China's CO2 emission scenario for the 2 degree global target

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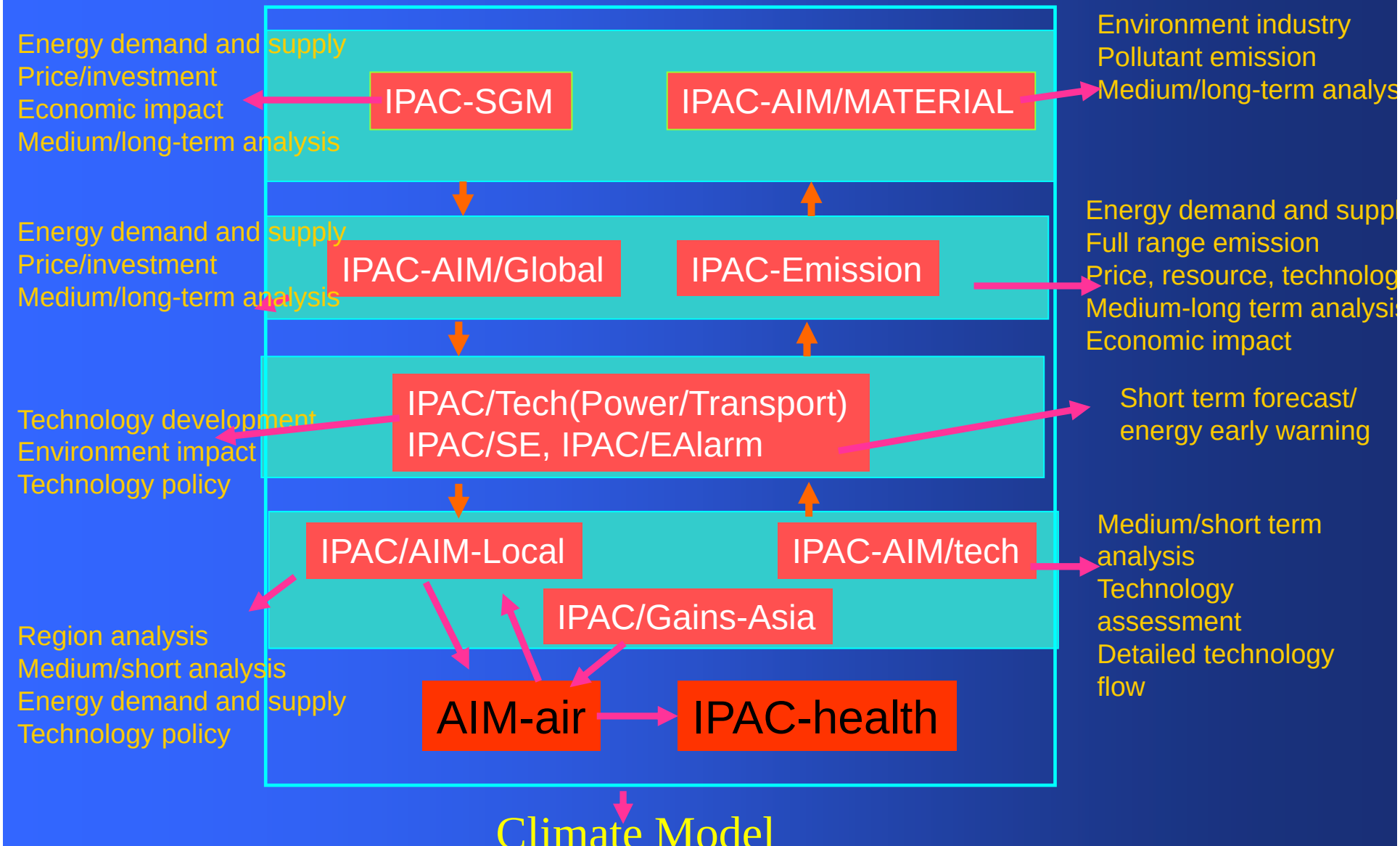
Energy Research Institute, China

Side event at Japanese Pavilion
Pathways toward low carbon societies in Asia by 2050 and contribution of Japan to their realization

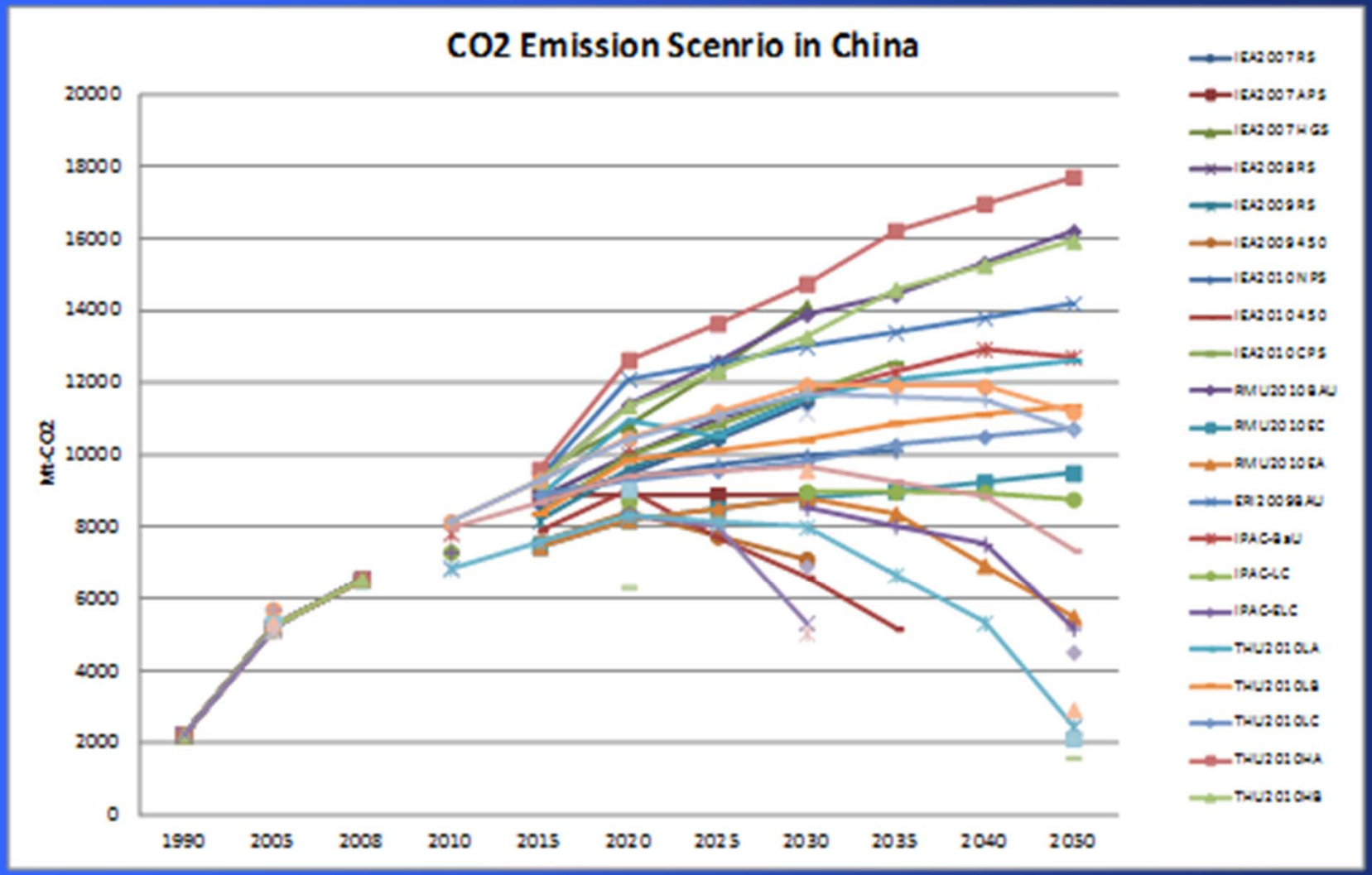
November 13 2013 (15:00-16:30)

Framework of Integrated Policy Model for China (IPAC)

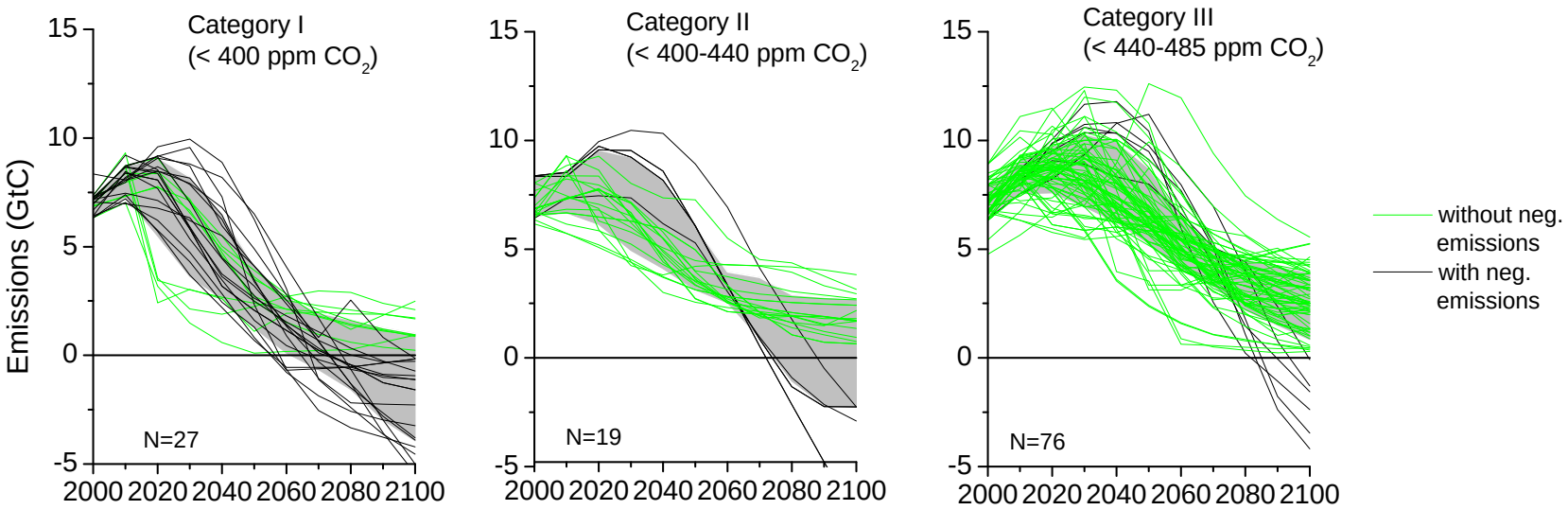


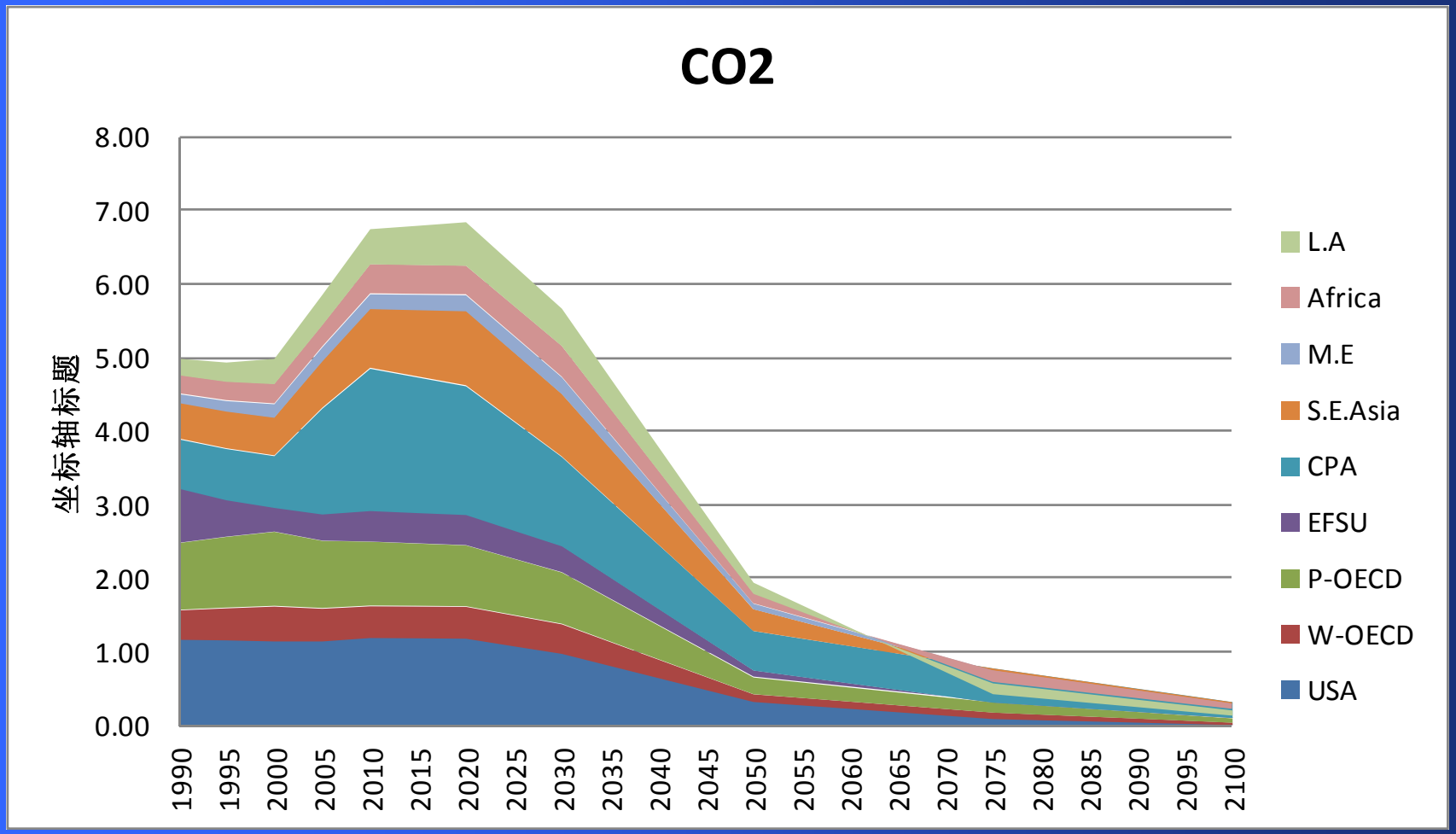
ERI, China

Review for recent CO2 emission scenarios

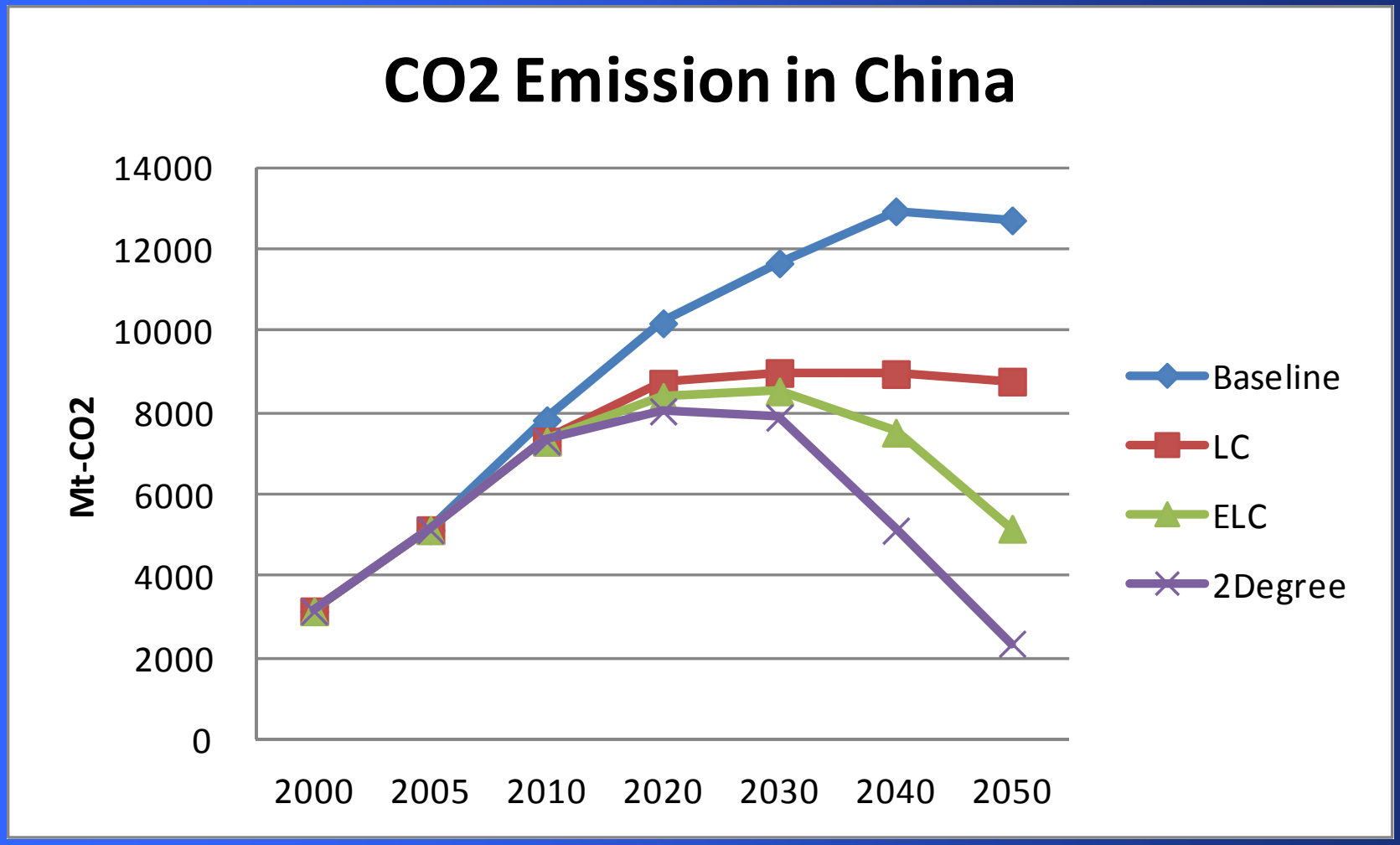


Keyword: Transition – mitigation to reach some climate change targets




CO2
8.00
7.00
6.00
5.00
4.00
3.00
2.00
1.00
0.00
坐标轴标题
1990
1995
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
2075
2080
2085
2090
2095
2100
L.A
Africa
M.E
S.E.Asia
CPA
EFSU
P-OECD
W-OECD
USA

Transformation: CO2 emission, a rapid change

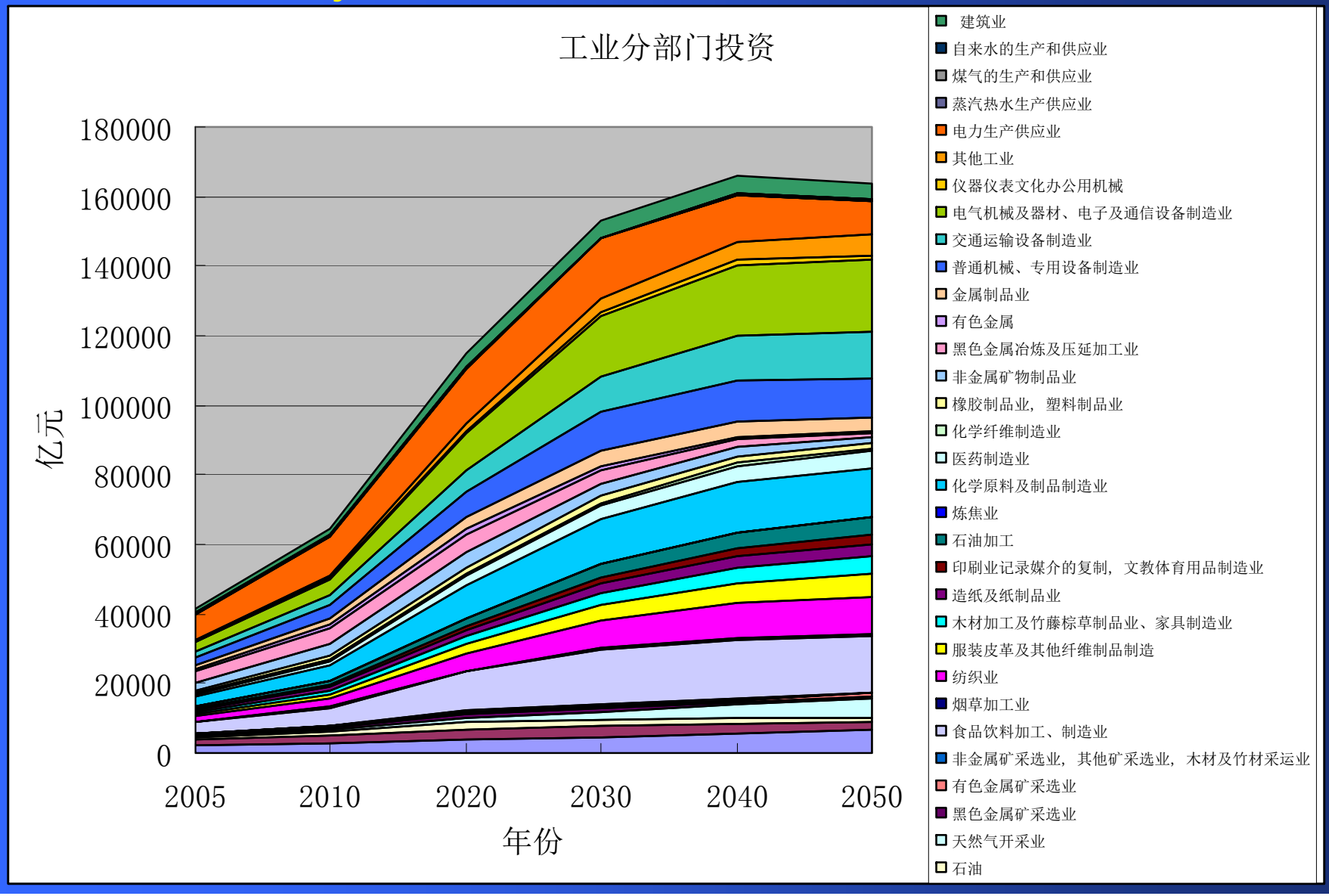


What's the future of China's low carbon policy: key factors

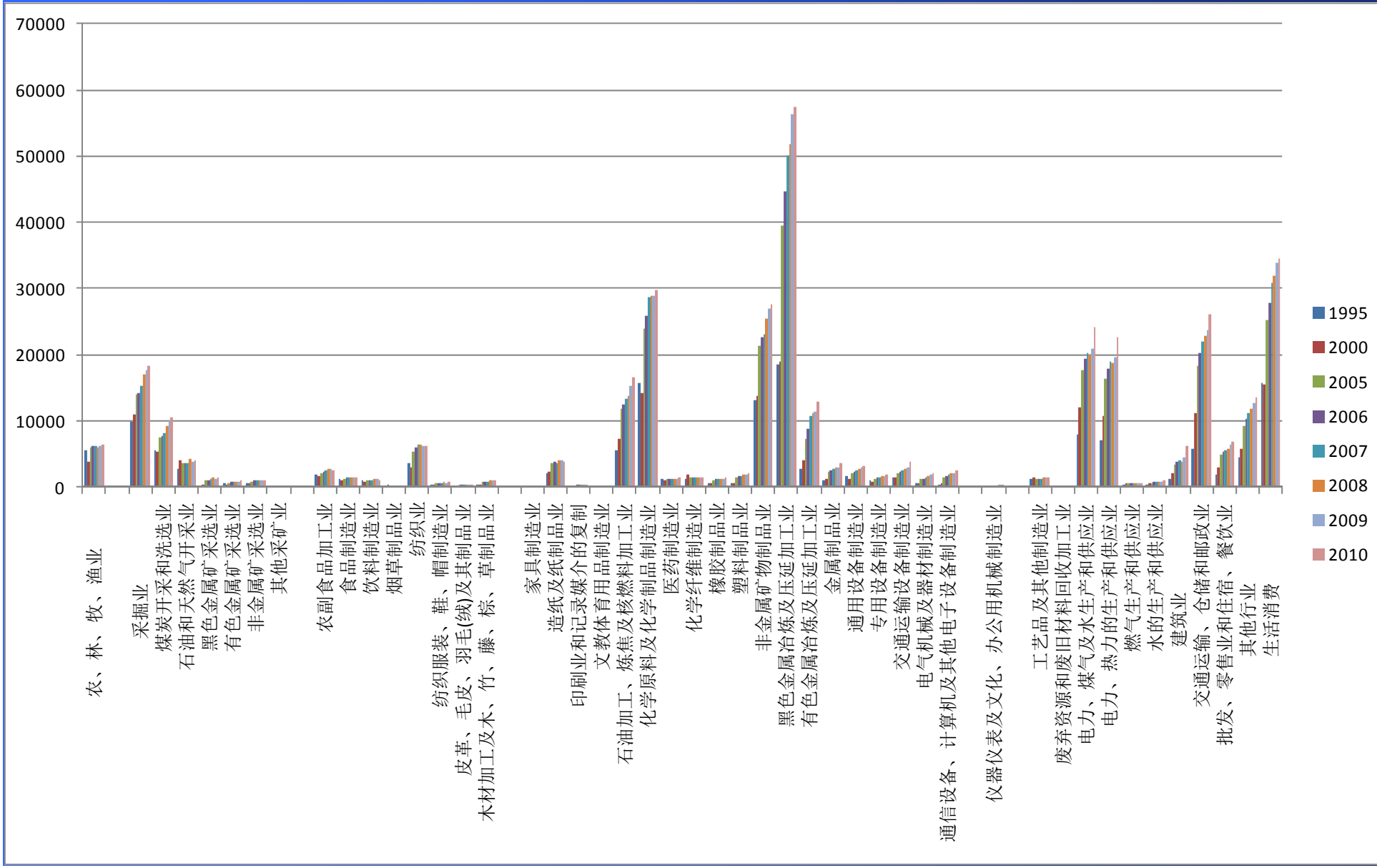
- Economic structure optimization policies
- Energy efficiency policies
- Renewable energy/nuclear power generation oriented policies
- CCS
- Low carbon consumption/ lifestyle
- Land use emission reduction policies: so far relatively poor
- Climate change target: China is key part of that
- Can we pay for it? Cost and benefit

Transformation: Economy system

Investment by industrial sectors



分部门能源消费量, Energy demand by sector, 1995-2010



Transformation: Energy efficiency

Unit energy use for key products, LCS Scenario

	Unit	2005	2020	2030	2040	2050
Steel	Kgce/t	760	650	564	554	545
Cement	Kgce/t	132	101	86	81	77
Glass	Kgce/Weight Cases	24	18	14.5	13.8	13.1
Brick	Kgce/万块	685	466	433	421	408
Ammonia	Kgce/t	1645	1328	1189	1141	1096
Ethylene	Kgce/t	1092	796	713	693	672
Soda Ash	Kgce/t	340	310	290	284	279
Casutic	Kgce/t	1410	990	890	868	851
Calcium carbide	Kgce/t	1482	1304	1215	1201	1193
Copper	Kgce/t	1273	1063	931	877	827
Aluminum	kWh/t	14320	12870	12170	11923	11877
Paper	Kgce/t	1047	840	761	721	686
Electricity fossil fuel	Gce/kWh	350	305	287	274	264

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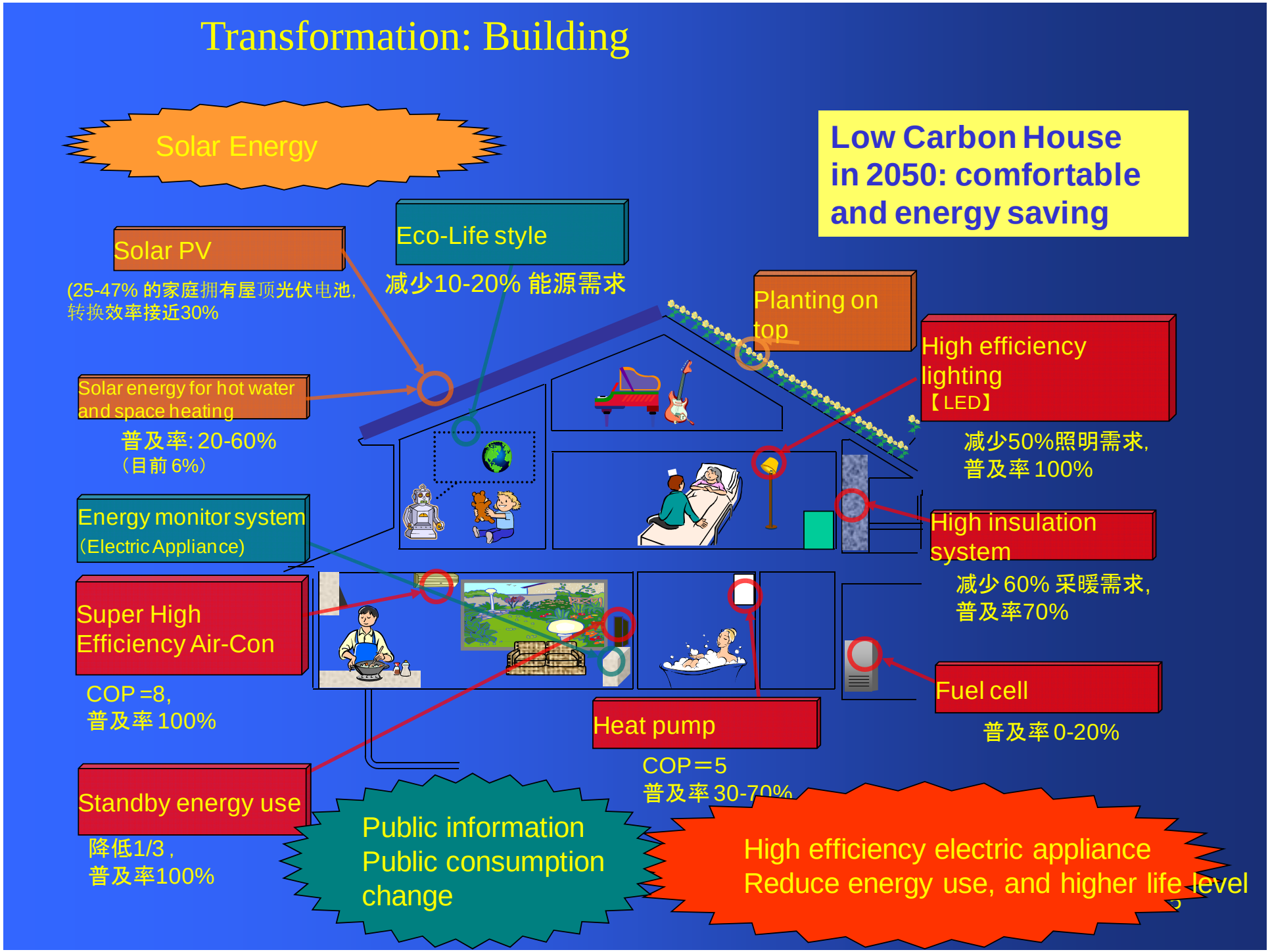
Transformation: Building

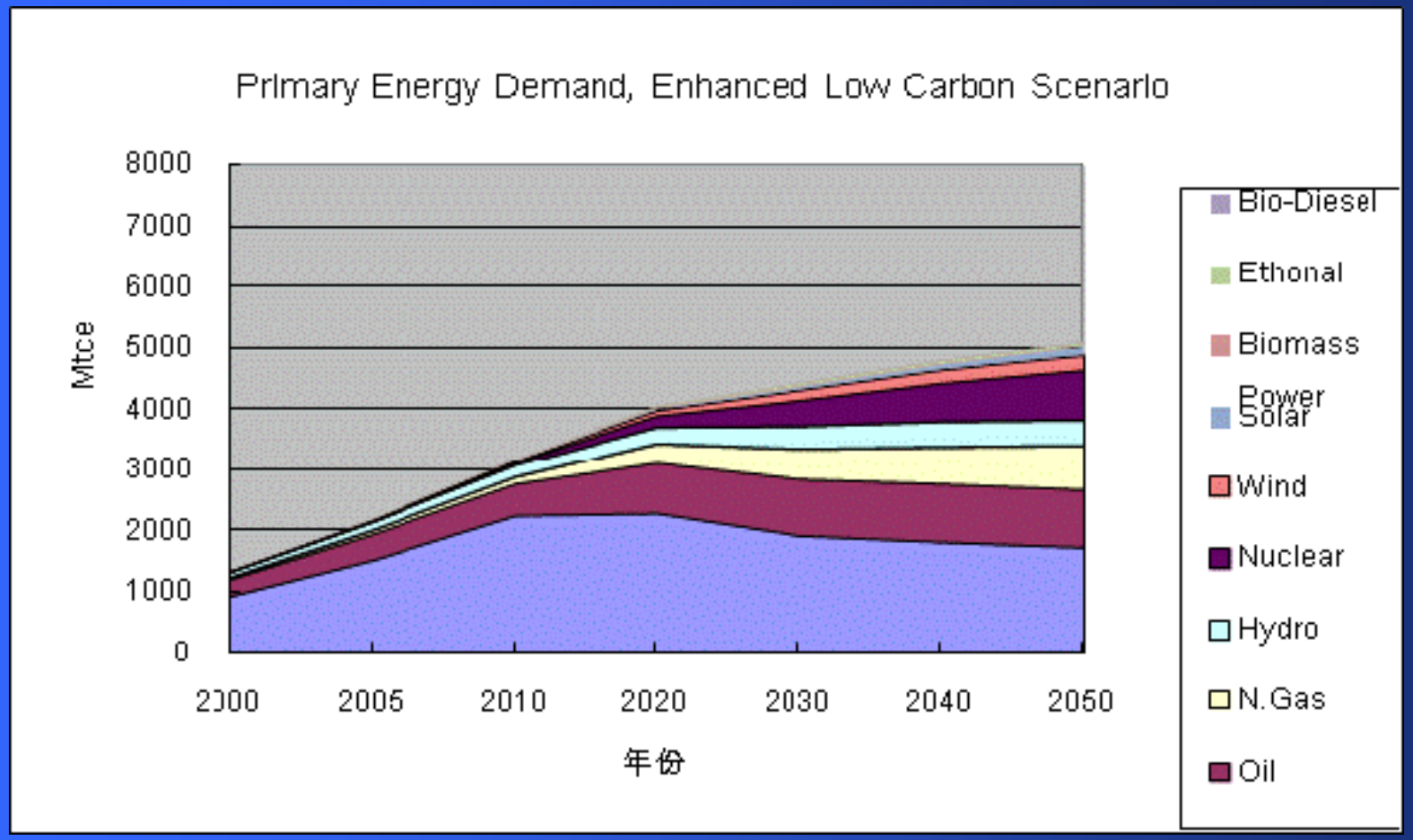


Transformation: Transport

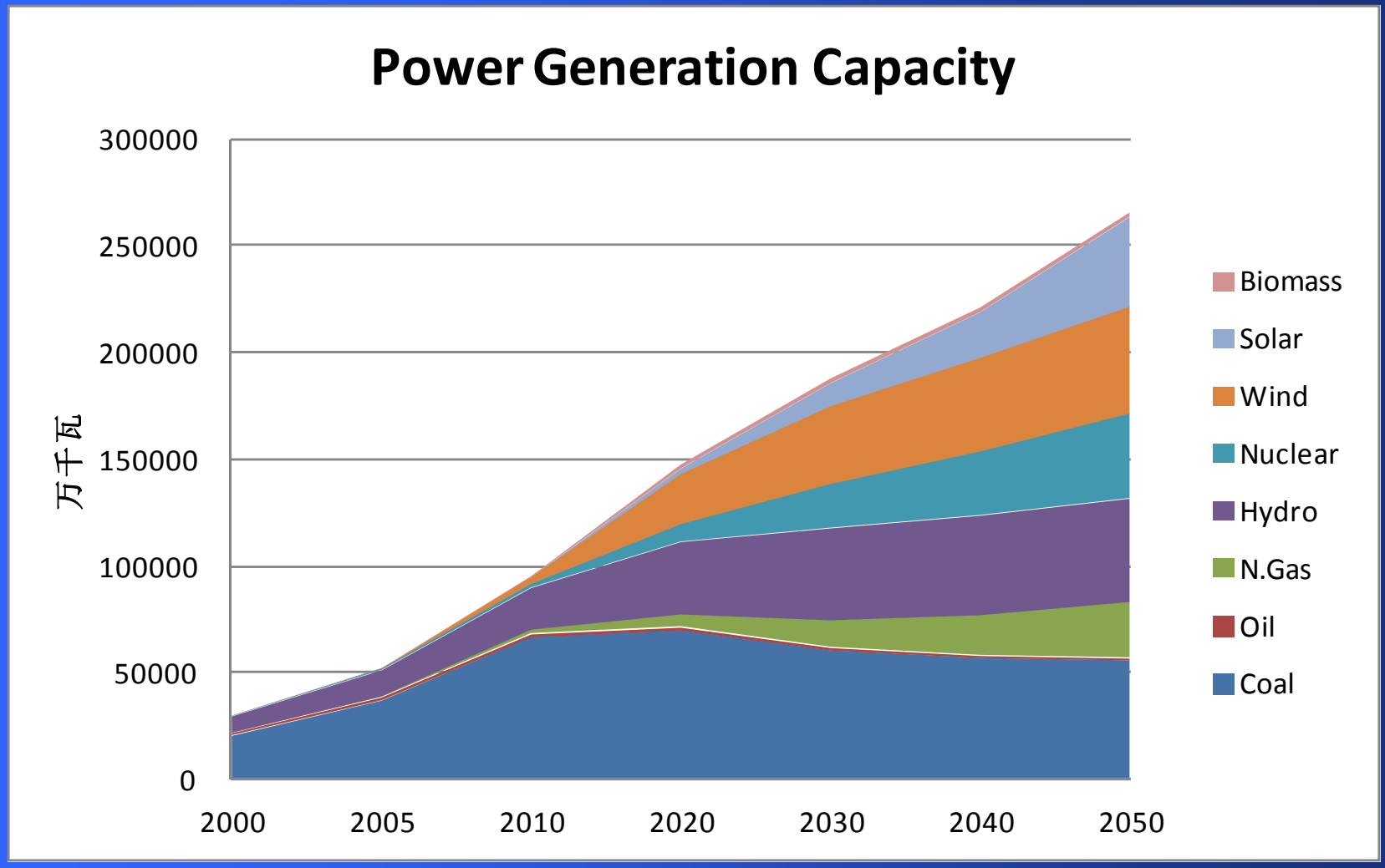
Transport, Low carbon scenario

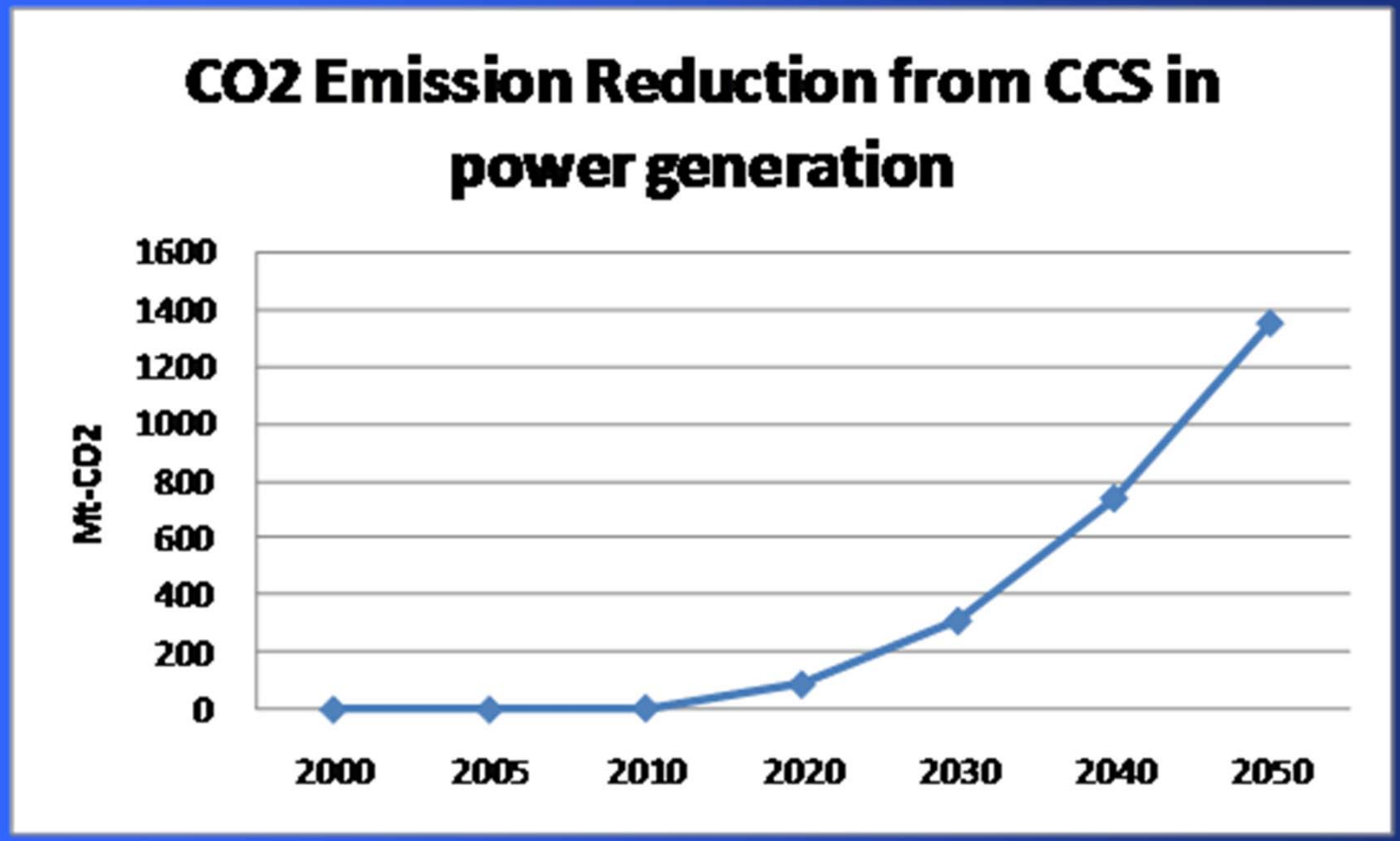
		2005	2010	2020	2030	2040	2050
Family car ownership, per 100HH	Urban	3.37	14	36	65	77	78
	Rural	0.08	0.2	8	38	70	90
Family car annual travel distance, km		9500	9500	9300	8635	8300	7480
Average engin size of family cars, litter		1.7	1.6	1.6	1.6	1.5	1.4
Fuel efficiency of car, L/100km		9.2	8.9	7.1	5.9	4.8	4.1
Share of MRT in total traffic volume, %		0.011	0.016	0.025	0.046	0.1	0.21
Share of Biofuel, %		1.10%	1.30%	4.1%	7.70%	12%	13%
Share of electric car, %		0%	0.12%	3.2%	6.80%	12.5%	19.8%
Share of fuel cell car, %		0%	0%	0.80%	1.60%	4.70%	7.90%

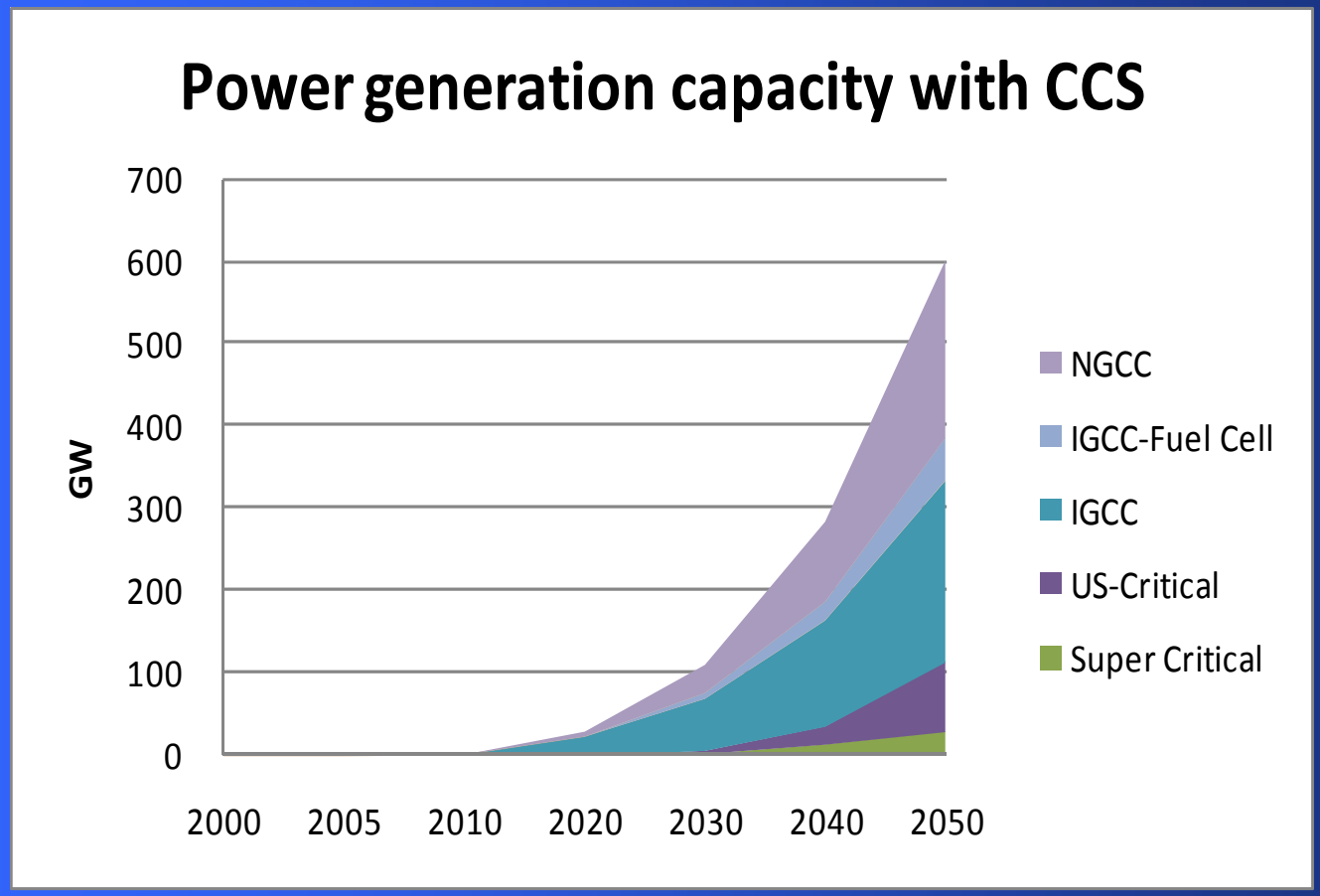
Transformation: Energy System

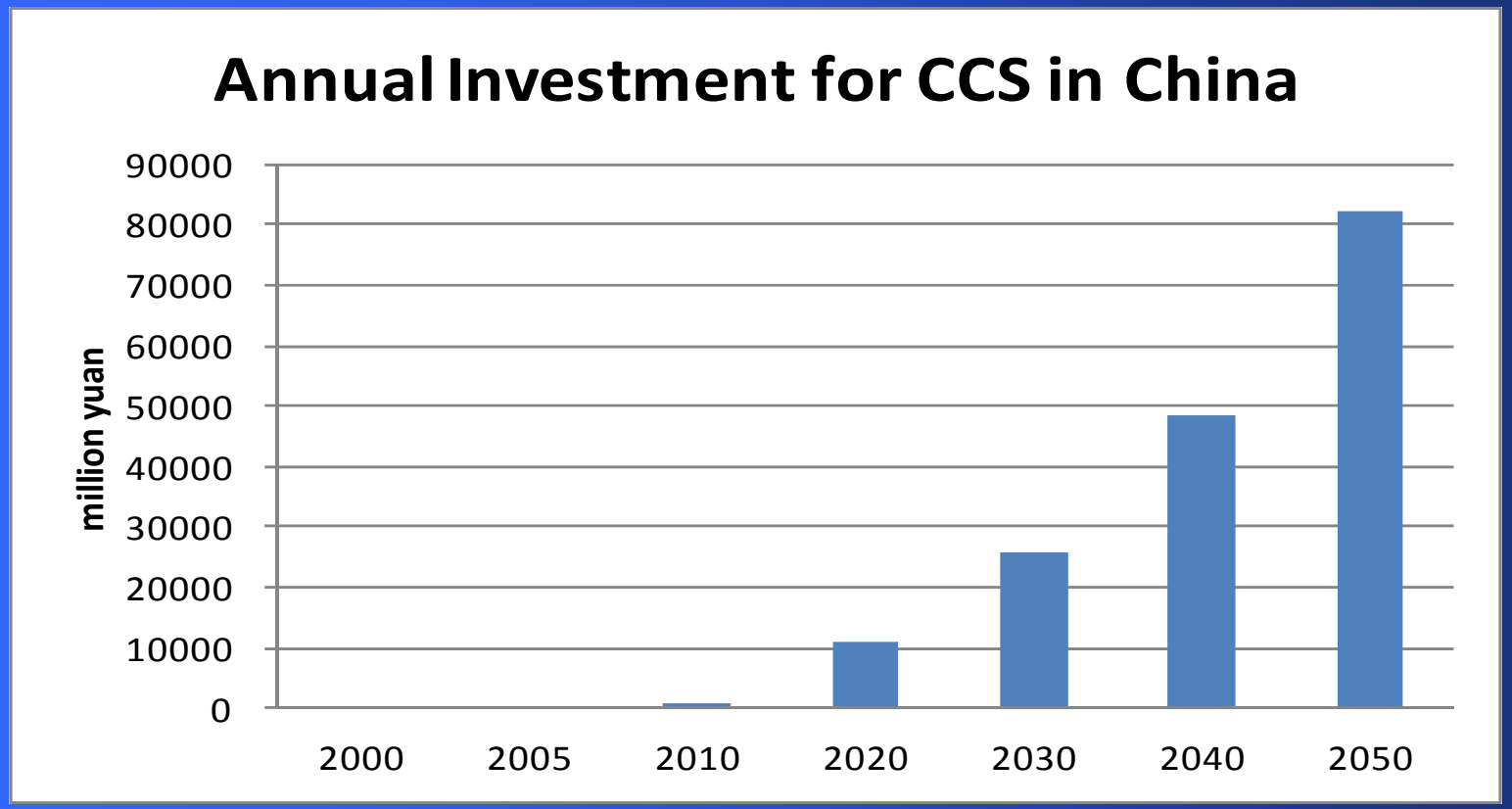


Transformation: Power generation



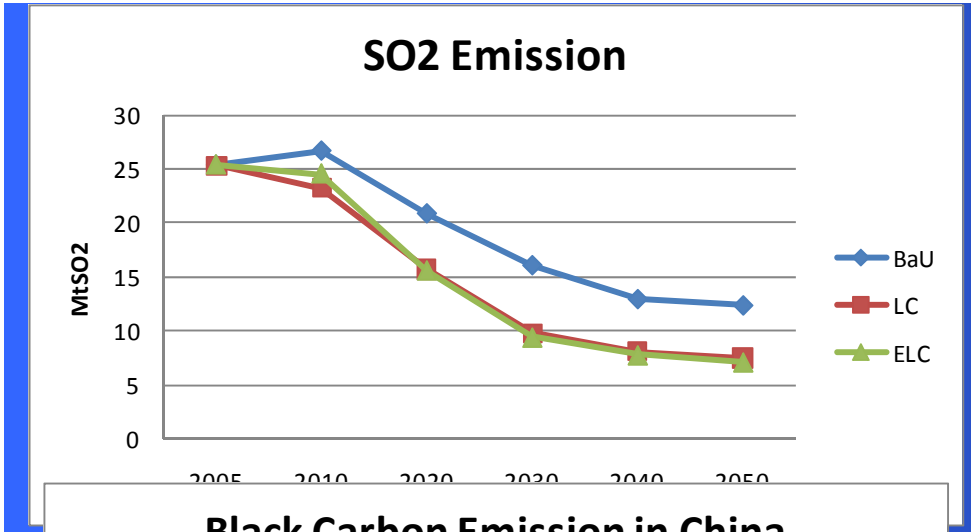

CO2 Emission Reduction from CCS in power generation
Mt-CO2
1600
1400
1200
1000
800
600
400
200
0
2000
2005
2010
2020
2030
2040
2050

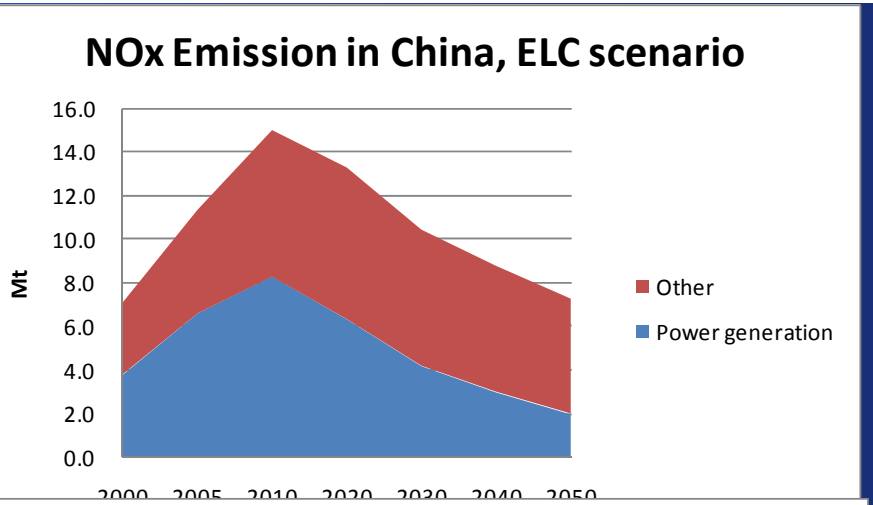

Power generation capacity with CCS
GW
700
600
500
400
300
200
100
0
2000
2005
2010
2020
2030
2040
2050
NGCC
IGCC-Fuel Cell
IGCC
US-Critical
Super Critical

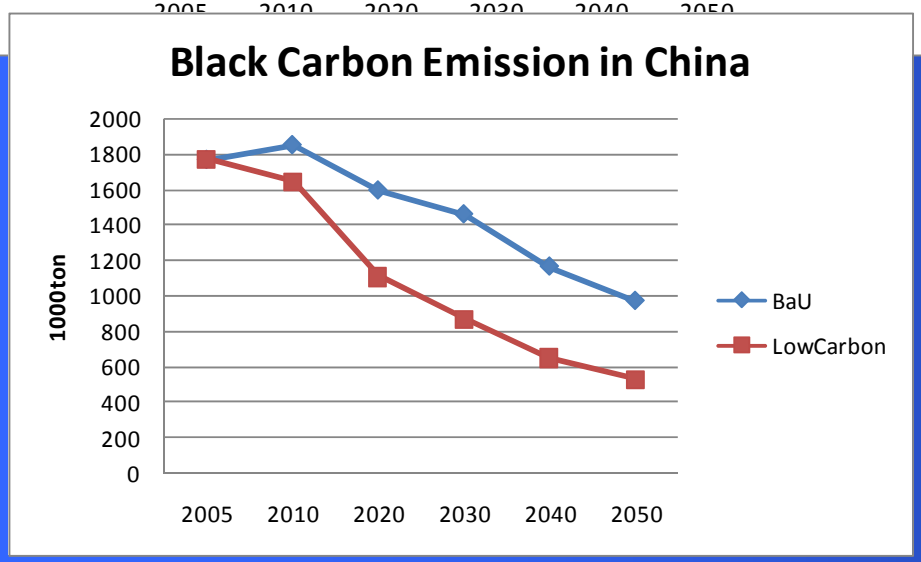

Annual Investment for CCS in China
million yuan
90000
80000
70000
60000
50000
40000
30000
20000
10000
0
2000
2005
2010
2020
2030
2040
2050

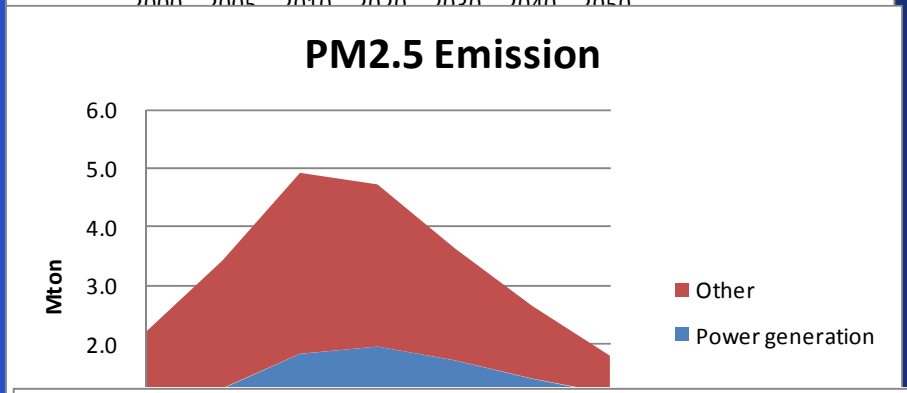
Roadmap for Electric Vehicle Development Technology

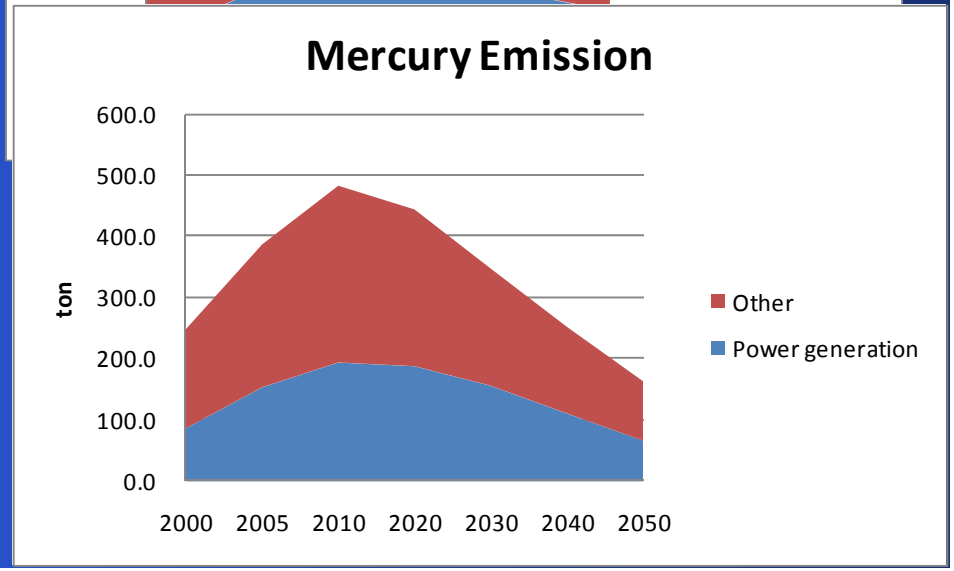
	2006-2010	2011-2015	2016-2020	2021-2025	2026-2030
Electric Vehicle Development Objective					
The Amount of Electric Vehicle(10,000)	Few	125	800	5,000	9,400
Quantity of Electric Vehicle Market Per Year(10,000)	Few	25	135	840	880
Electric Vehicle Technology Advance					
The Maximum Speed(km/h)	85	120	140	140	
Cruising Range(km)	112	130	200	350	400
Power Consumption Measuring on One-hundred-kilometer	16-18	14	13	8	8
Technology Advance					
Energy Density(Wh/kg, Wh/L)	90-125Wh/kg	150 Wh/kg;150 Wh/L	225 Wh/kg;200 Wh/L	500 Wh/kg;460 Wh/L	700 Wh/kg
Total Energy	16	24	40-48	80-93	112-124
Pack Lifespan	1000 times	1500 times	3000 times	3800 times	3800 times
Cost(Yuan/kWh)	5025	2513	717	503	200
Charging Station Technology and Construction Process					
Charging Station Development Planning(National Grid and South Grid)	325 new charging stations and 1,870,000 charging piles	4,325 new charging stations and 2,840,000 charging piles	10,000 new charging stations and 3,000,000 charging piles		
Charging Station System Construction Process	Conventional charging facility (charging piles)construction; battery replacement mode demonstration; mainly in residency districts or parking of large office buildings	Conventional charging as primary; fast charging and battery replacement demonstration; construct fast charging and battery replacement station mainly at the airport, railway station, hospital, shopping mall or petrol gas station and other public places	Conventional charging as primary; fast charging and battery replacement as supplementary to form an embryo for charging station network system	Improve charging station network system and lay out charging system on the charging cruising range of electric vehicle per time; solar energy charging station demonstration; mobile charging station demonstration	Controlled-charging technology makes electric vehicle be friendly-power consumption load; solar energy charging stations account for 5-10% of market share; mobile charging stations are applied.











Transformation: Air pollution

Our Studies Now

- Global emission scenarios by joining international studies: RoSE, EMPERE, LIMIT, IAMC, EMF30
- CO2 Emission scenario for China: focusing on 2 degree scenario
- Local air pollution emission scenario and policy roadmap: focusing on Jing-Jin-Ji area
- Energy and GHG indicators for 13th Five Year Plan
- Carbon tax implementation analysis
- Coal cap scenario analysis
- ETS design modeling for China and pilot phase cities
- Policy design for building on energy and CO2 emission target
- International emission scenario analysis: US, Japan, EU, China
- Up-Grade of Chinese Economy: a Yangtze River Case