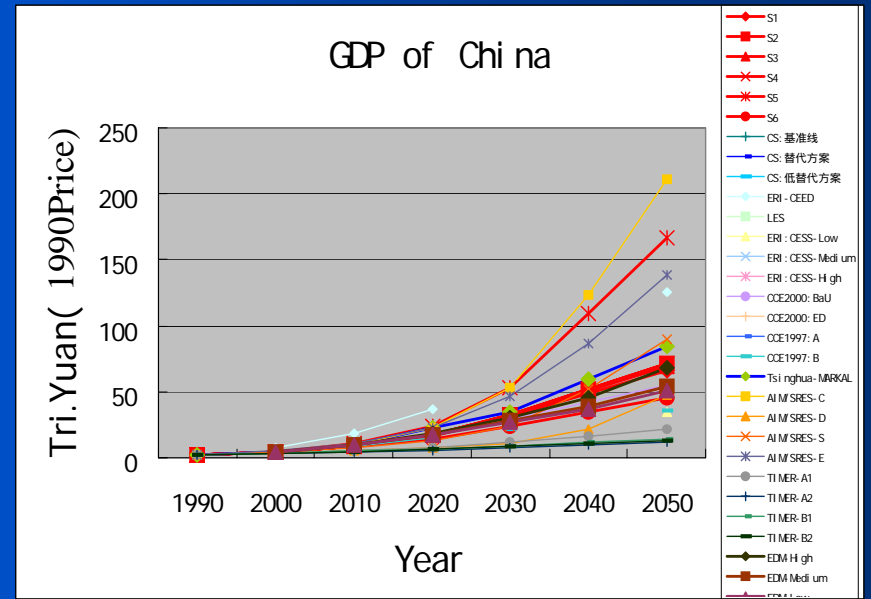
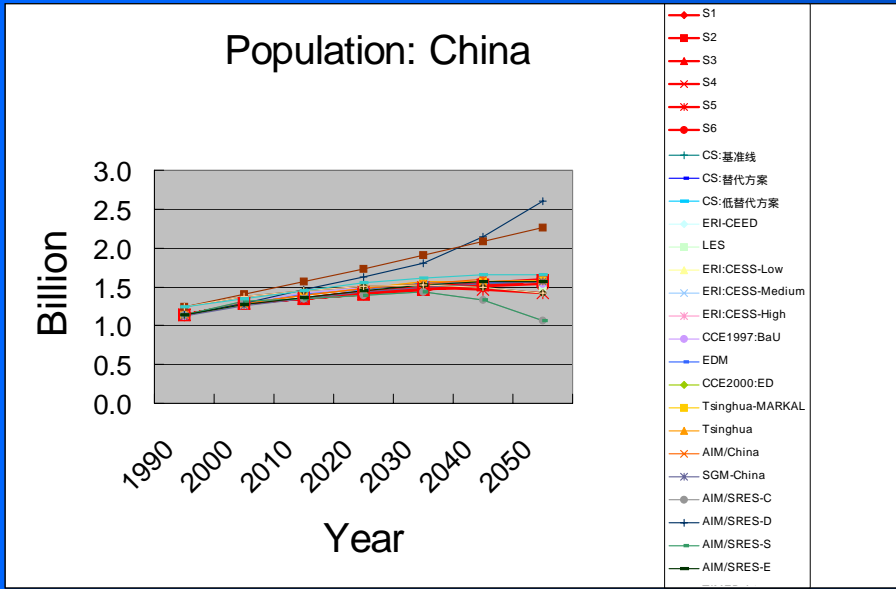
Energy Production and Consumption in China



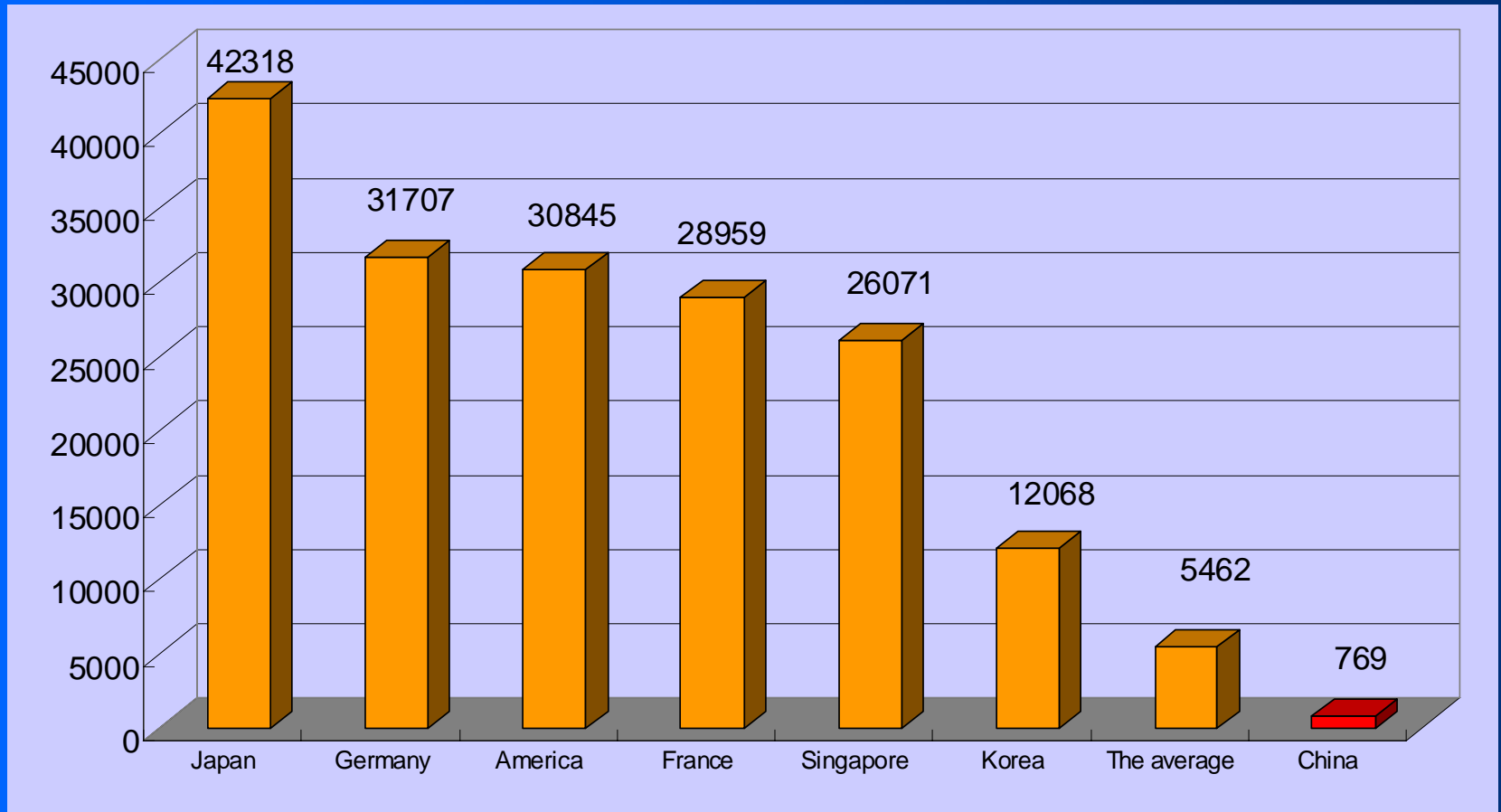
CO₂ Emission Trends in China



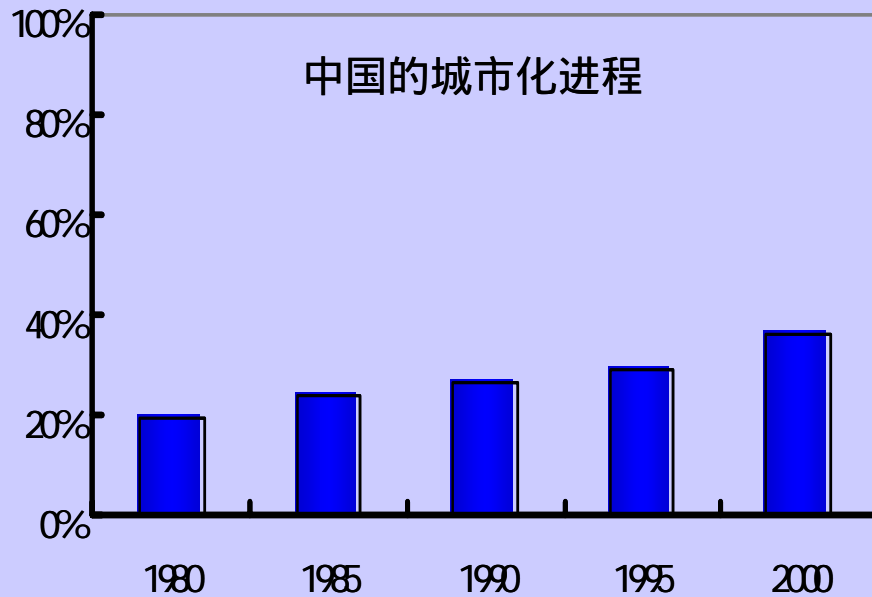
IPAC-Emission



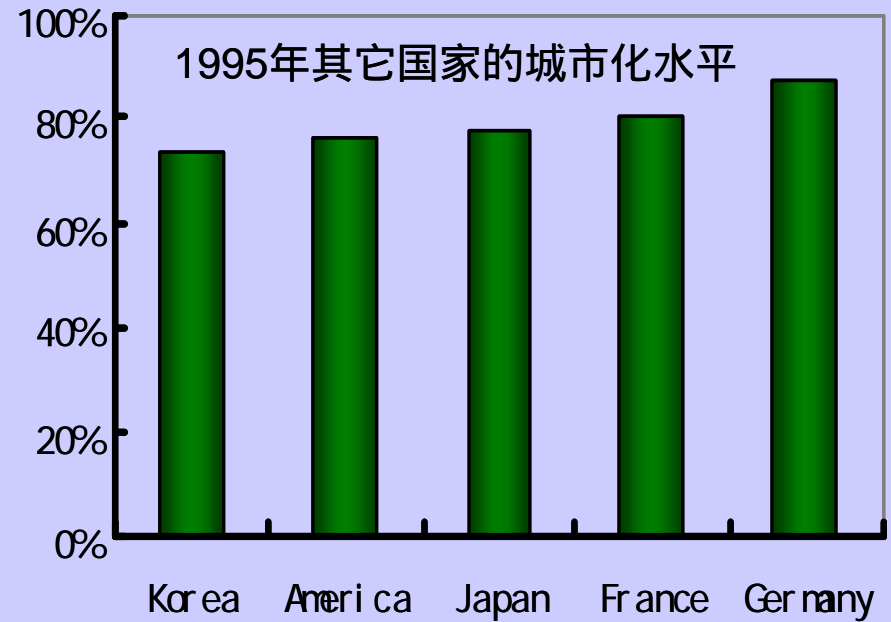
GDP Per Capita



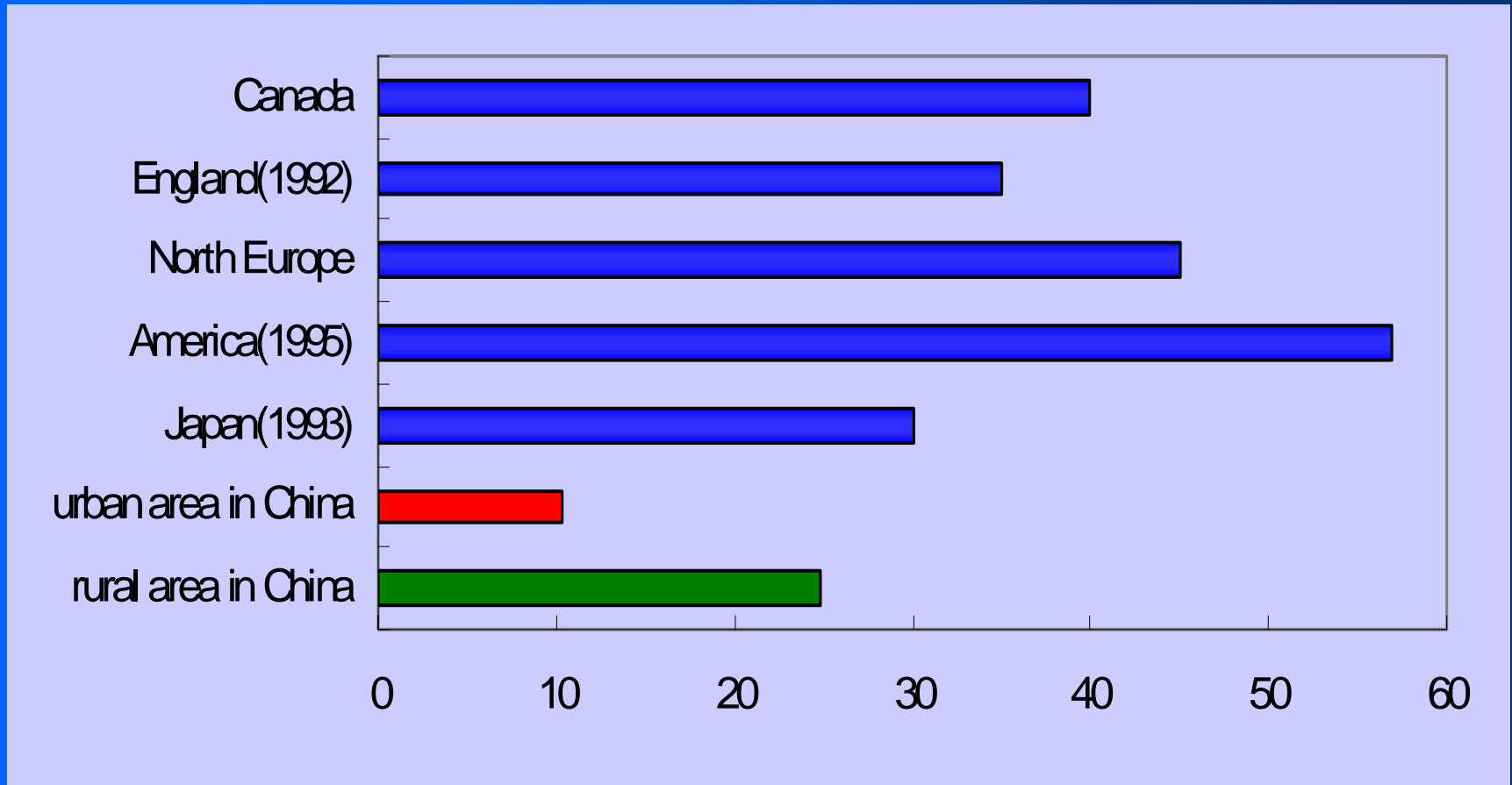
The urbanization course in China



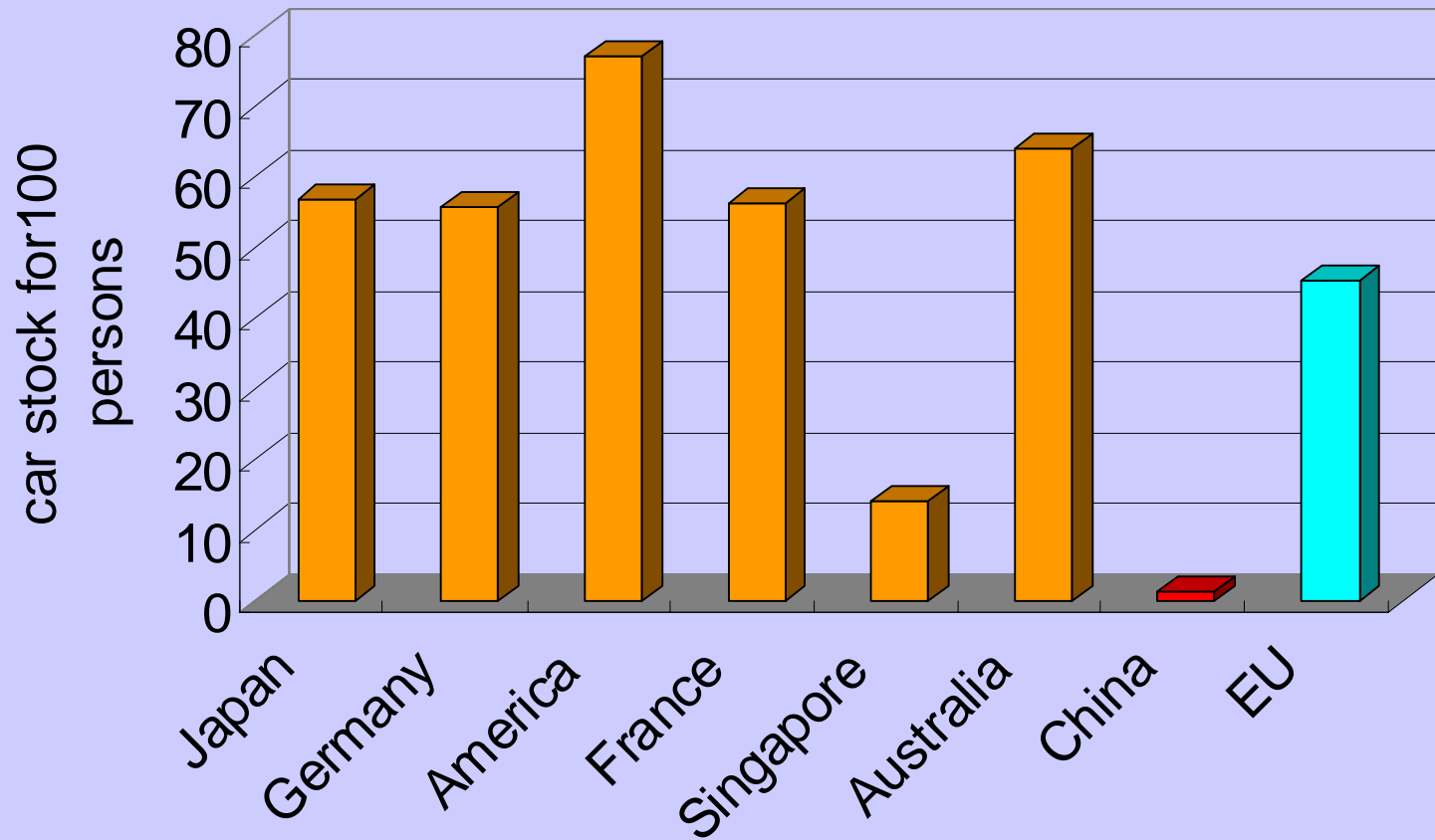
The urbanization level of other countries in 1995



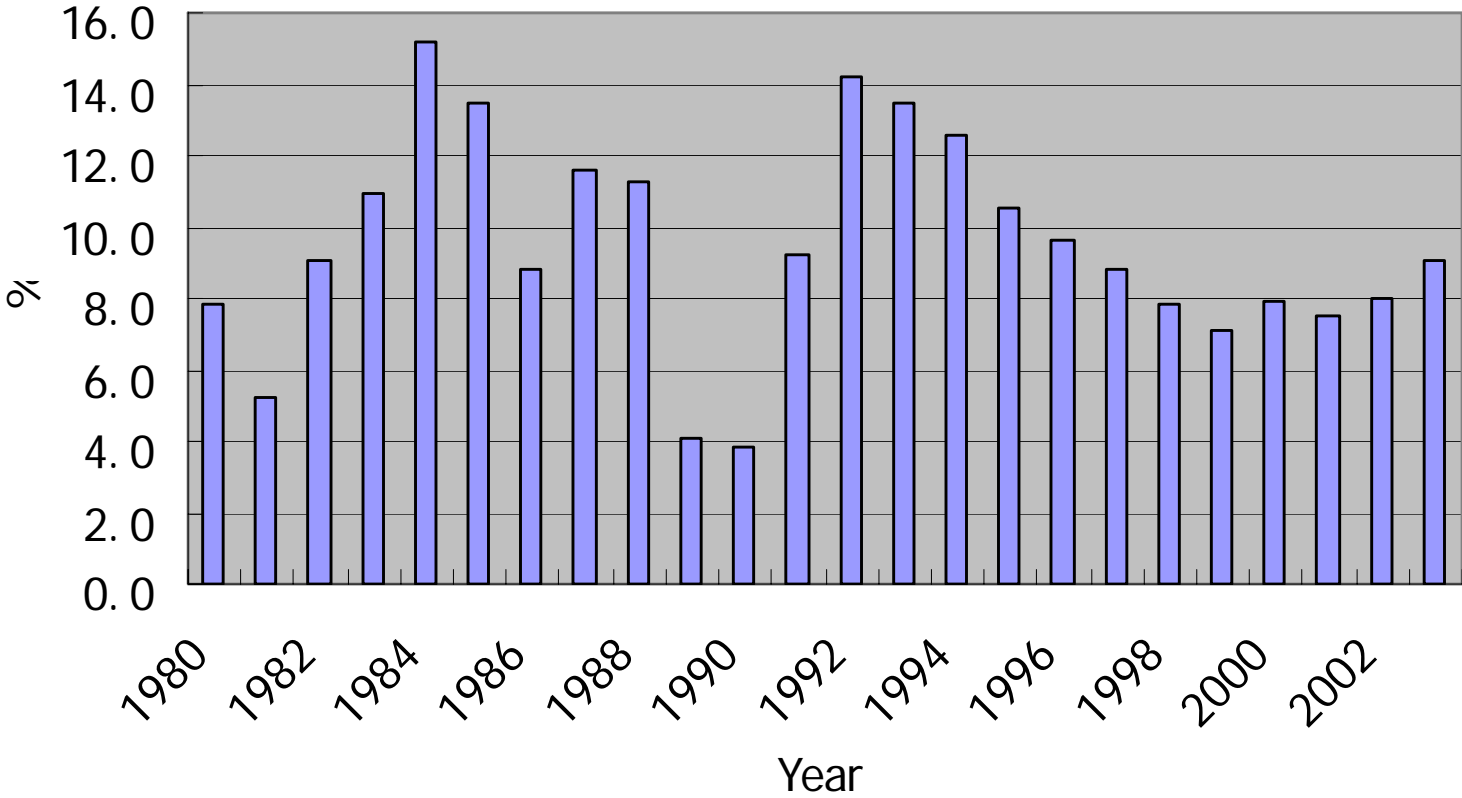
Average living area per capita, m²



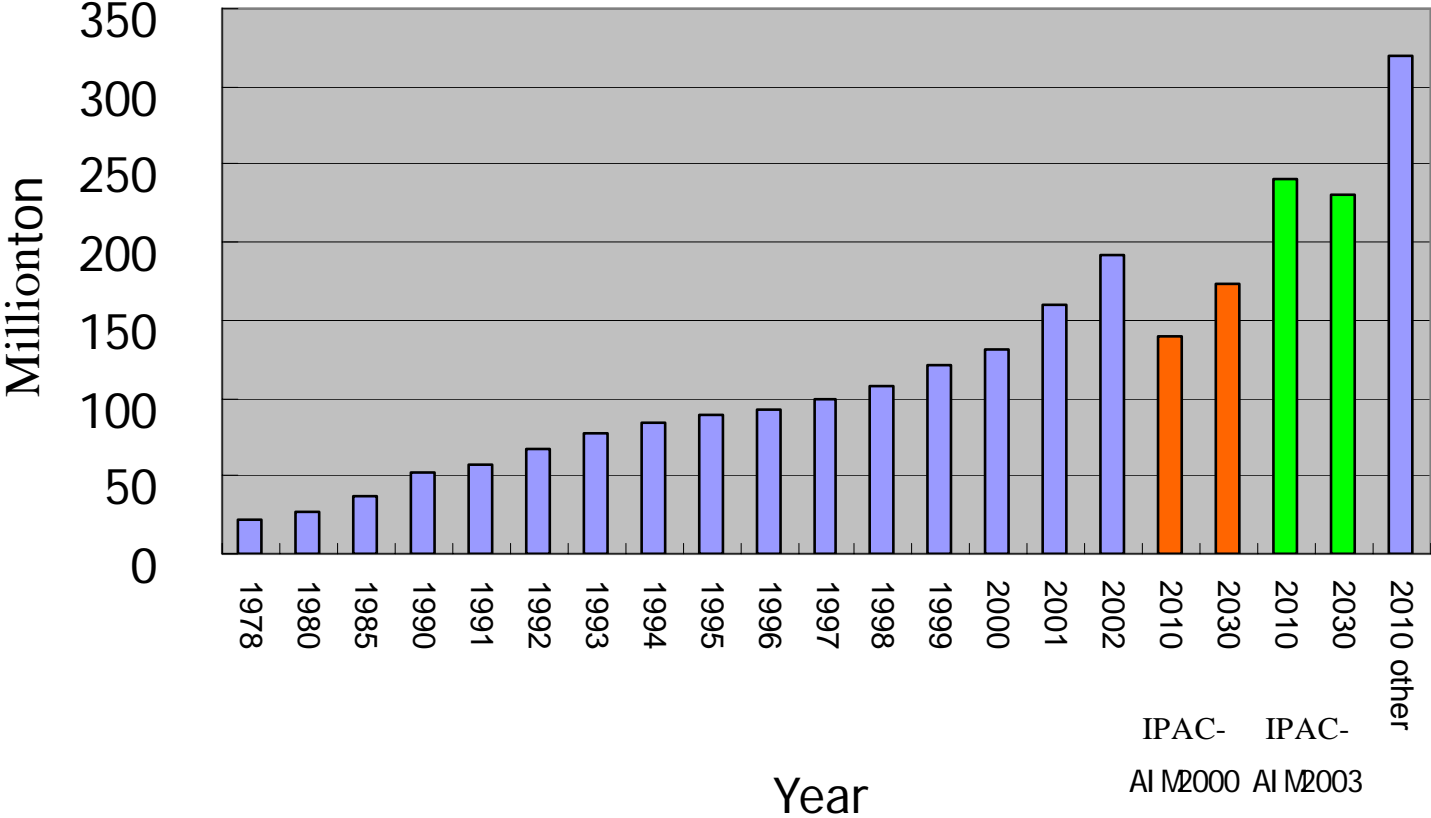
Car Ownership



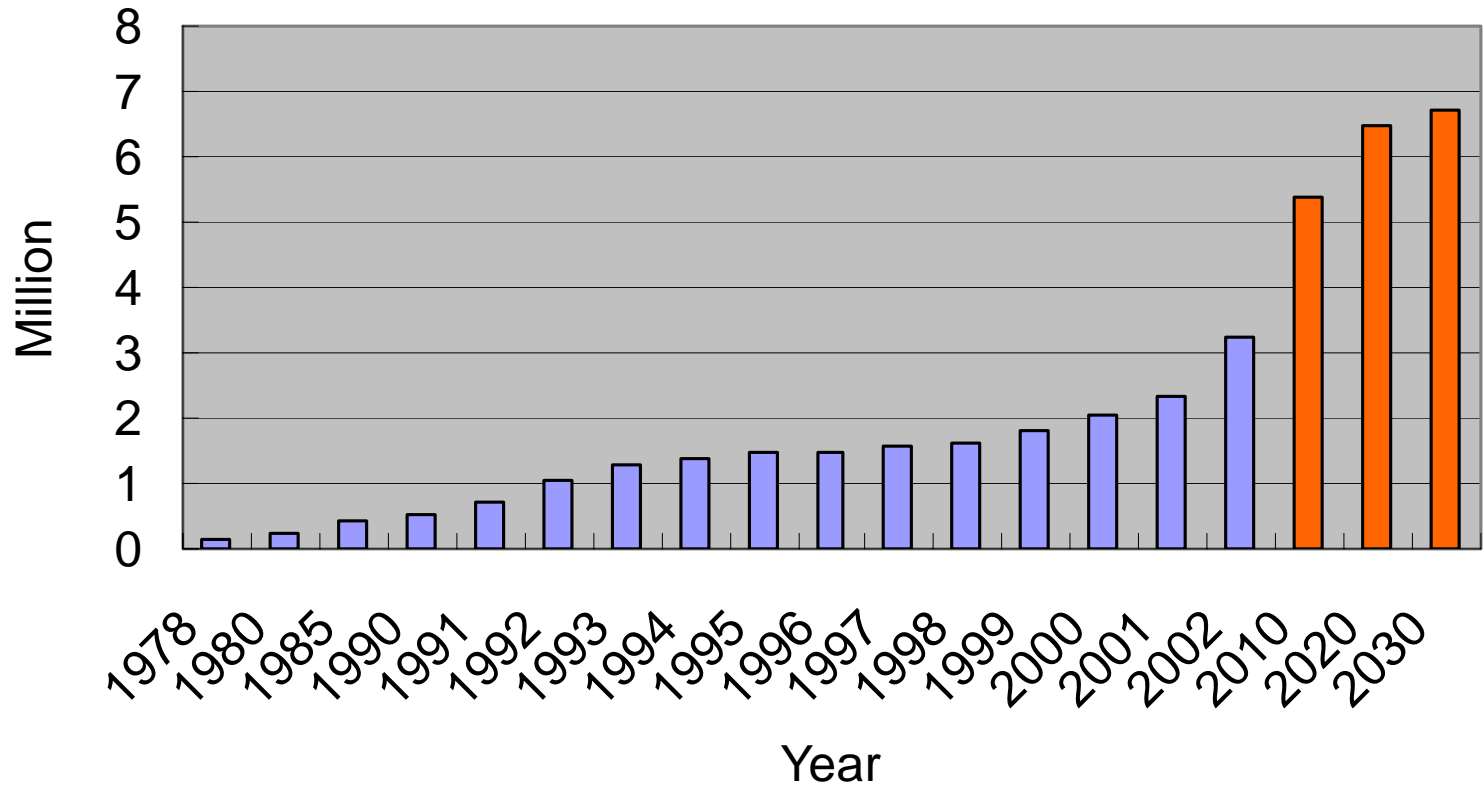
GDP Growth Rate in China



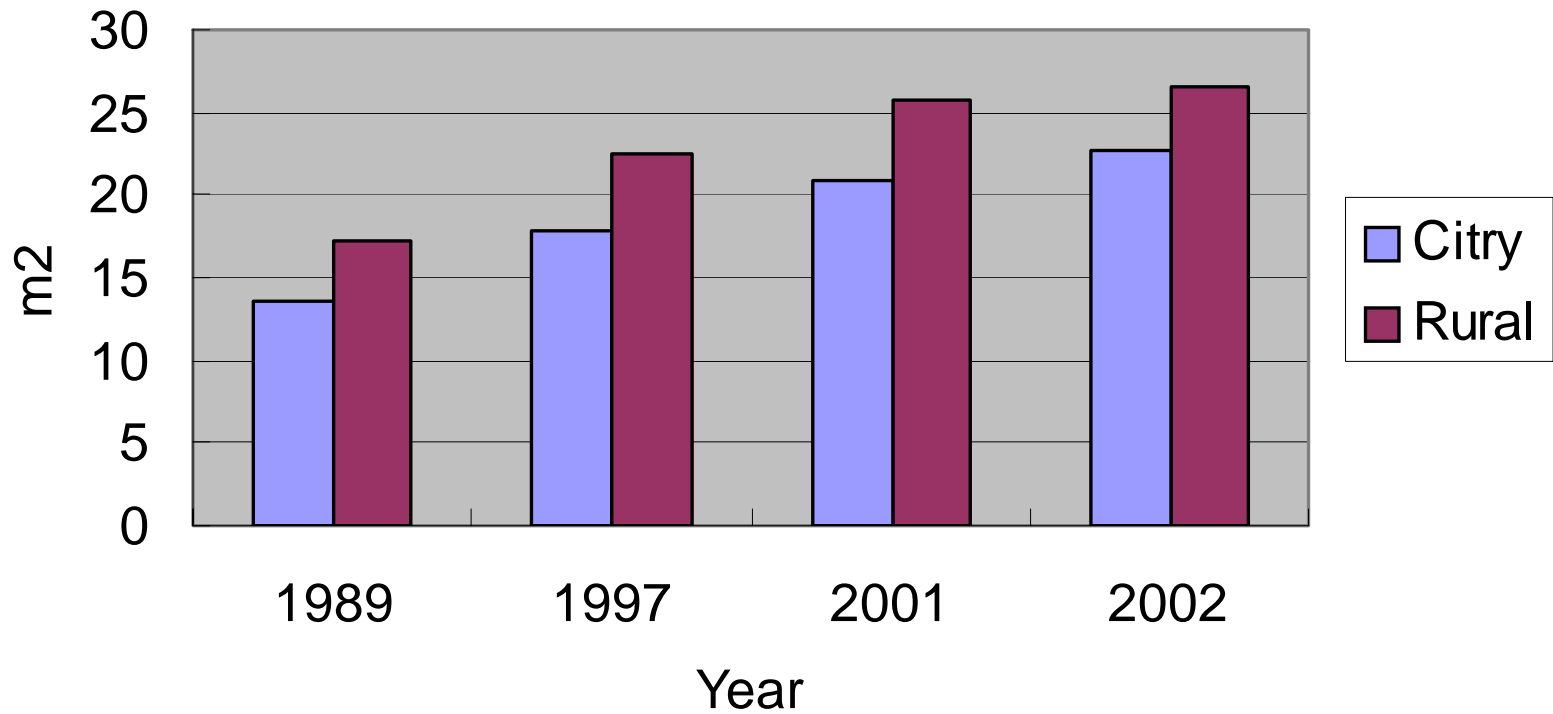
Steel output in China



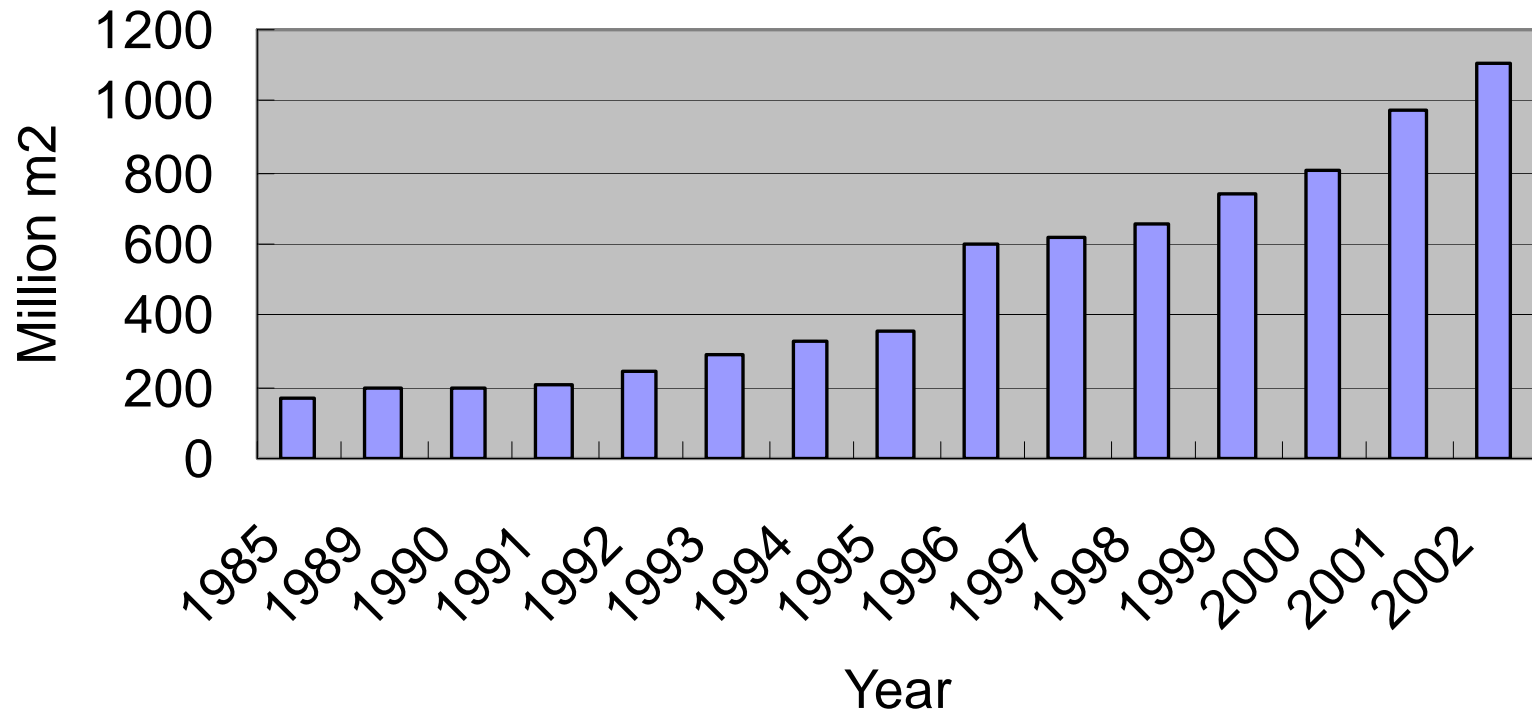
Motor Vehicles Output in China



Per Capita Residence Floor Space



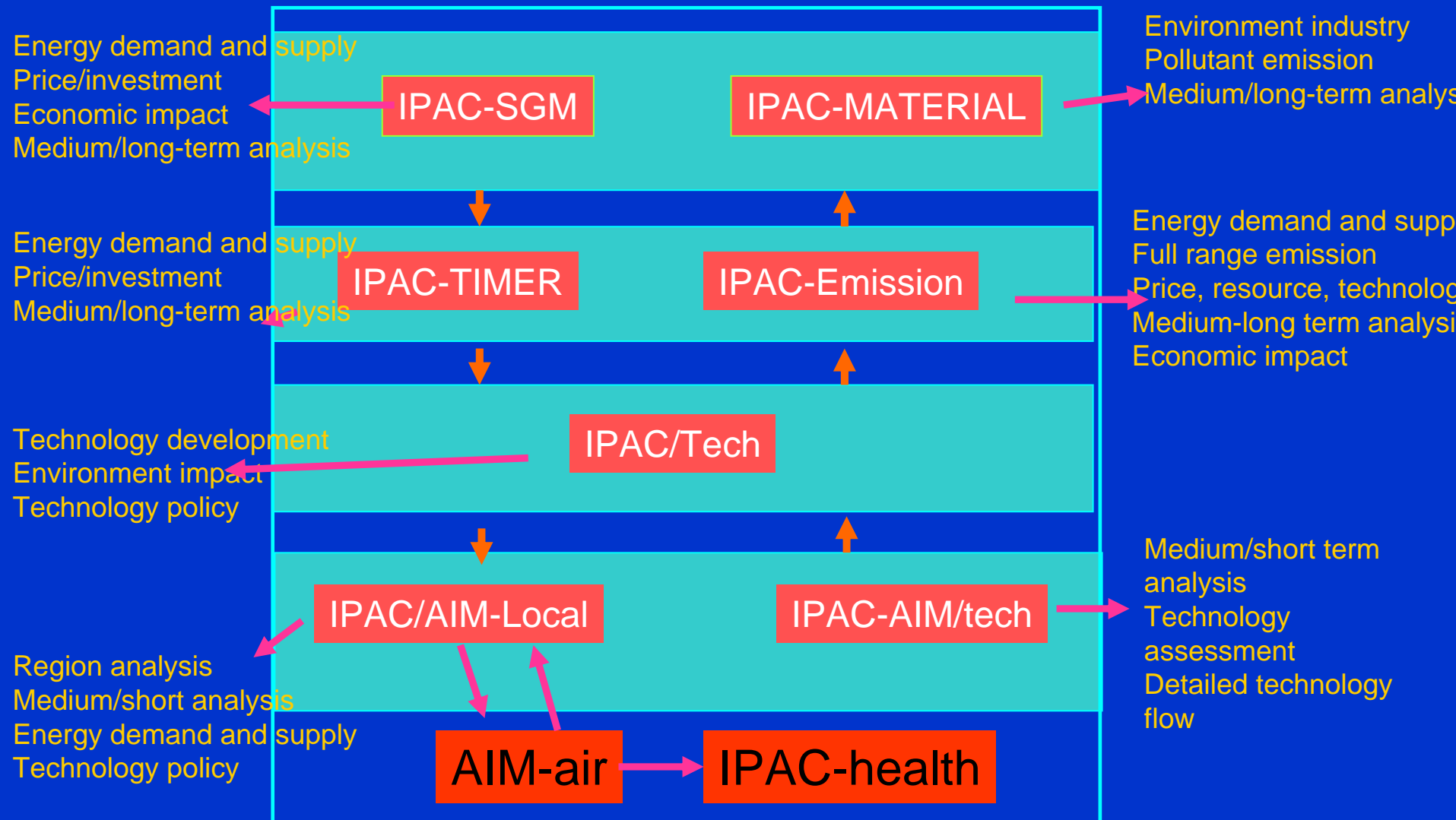
Space Floor Completed



Economy Target of China in 2020

- Government Target: Overall wealthy society
 - On the basis of economy structure optimal and increasing profit, GDP will be four time in 2020 comparing with that in 2000 , realize fundamental industrialization” ;
 - Take a new way for industry development ;
 - “continually increase ability for sustainable development” ;

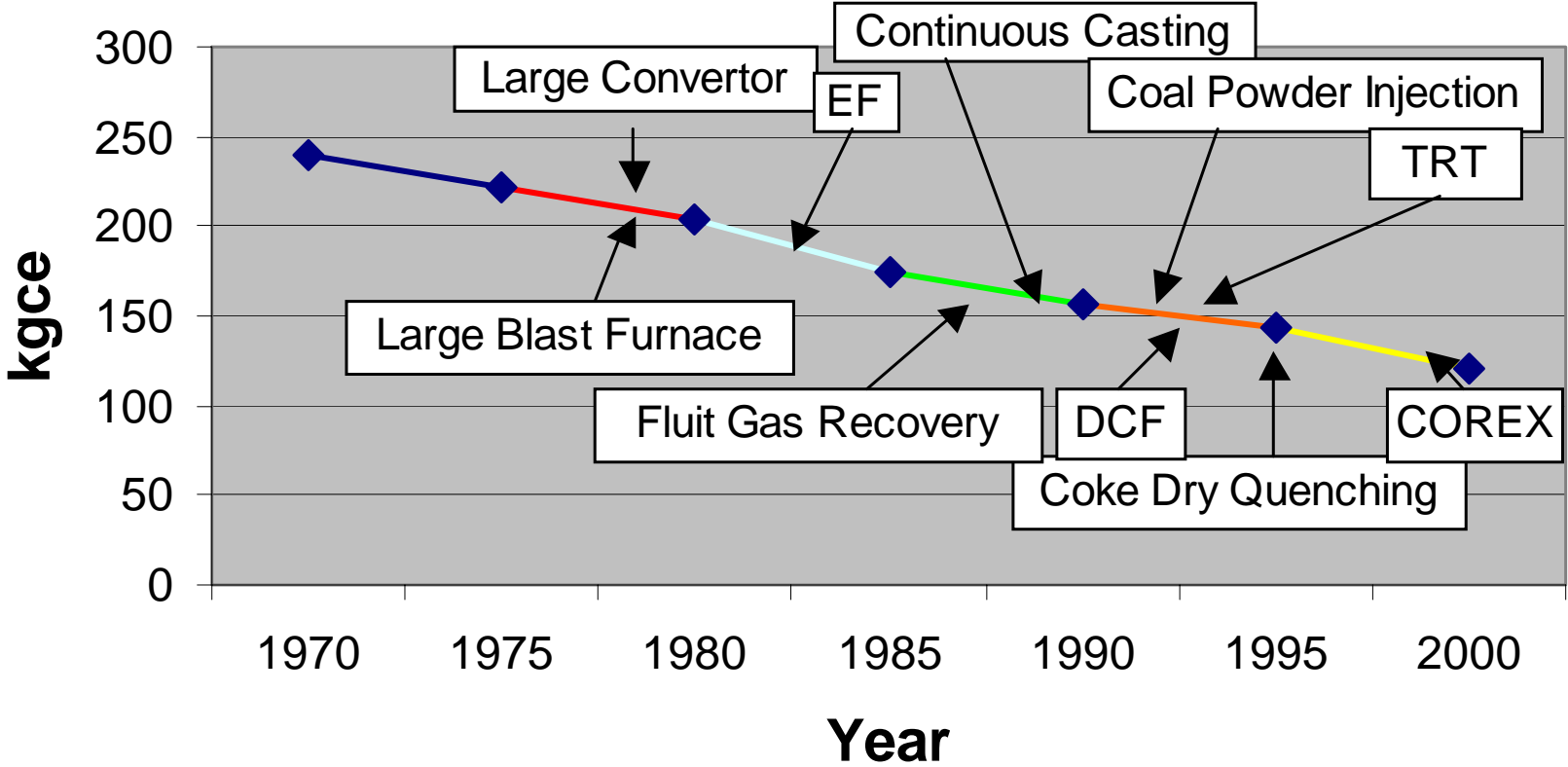
Framework of IPAC



Co-benefit to Consistency: climate and development

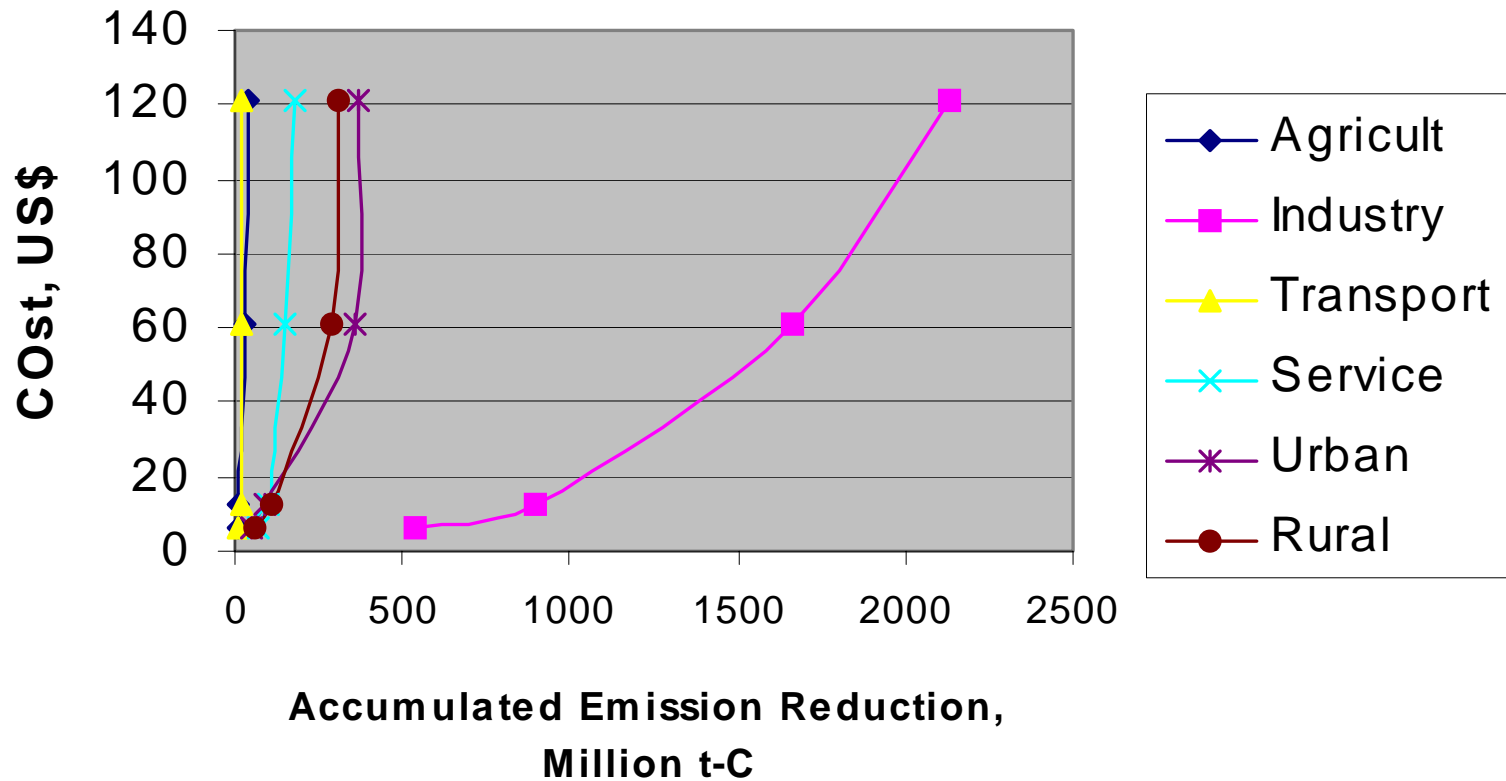
- ◆ **Identify domestic development plan**
- ◆ **Domestic energy/land use policies**
- ◆ **Looking for consistency**
- ◆ **Help developing countries for their own purpose based on the consistency**

Unit Energy Use in Steel Making Industry

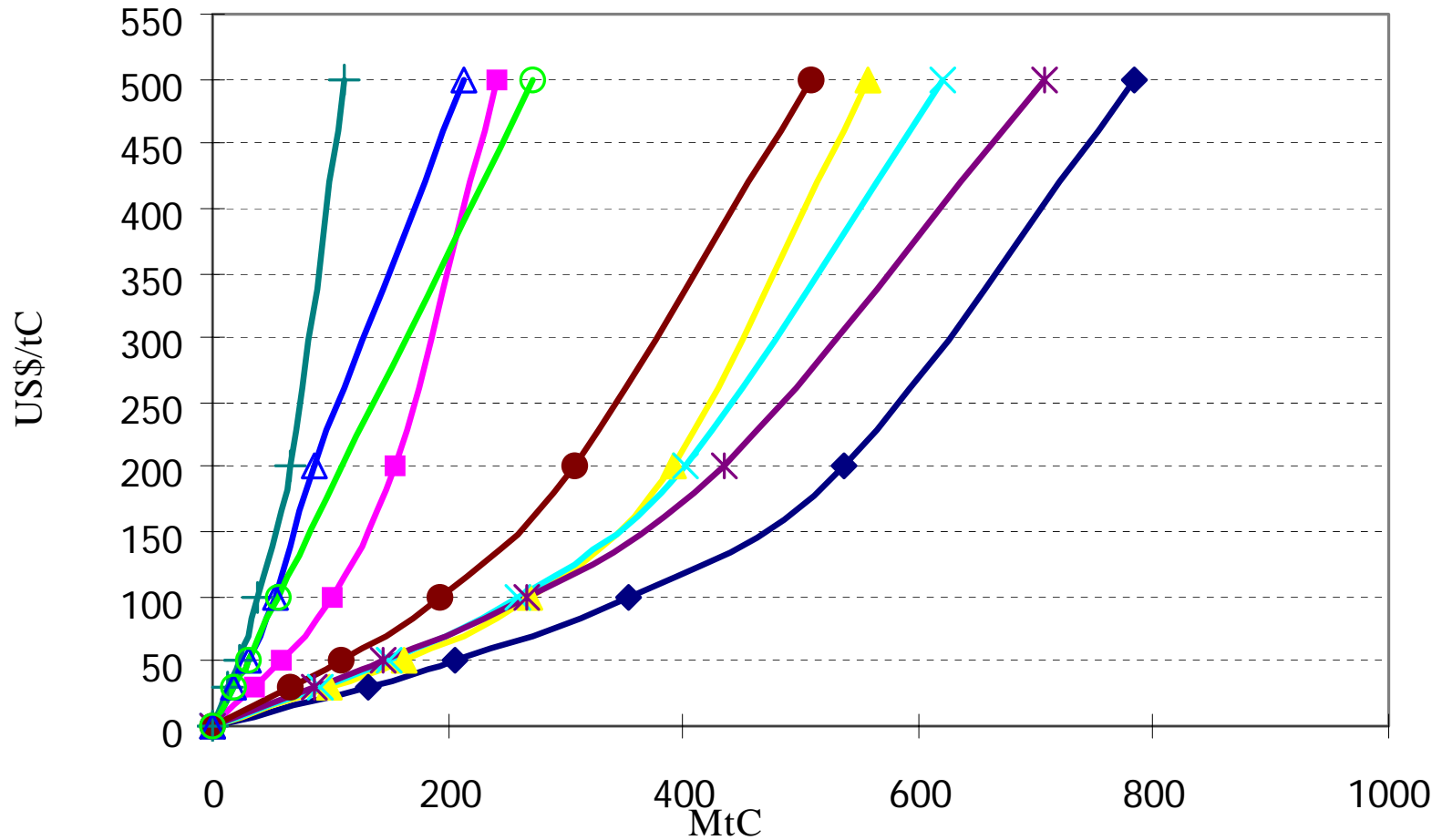


IPAC-AIM/Technology:

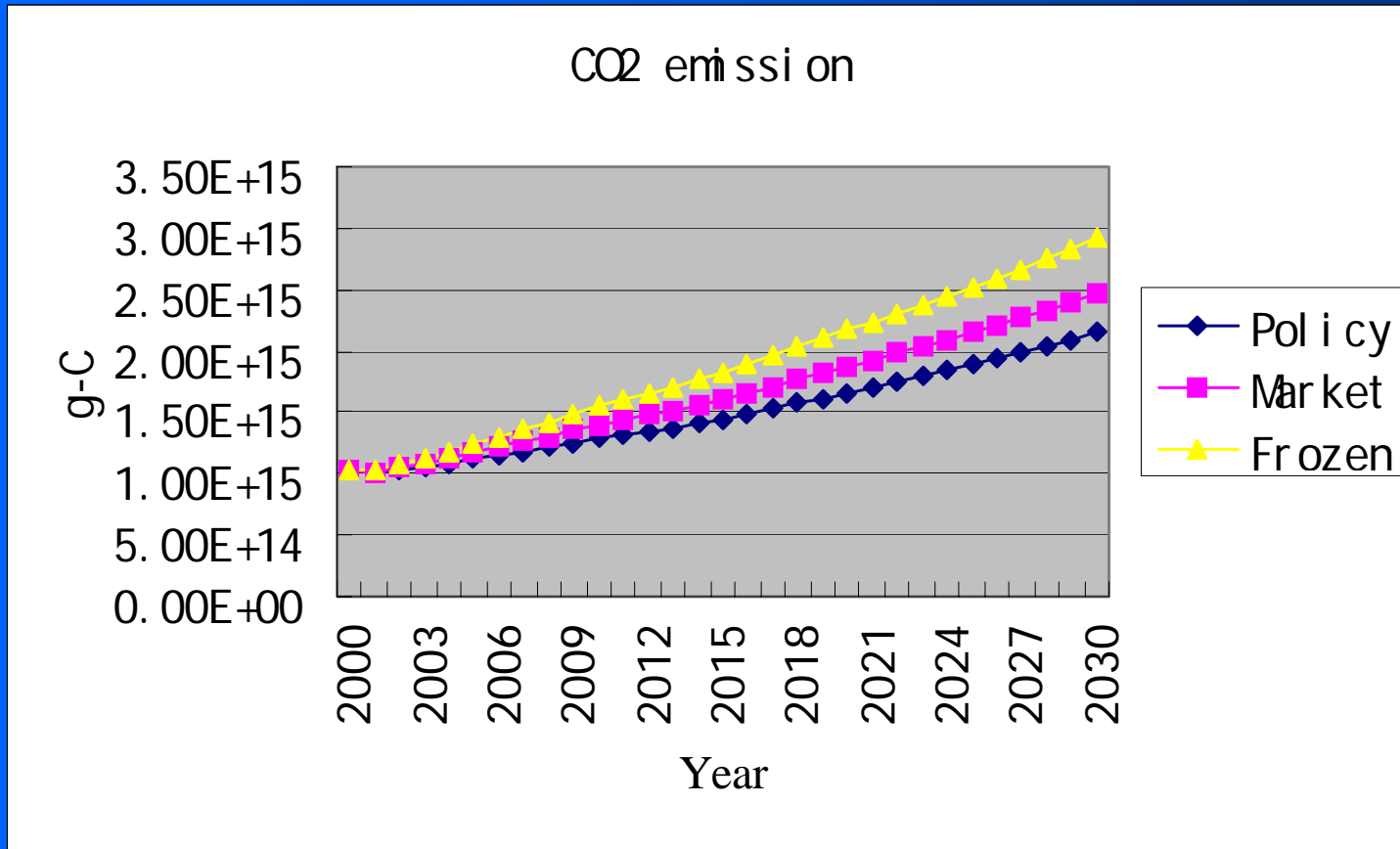
CO2 Emission Reduction Cost



Marginal Abatement Cost: IPAC-Emission model



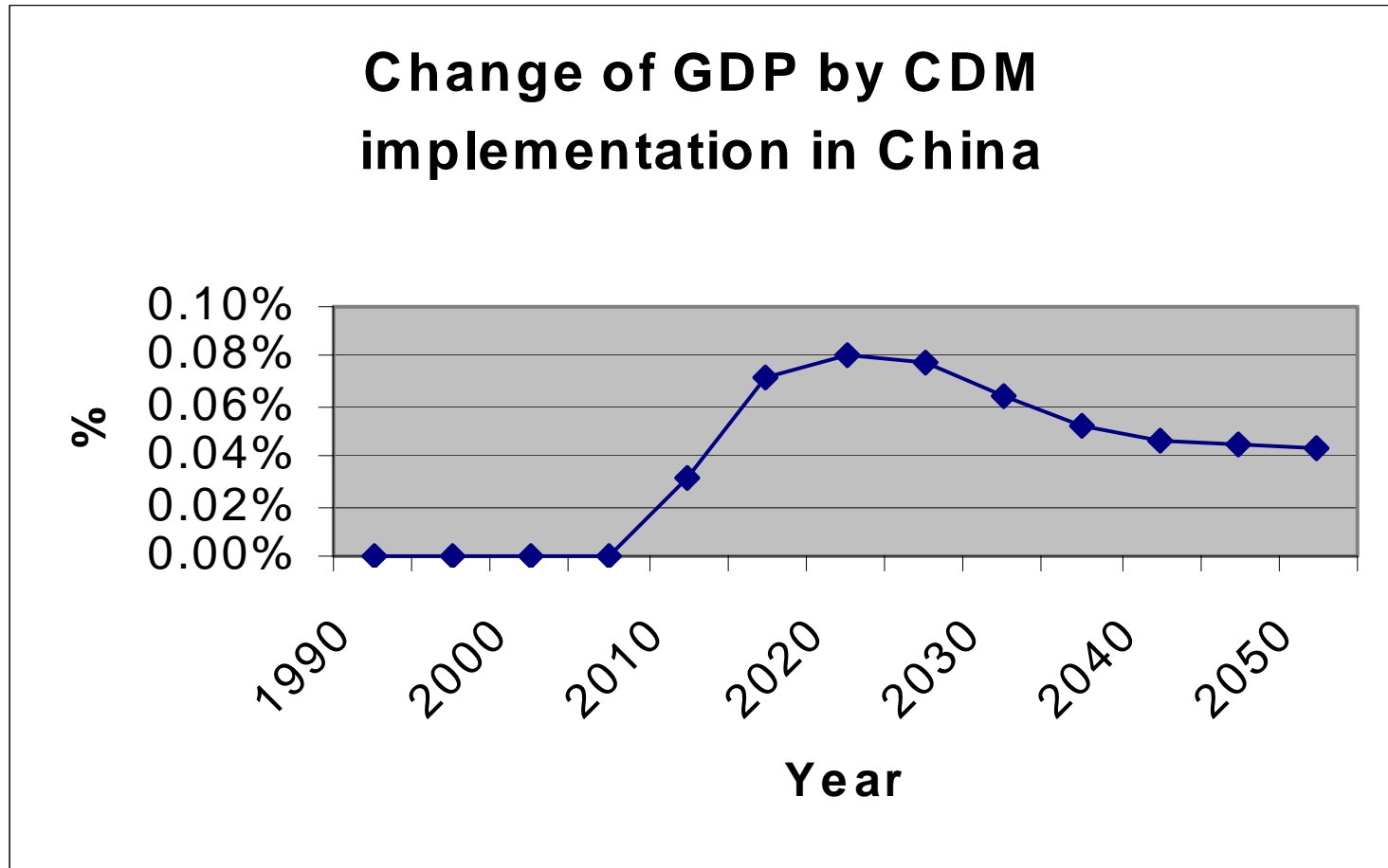
AIM/Technology



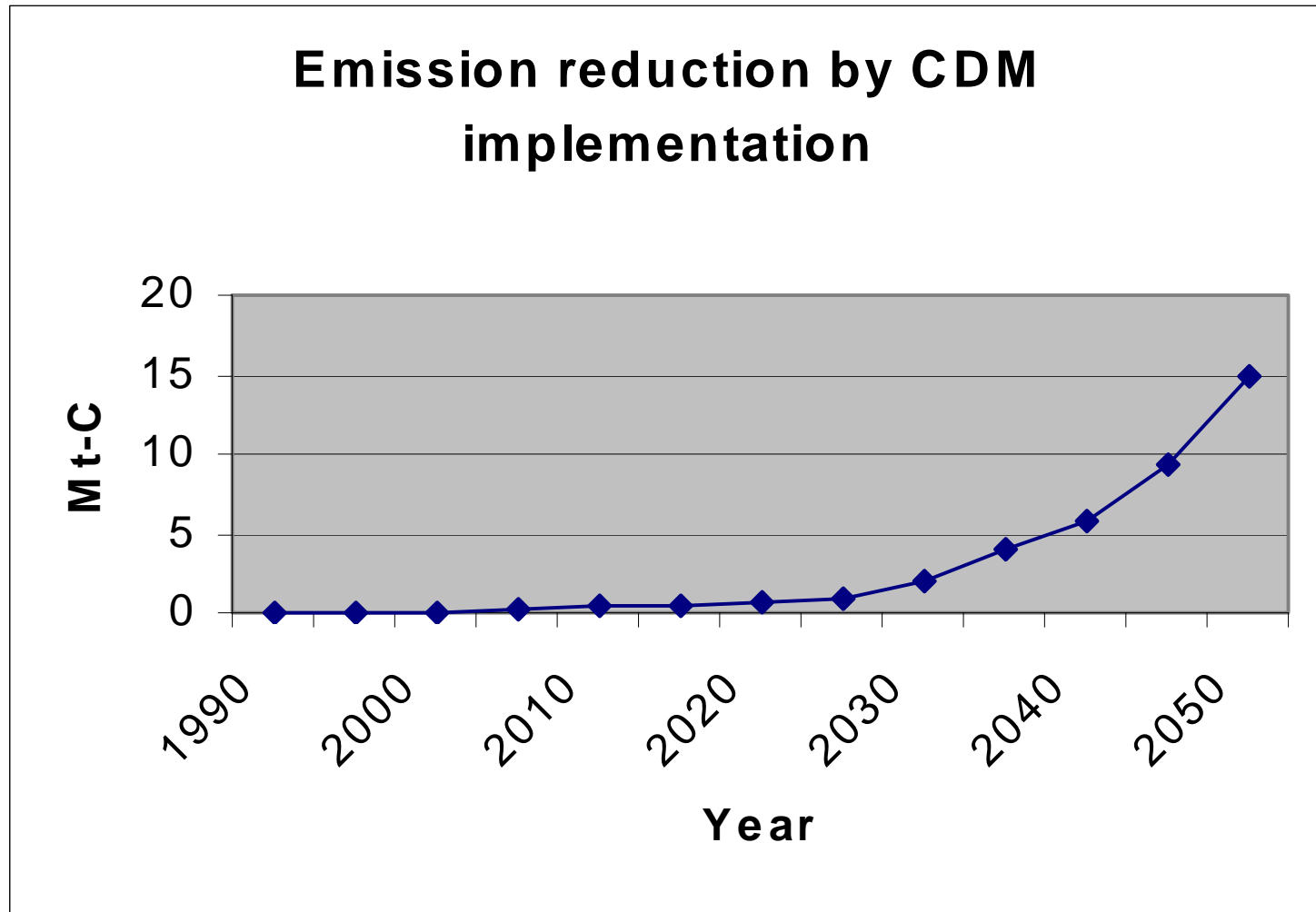
Impact mitigation on Chinese economy

	2010	2020	2030	2050	2075	2100
GDP loss , %						
650	-0.10%	-0.10%	1.20%	1.10%	0.90%	0.90%
550	-0.20%	-0.20%	1.90%	2.00%	2.00%	2.40%
450	1.40%	2.30%	2.90%	3.70%	3.90%	4.80%
Per Capita Emission	-0.20%	-0.20%	-0.10%	-0.10%	0.70%	1.50%
Carbon Intensity	-0.20%	-0.20%	-0.10%	-0.10%	-0.20%	-0.20%
CO2 reduction rate , %						
650	-1.50%	-1.70%	18.80%	22.60%	27.70%	30.50%
550	-2.60%	-2.40%	29.10%	40.60%	51.60%	58.00%
450	14.70%	30.00%	41.60%	62.40%	69.00%	75.00%
Per Capita Emission	-2.60%	-2.40%	-1.90%	-1.80%	27.30%	48.50%
Carbon Intensity	-2.60%	-2.40%	-1.90%	-1.80%	-4.00%	-3.10%

Marginal Abatement Cost: IPAC-SGM model



Marginal Abatement Cost: IPAC-SGM model



An easy way

- ◆ **More flexible market-
multilateral/bilateral/global**
- ◆ **Technology R&D/international collaboration**
- ◆ **Domestic policies**
- ◆ **Criticism system: reporting**

Next

- ◆ **Modeling focus on technology change and domestic policies: demand from energy planning**
- ◆ **Driver analysis by using IPAC-AIM/Technology, join the forum for energy scenario**
- ◆ **Study for city or province: Beijing, Chongqing, Taiyuan, Ningxia**
- ◆ **After Kyoto**
- ◆ **Multi-gas analysis**

UK: A Low Carbon Economy

60% emission reduction by 2050, and hope other developed country join

By using various countermeasures

Not much impact on economy: 0.5%-2% in 2050

UK: Countermeasures

- ☰ **Emission trading: volunteer trading system**
- ☰ **Energy efficiency increasing: companies, household and public utilities**
- ☰ **Natural gas import**
- ☰ **Extension of competitive energy market**
- ☰ **Technology innovation: hydrogen, renewable energy, CHP and new energy conservation technology**
- ☰ **Work together with IS and EU for technology R&D**

UK: technologies

- ☰ Offshore power generation(Wave, tide and wind)
- ☰ CHP(local biomass, waste, wind, tide)
- ☰ Mini-power generation(polygeneration, fuel cell, PV)
- ☰ New building design(0 emission)
- ☰ Fuel cell
- ☰ Transport(Hybrid, bio-fuel, hydrogen)
- ☰ Nuclear fusion

Others

- ☐ **Similar countermeasure package**
- ☐ **Different target(only for Kyoto)**
- ☐ **US, Japan, EU**

Policies contribute to climate change

- ✓ Economic policies to promote tertiary industry
- ✓ Clean energy supply policy: natural gas
- ✓ Renewable energy development: national wind plan, hydropower
- ✓ Clean coal technology promotion
- ✓ High efficiency technology: green lighting, energy efficiency standard
- ✓ Clean production
- ✓ Close low efficiency and small scale factory
- ✓ Technology R&D: 863 high-tech project, 973 research plan
- ✓ Emission standard
- ✓ SO₂ emission market
- ✓ ...

What's for China

- ✓ Taking action in some sense
- ✓ But hard to make political commitment
- ✓ Policy implementation
- ✓ Not difficult to combine climate change and domestic development
- ✓ Should prepare 20 year national plan, and think about 2050 long-term strategy
- ✓ China follow well the experience on energy policies and countermeasure
- ✓ Technology is difficult/important
- ✓ Discussion about technology transfer/localization

2004 is important

- ✓ “Eleventh-Five Year Plan”
- ✓ “National Climate change strategy”
- ✓ Energy forecasting/scenario
- ✓ Integrating with local development/at early time

Modeling activities

- ✓ Think about near or medium term policy implementation
- ✓ Technology diffusion, R&D
- ✓ What's the impact of UK proposal
- ✓ After Kyoto: meaning of Participation/ new framework