

China's Low Carbon and Energy Transition -Peaking CO₂ emission in 2020 to 2022 -

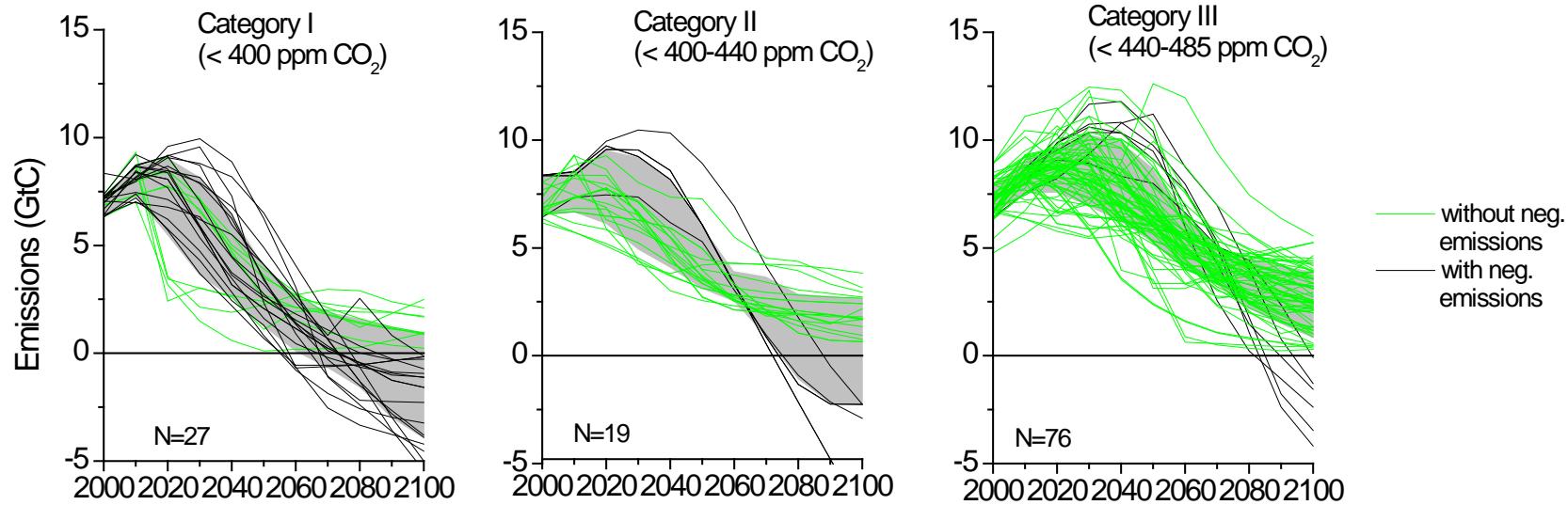
-We NEED Rapid Transition -

Jiang Kejun

Energy Research Institute
Peking University

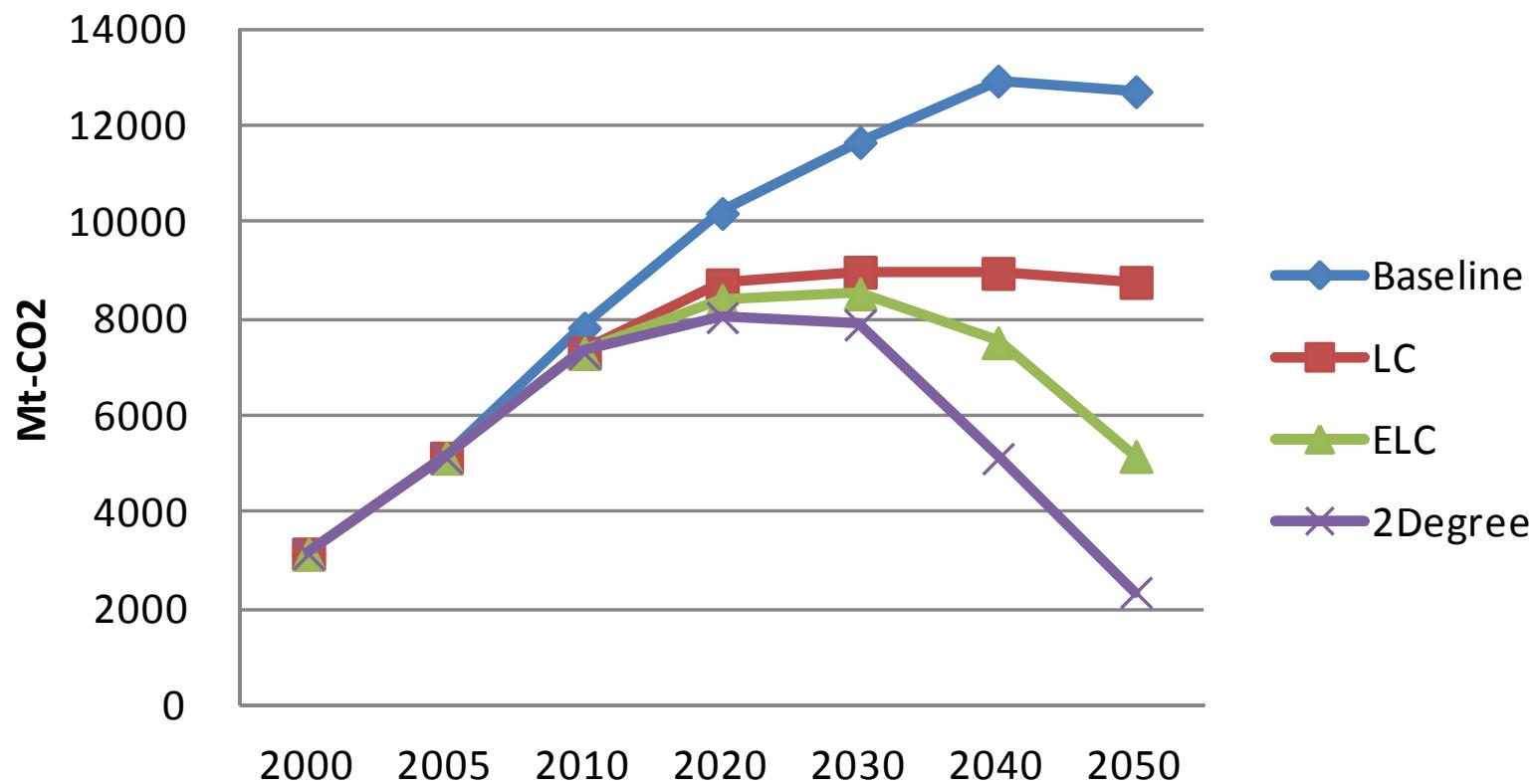
2016 EIA ENERGY CONFERENCE
July 11-12, 2016

Keyword: Transition – mitigation to reach some climate change targets

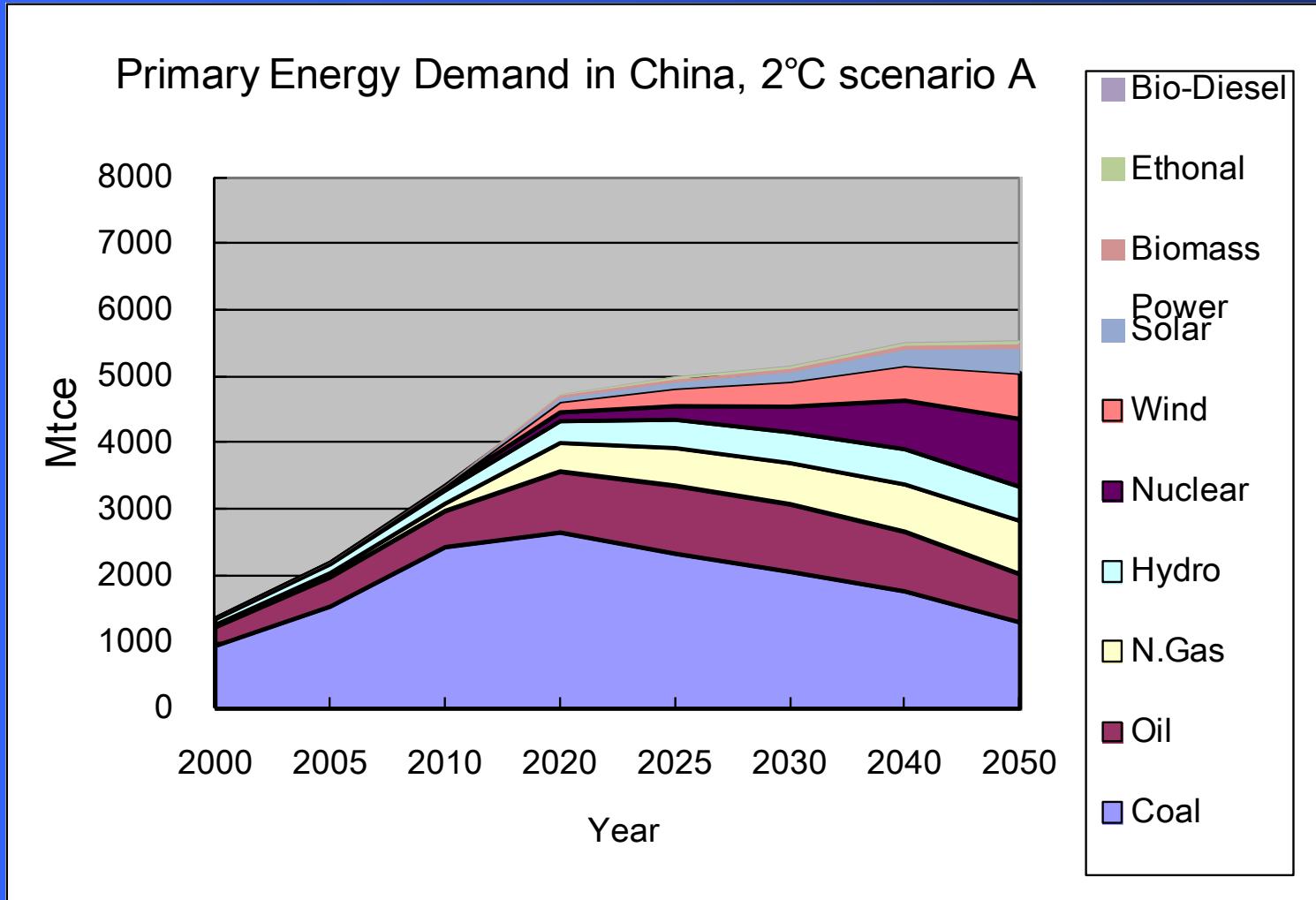


Transformation: CO2 emission, a rapid change

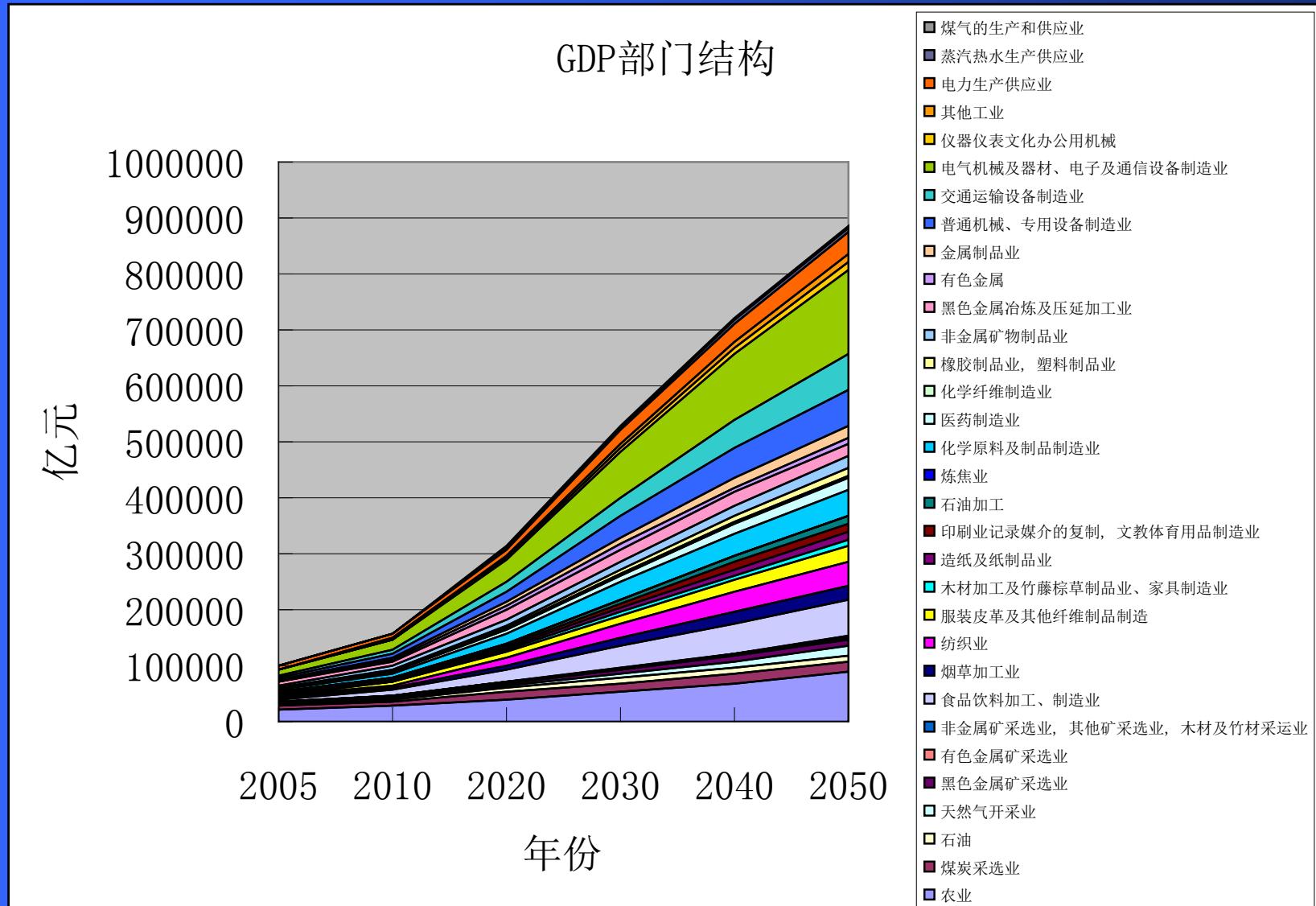
CO2 Emission in China



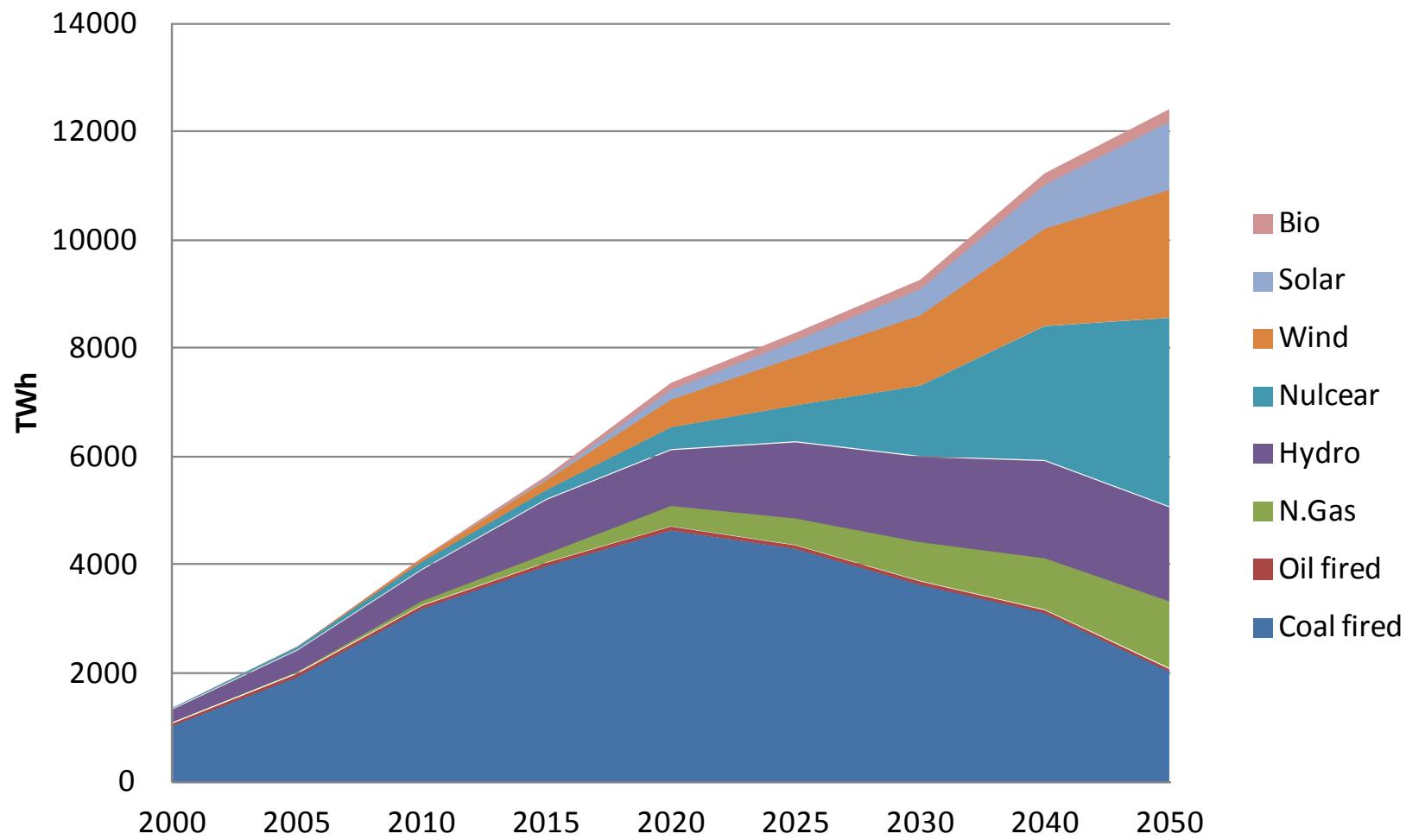
We Need Rapid Transition: Put that into 13th Five Year Plan Primary Energy Demand



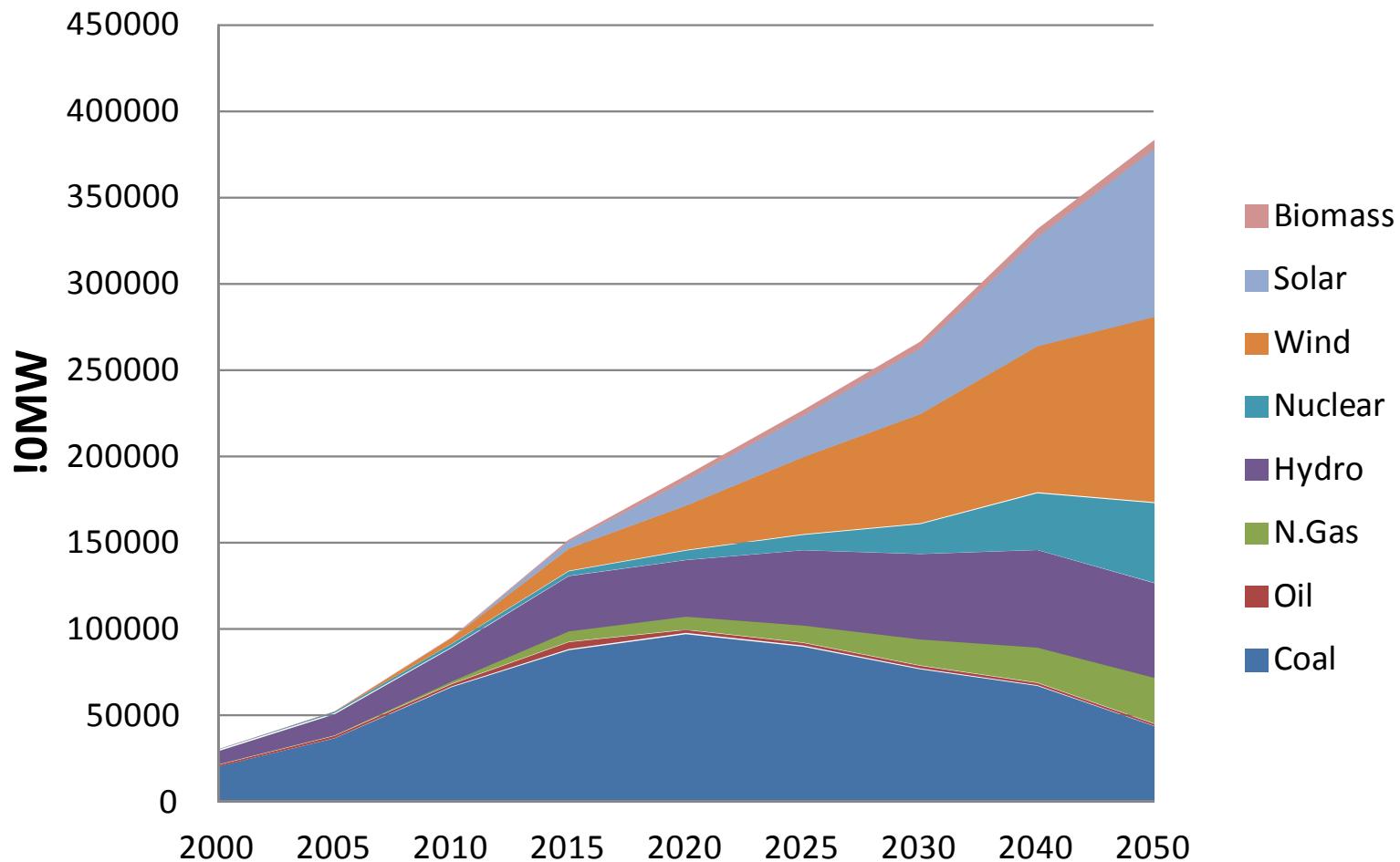
GDP by sectors

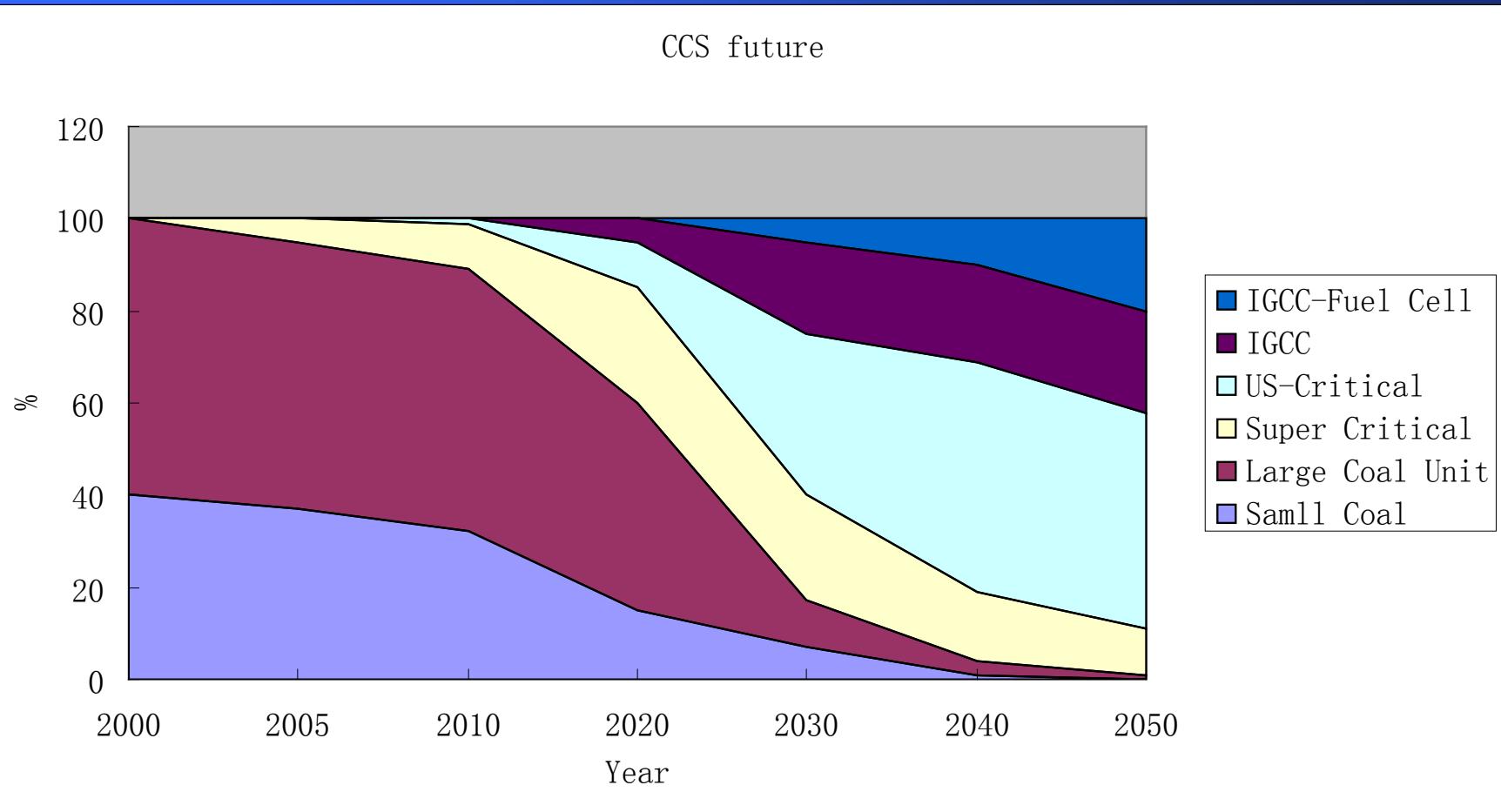


Power Generation, 2°C Scenario A

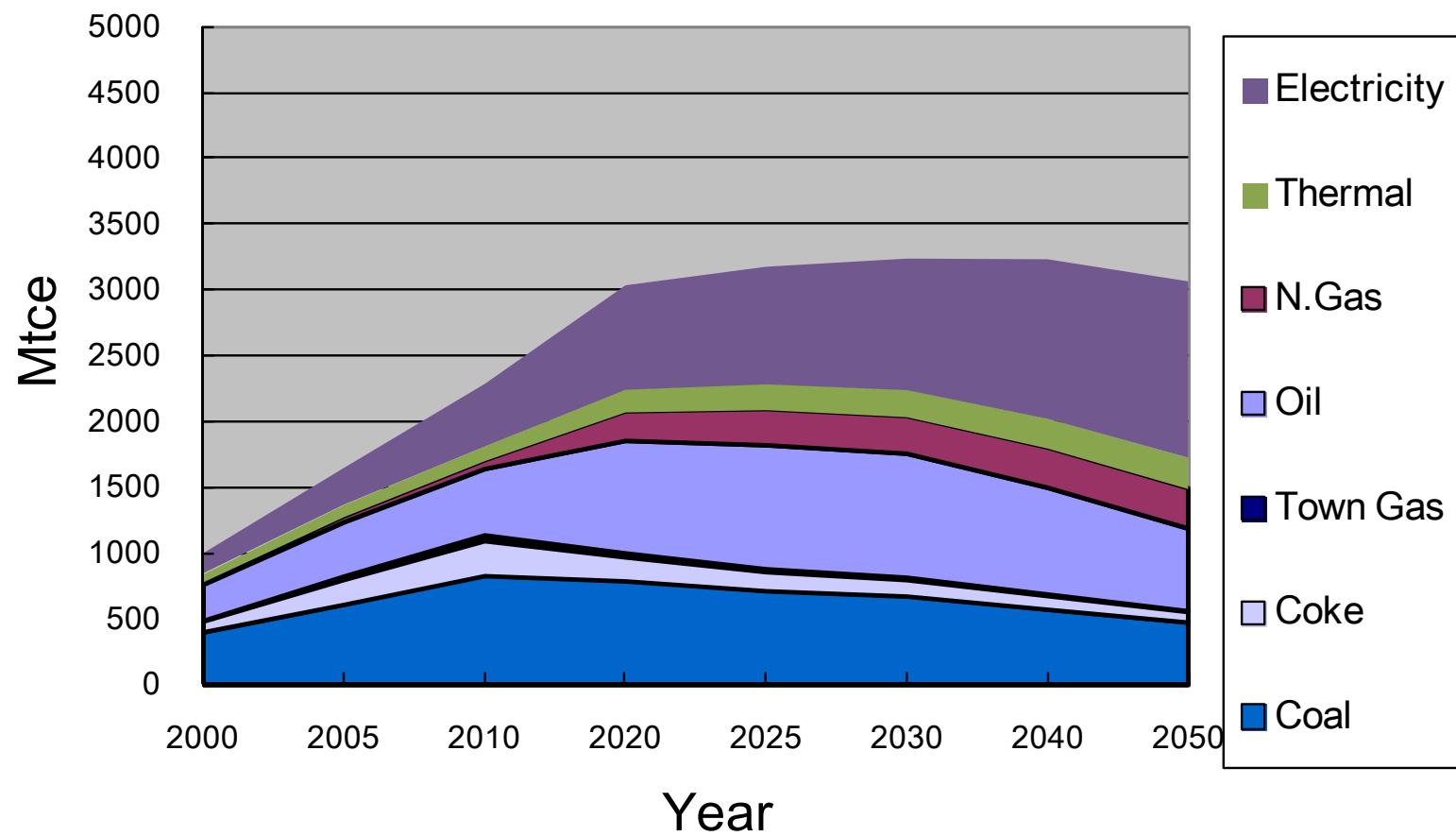


Installed Capacity, 2 °C Scenario A

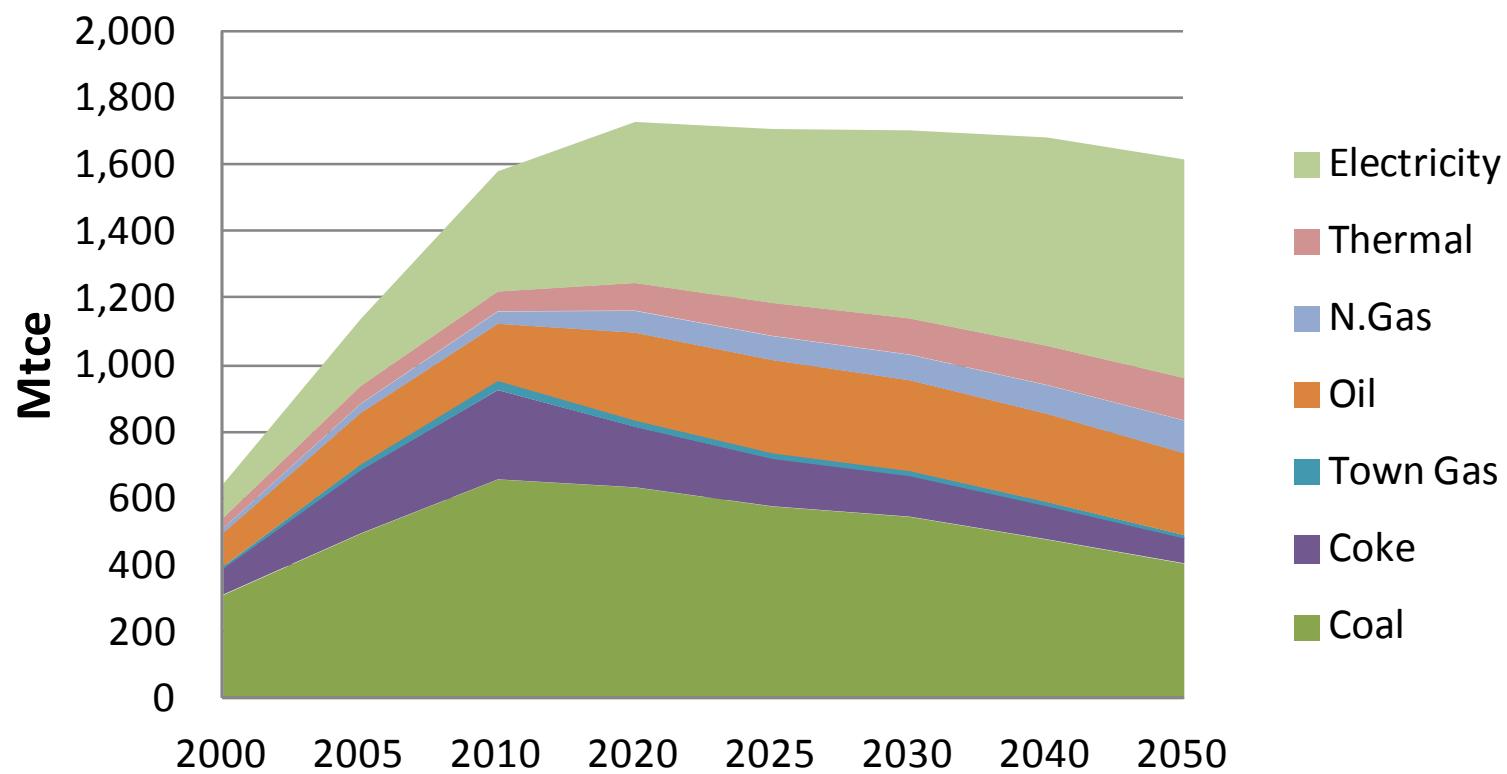




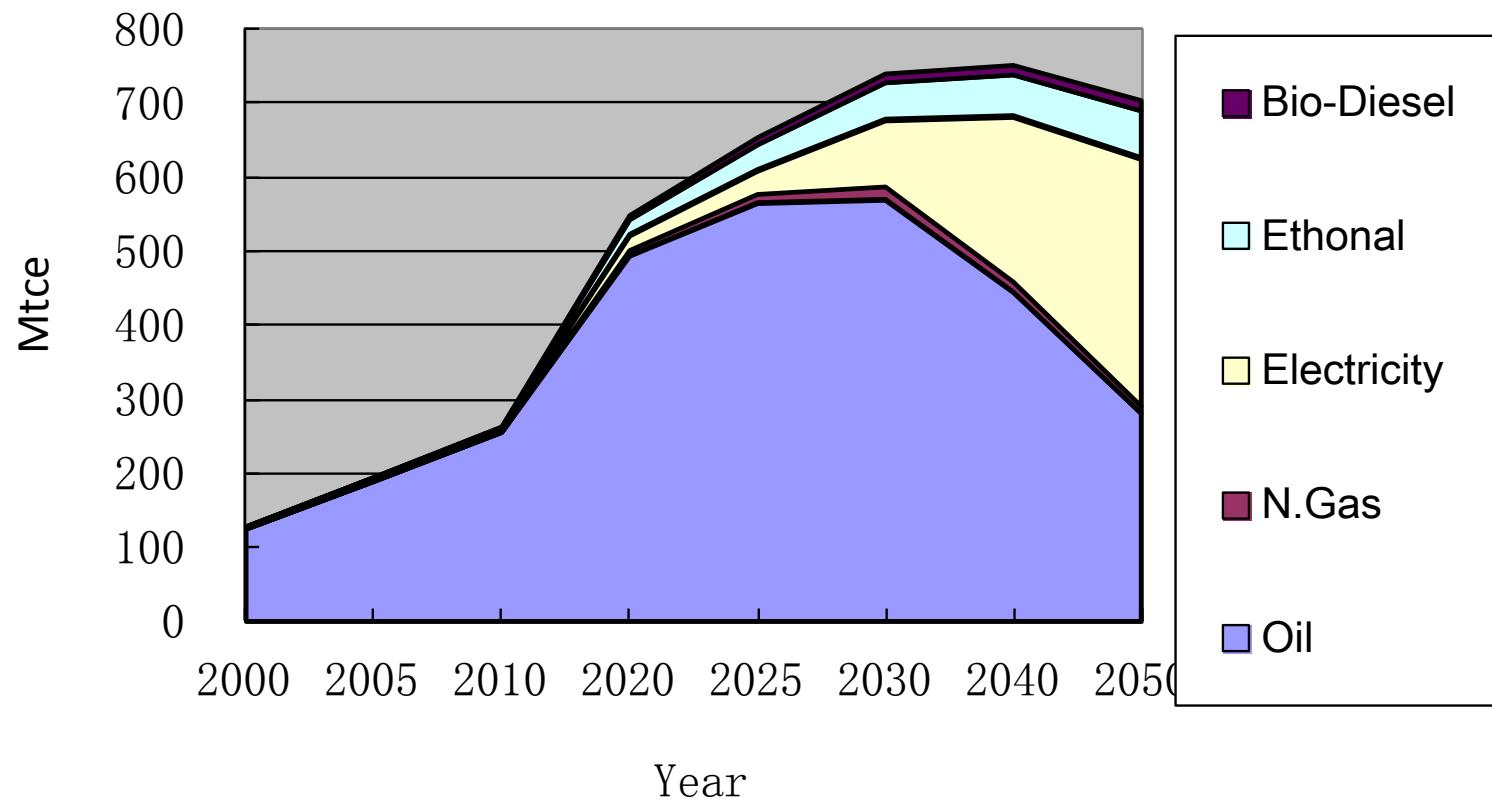
Final Energy Demand, 2 degree scenario



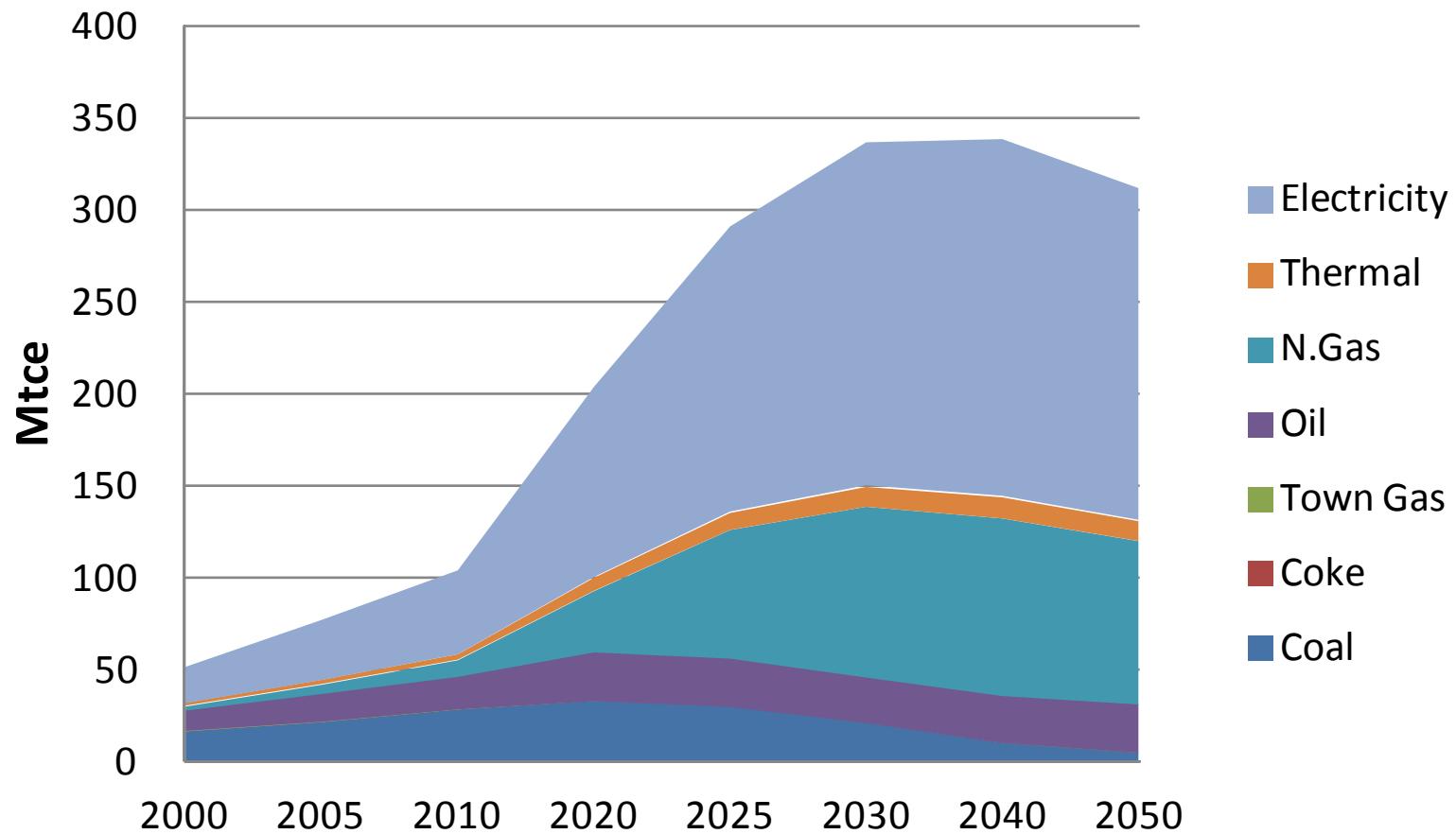
Final Energy Demand in Industry, 2°C Scenario A



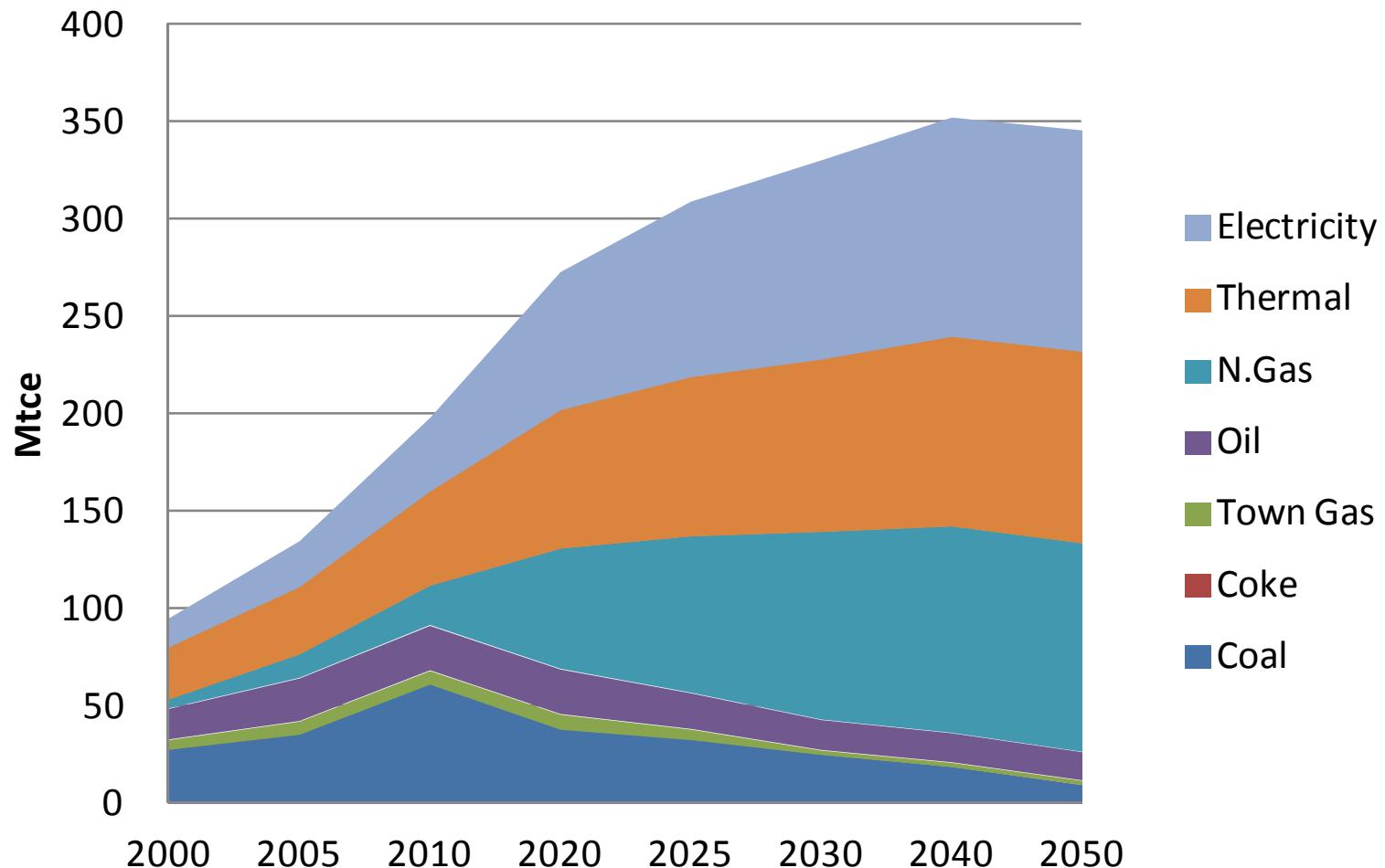
Transport Energy Demand: 2 degree scenario



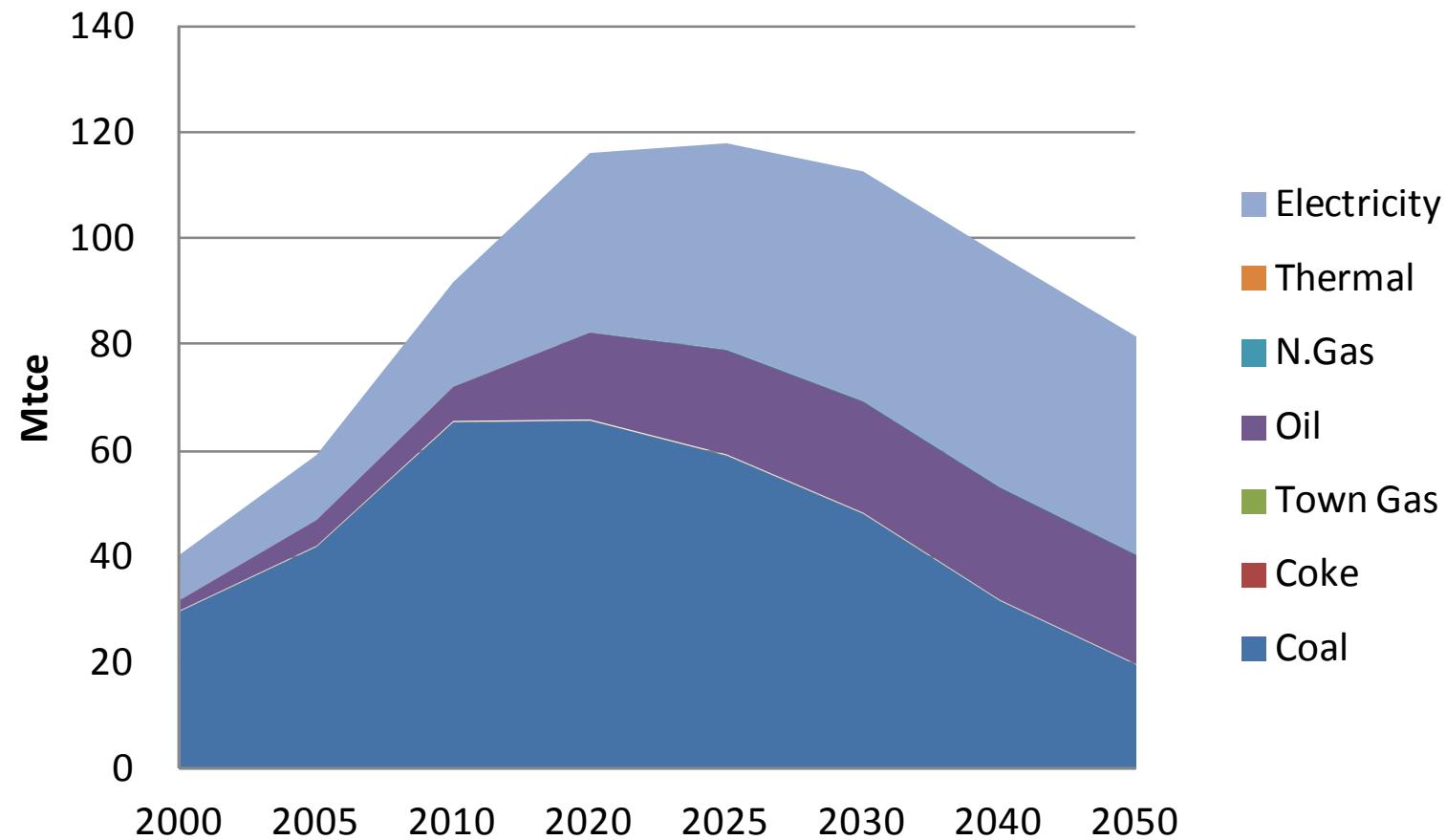
Tertiary Sector Energy Demand



Urban Household Energy Demand



Rural Household Energy Demand



+ 礼品

+ 运动器械

显示全部分类 ▾

推广商品



爆款

¥6.9
参考价:¥55.0

60000人收藏, 70000人购买,
80000人安装!

¥6.90



买五送一

满五送一 亮的美LED灯泡e14尖泡蜡



买五送一



云科技 恒照明

3W



¥6.9
参考价:¥55.0



爆款

¥6.9
参考价:¥55.0

60000人收藏, 70000人购买,
80000人安装!

¥6.90



限量
1000套



VNC3W经济型天花灯LED一体化背景墙射灯 BB4/B05/B06/B09/C08 高光暖白光BB4

¥9.90 直降

已有1276人评价



劲爆
特价

航天铝制散热器 LED

3W 正白 E27球泡

尚仕达 LED节能灯泡 超高亮led球泡灯源

3w/5w/7w e27螺口灯 lamp 3W球泡-JDC1

¥5.70 直降

已有490人评价



全民
百货



全民
百货



佛山照明 LED灯泡 3W透明全柱E14暖白光蜡尾尖泡 5支装

¥115.00 直降

已有1071人评价



佛山照明 LED灯泡 7W超炫银E27暖白光球泡 2支装

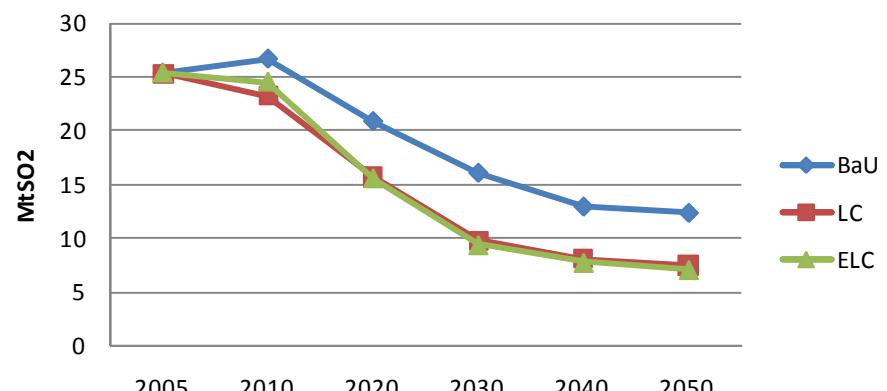
¥76.00 直降

已有456人评价

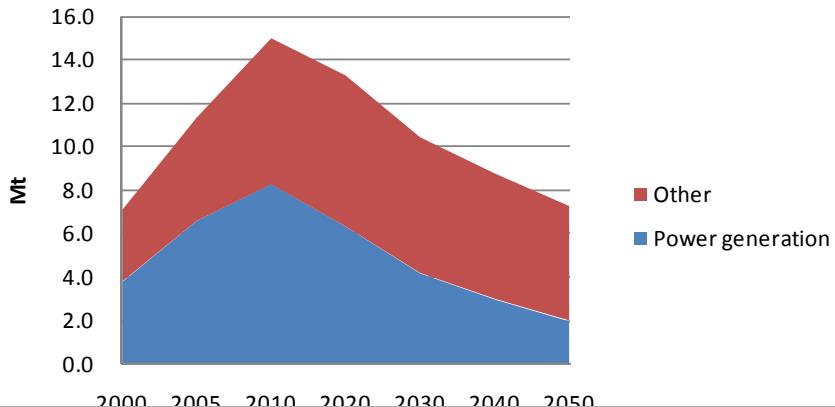
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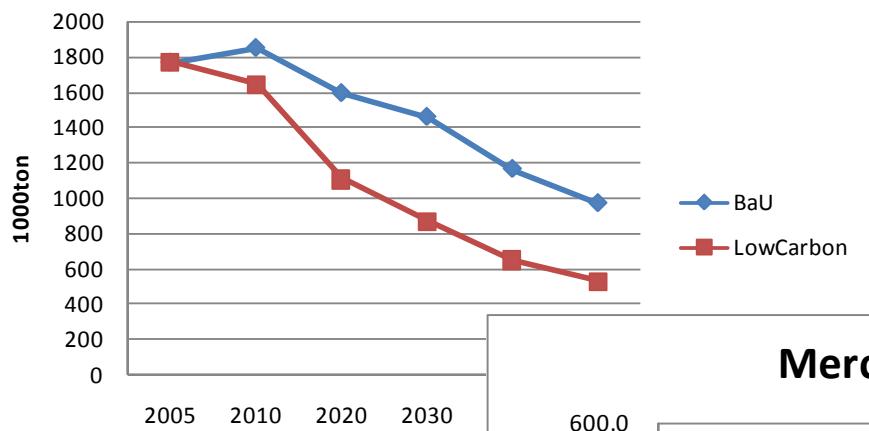
SO₂ Emission



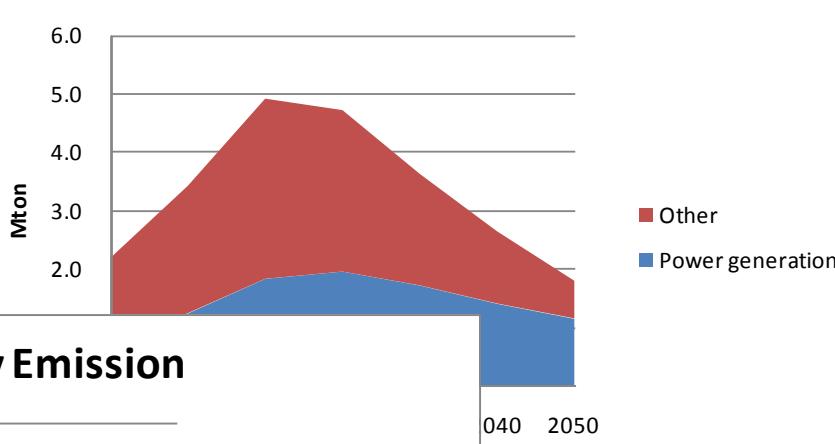
NOx Emission in China, ELC scenario



Black Carbon Emission in China



PM2.5 Emission



Mercury Emission

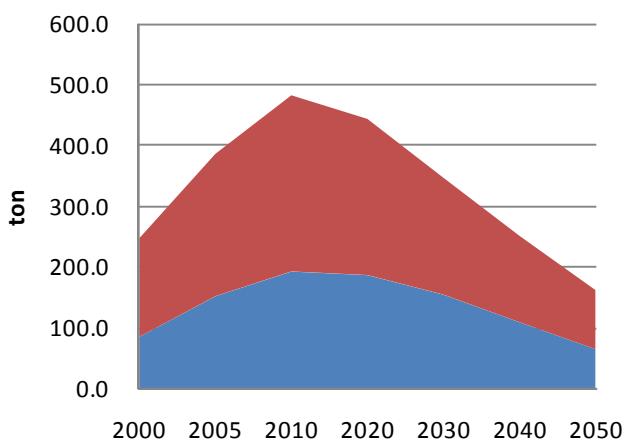
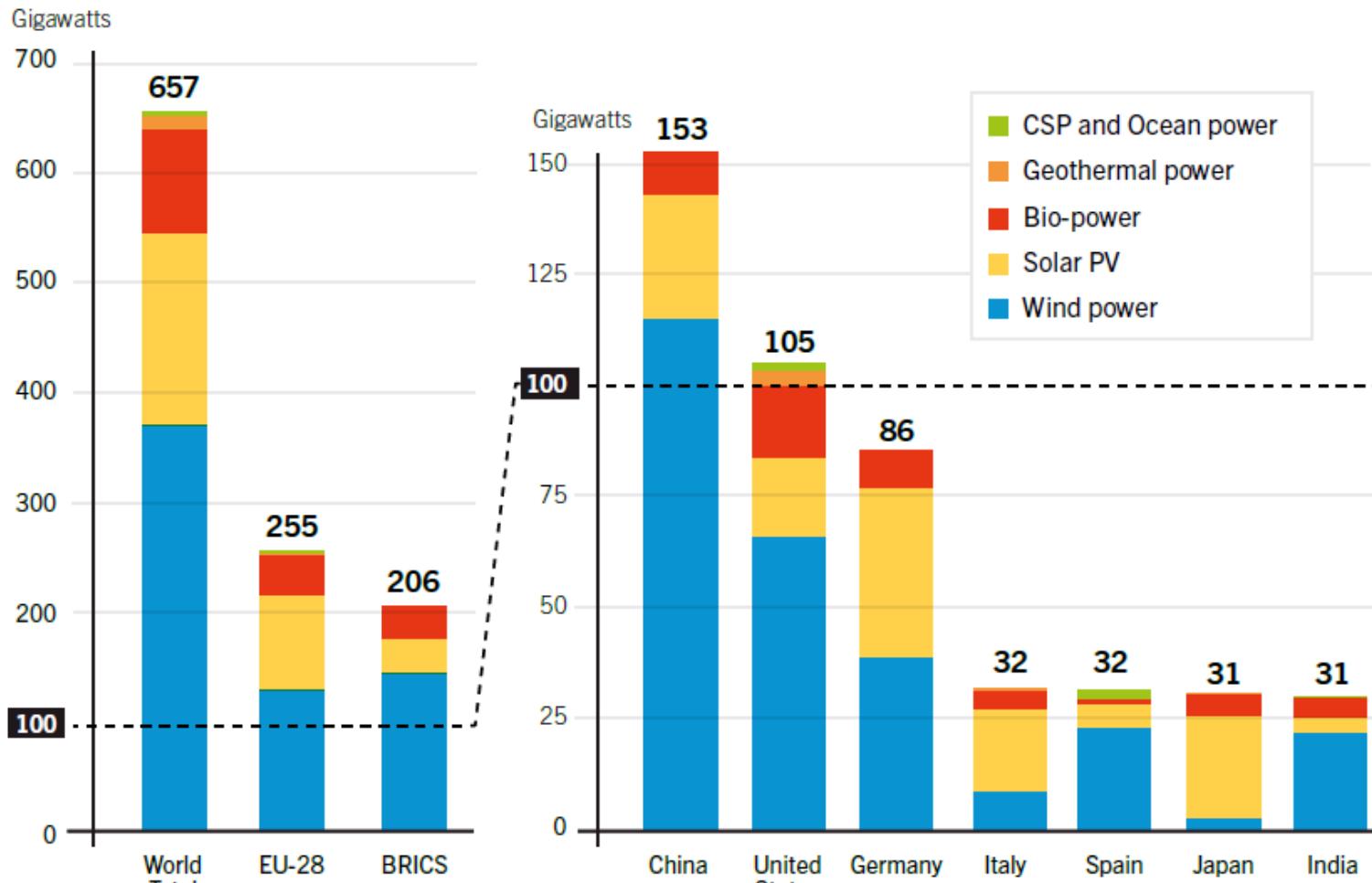


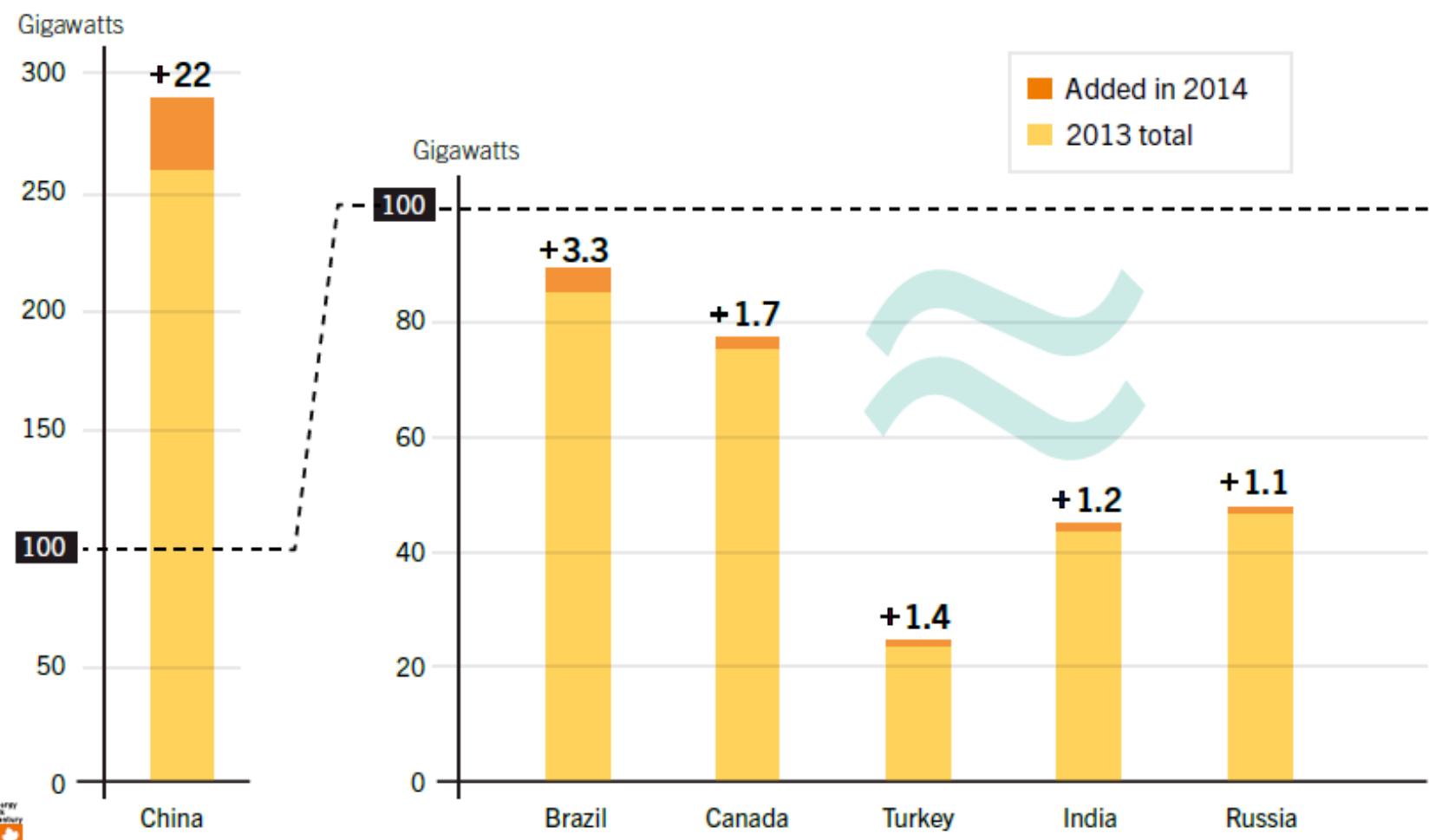
Figure 4. Renewable Power Capacities* in World, EU-28, BRICS, and Top Seven Countries, 2014



* not including hydropower (See Reference Table R2 for data including hydropower.)

Source
See En
for this

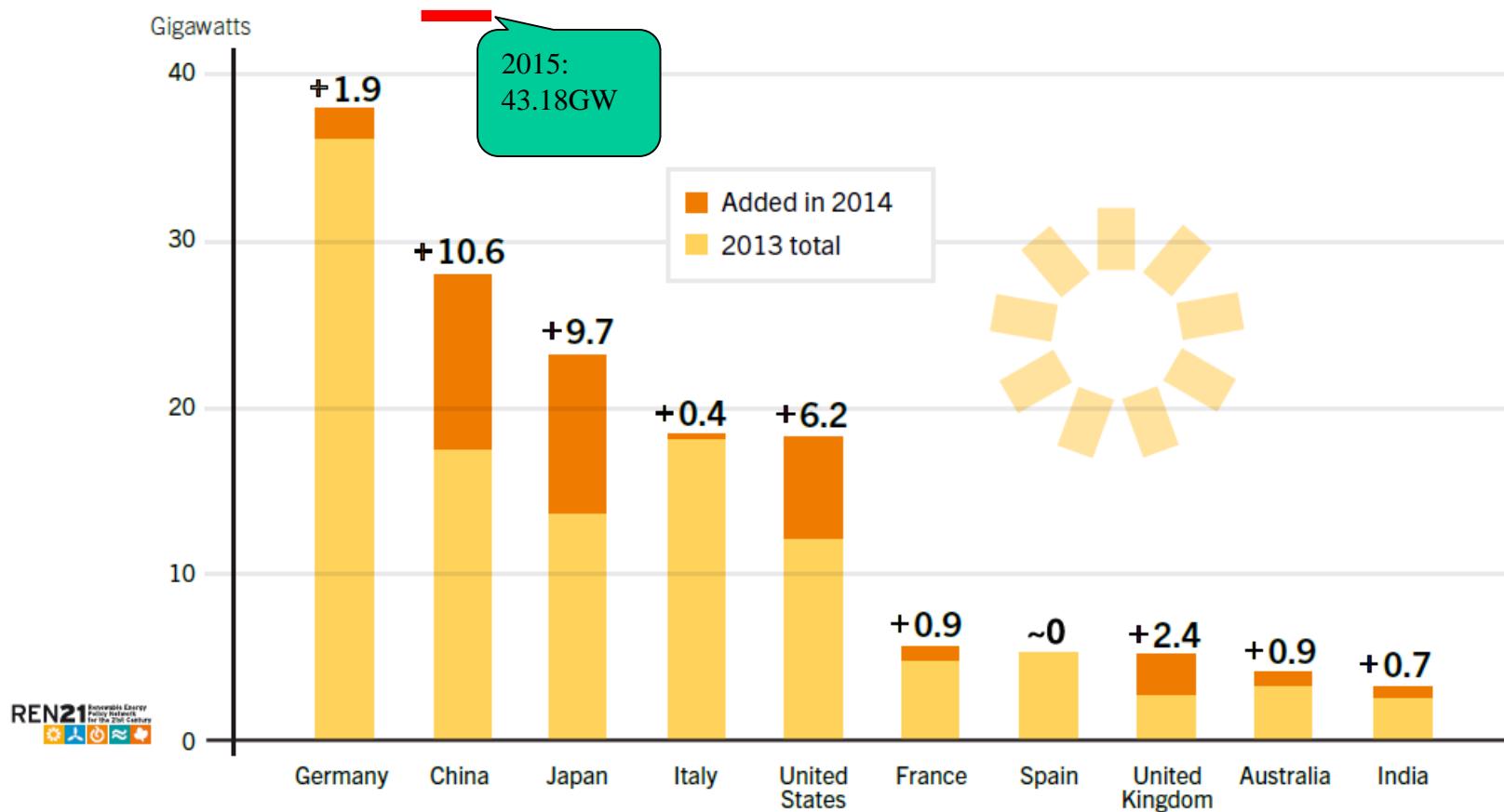
Figure 15. Hydropower Capacity and Additions, Top Six Countries for Capacity Added, 2014



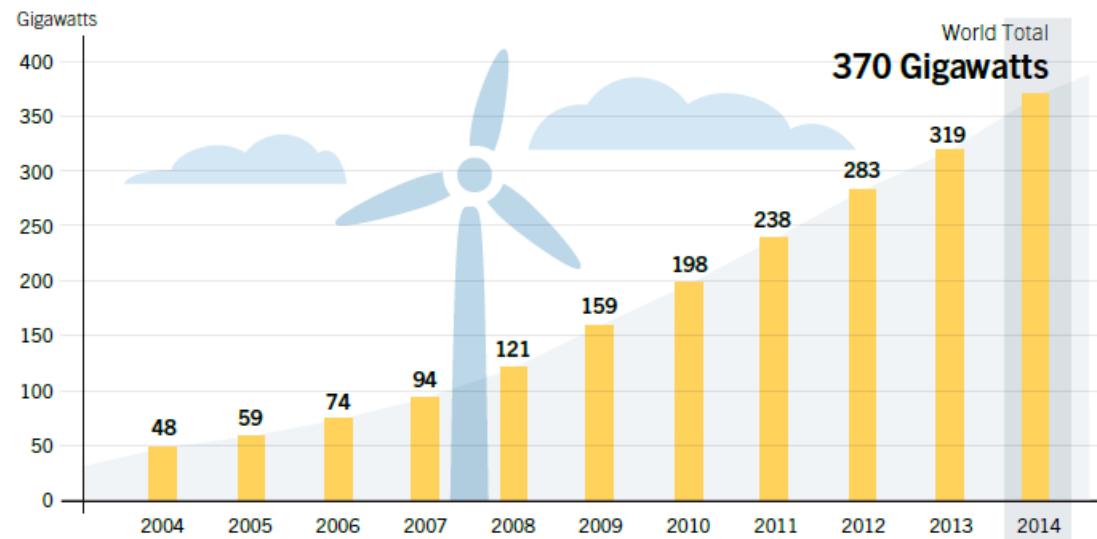


40 GW added in 2014

Solar PV Capacity and Additions, Top 10 Countries, 2014



Wind Power Global Capacity, 2004–2014

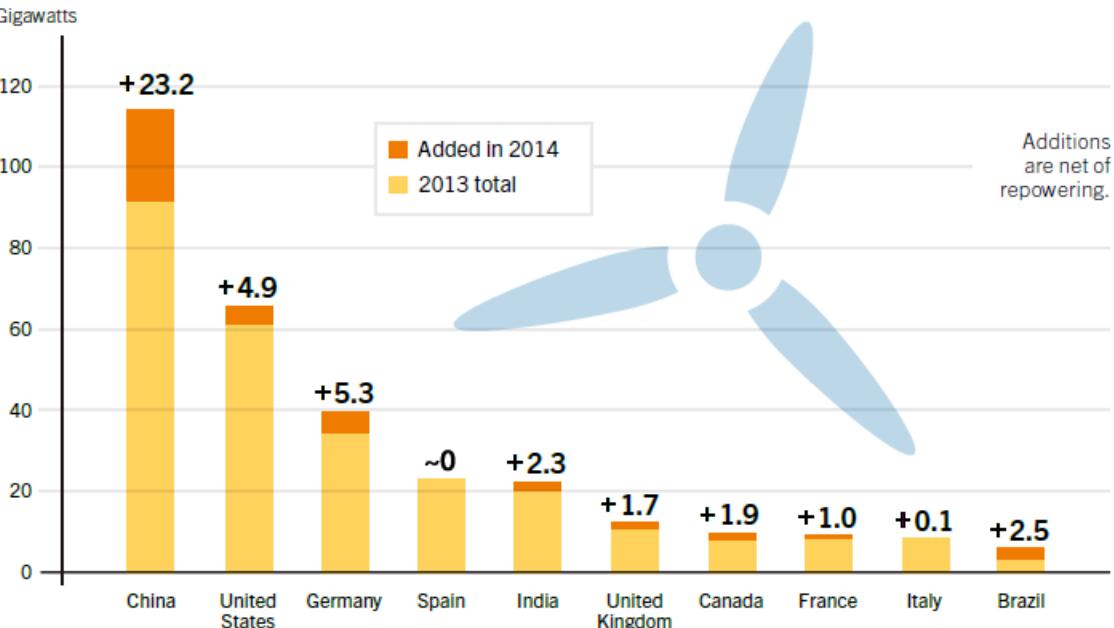


REN21
Sustainable Energy
for the 21st Century

**51 GW
ADDED
in 2014**

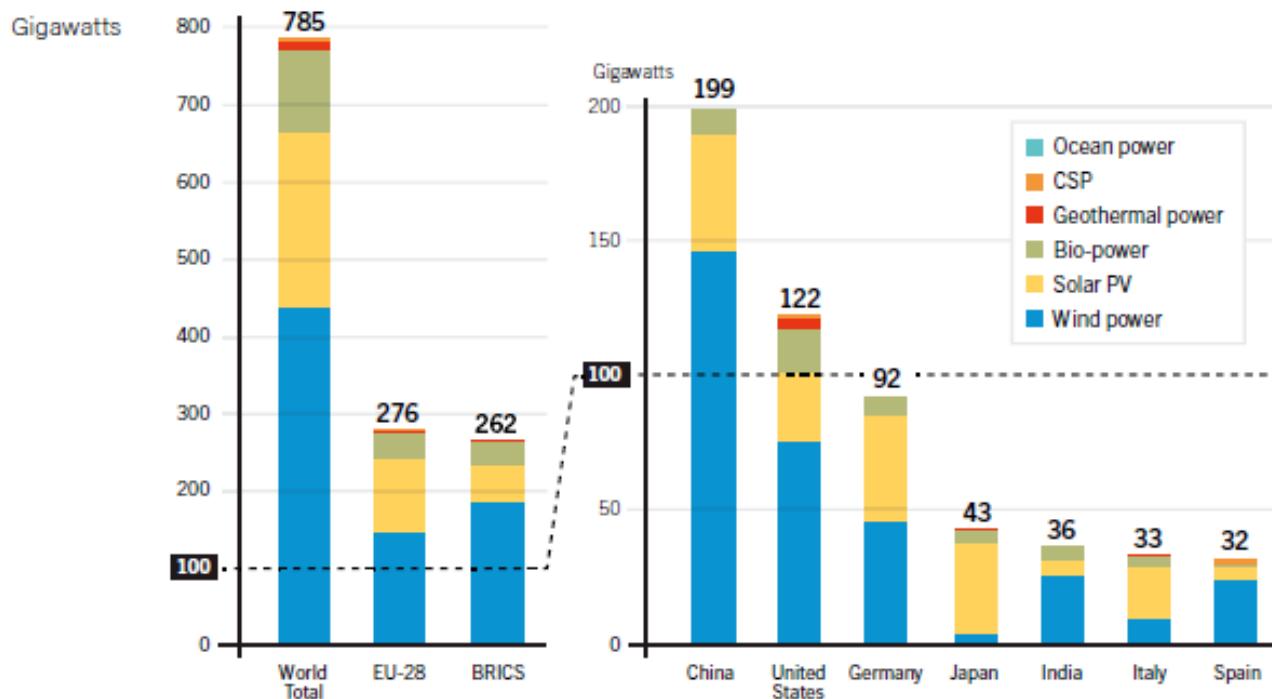
Wind
generated more than
20%
of electricity in
several countries, including:
**Denmark,
Nicaragua,
Portugal, and Spain**

Wind Power Capacity and Additions, Top 10 Countries, 2014



REN21
Sustainable Energy
for the 21st Century

Renewable Power Capacities, in World, EU-28, BRICS and Top Seven Countries, End-2015

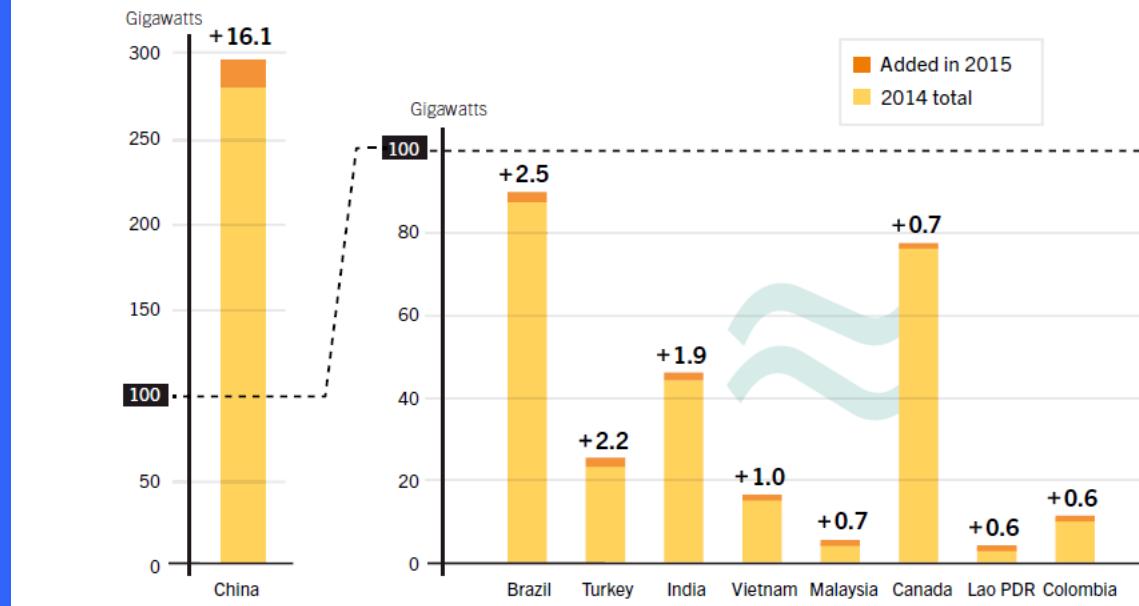


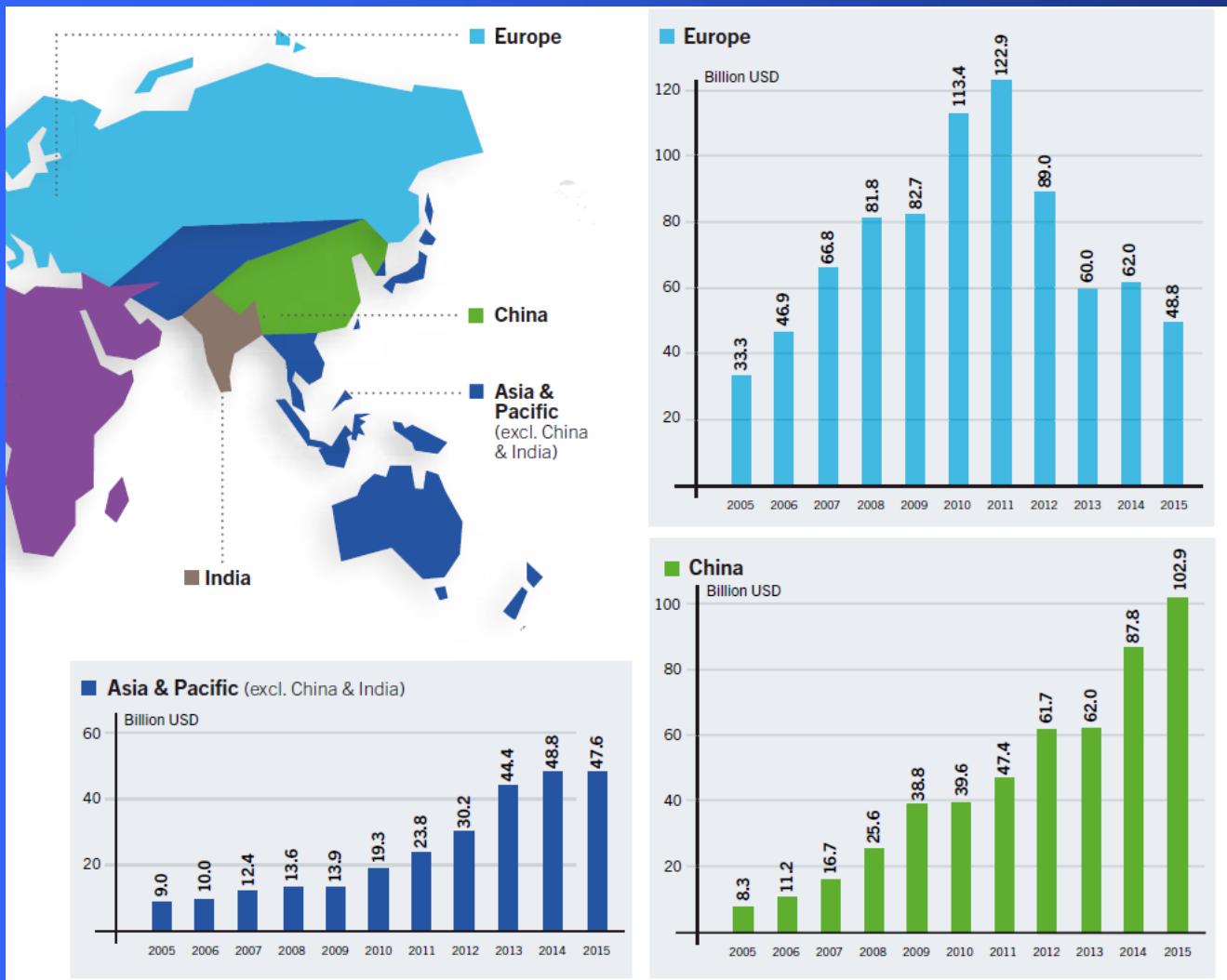
*Not including hydropower (see Reference Table R2 for data including hydropower). The five BRICS countries are Brazil, the Russian Federation, India, China and South Africa.

GLOBAL CAPACITY REACHED 1,064 GW

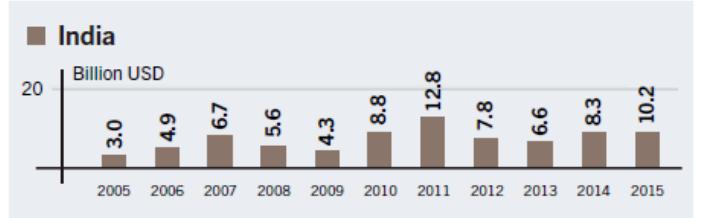
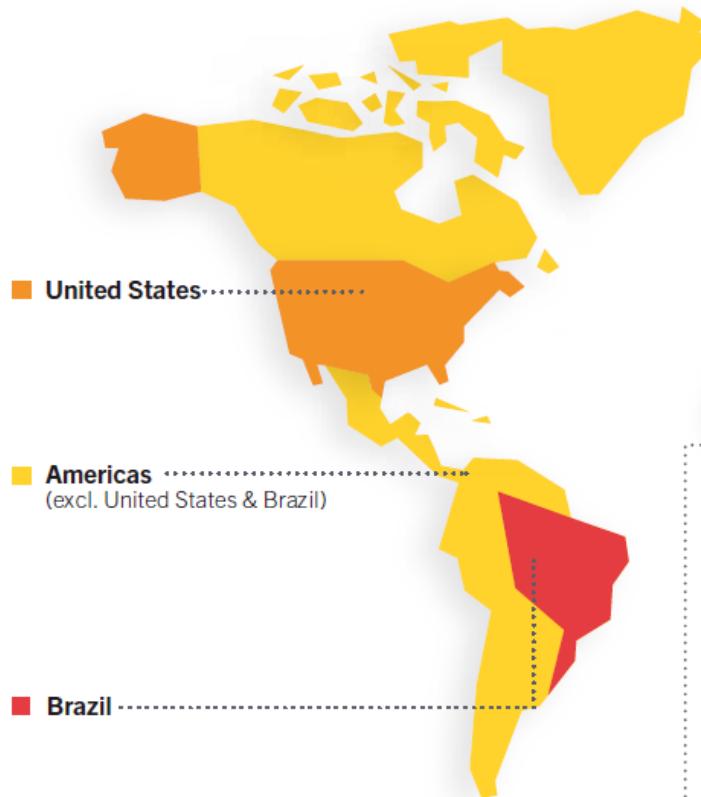
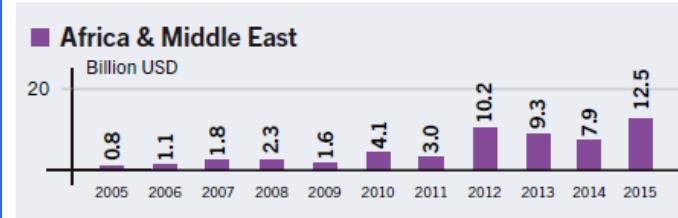
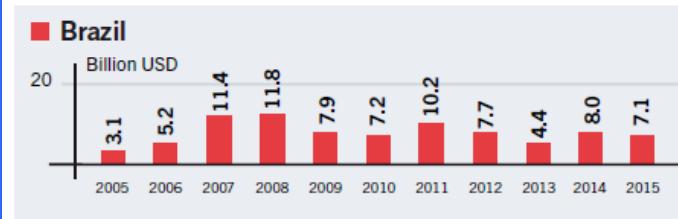
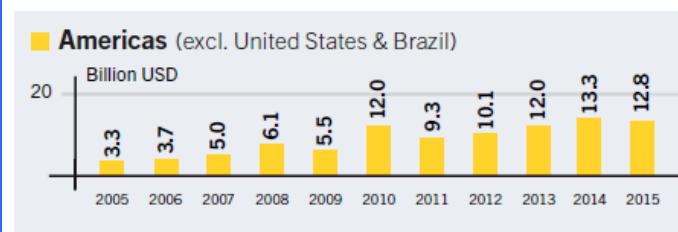
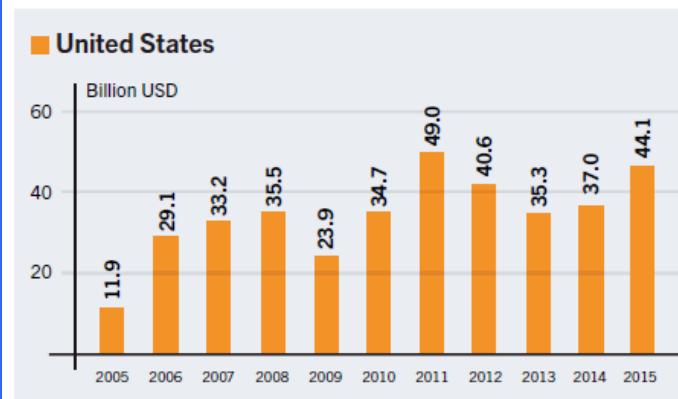


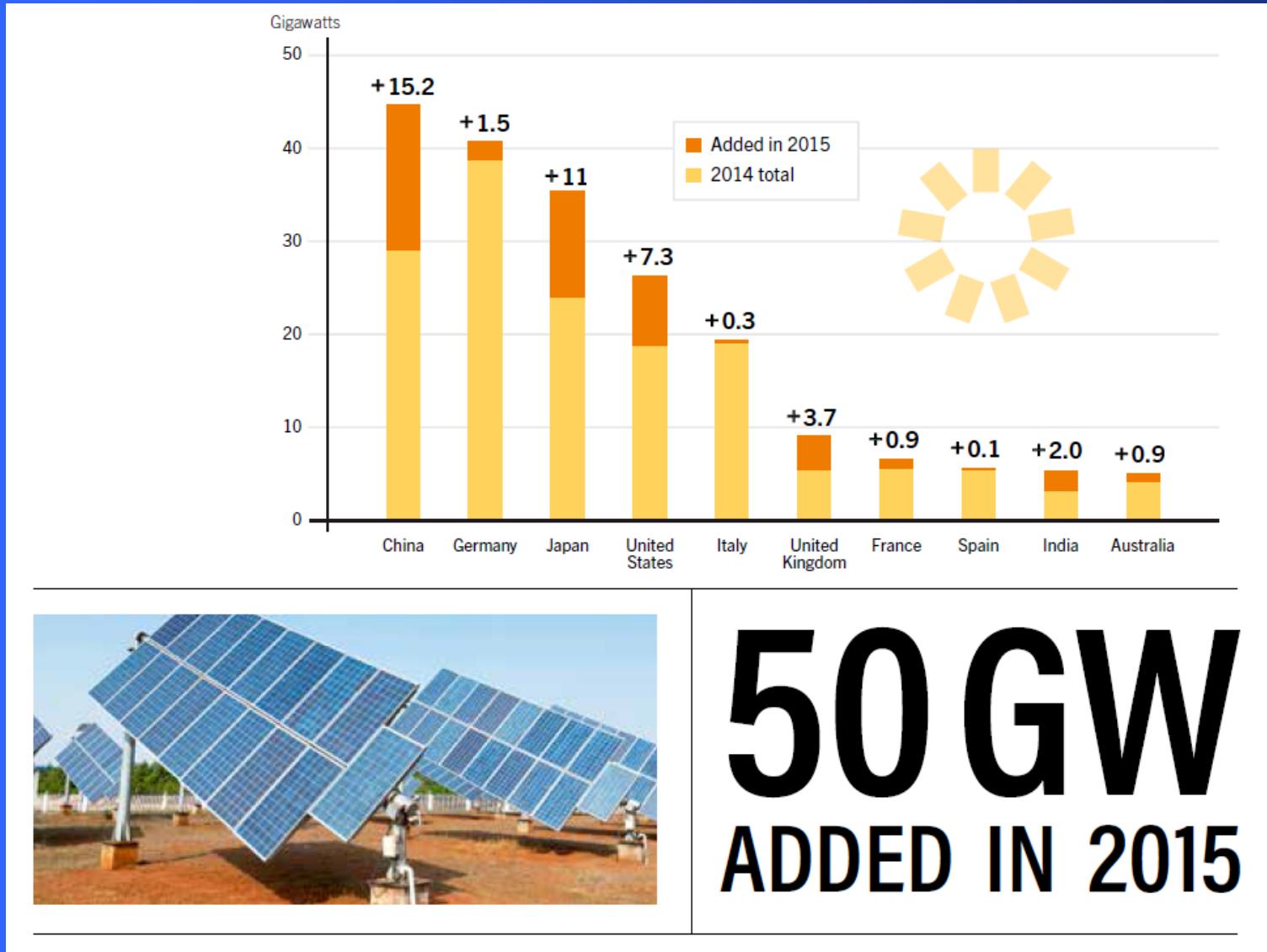
Hydropower Capacity and Additions, Top Six Countries for Capacity Added, 2015





Global New Investment in Renewable Power and Fuels, by Country/Region, 2004–2015





What's the future of China's low carbon policy: a big picture

- 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

What's the future of China's low carbon policy: a big picture

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- Land use emission reduction policies: so far relatively poor

INDC+/NDC
for China, and others

INDC of China in Paris

- Peak CO₂ emission in 2030, try to peak earlier
- 60% to 65% carbon intensity reduction by 2030 with comparison with 2005
- 20% non-fossil energy in TPE

INDC+/NDC for China

- Peak CO₂ emission in 2030, **try to peak earlier**

peak 2020-2022

- 60% to 65% carbon intensity reduction by 2030 with comparison with 2005

70%-75% carbon intensity

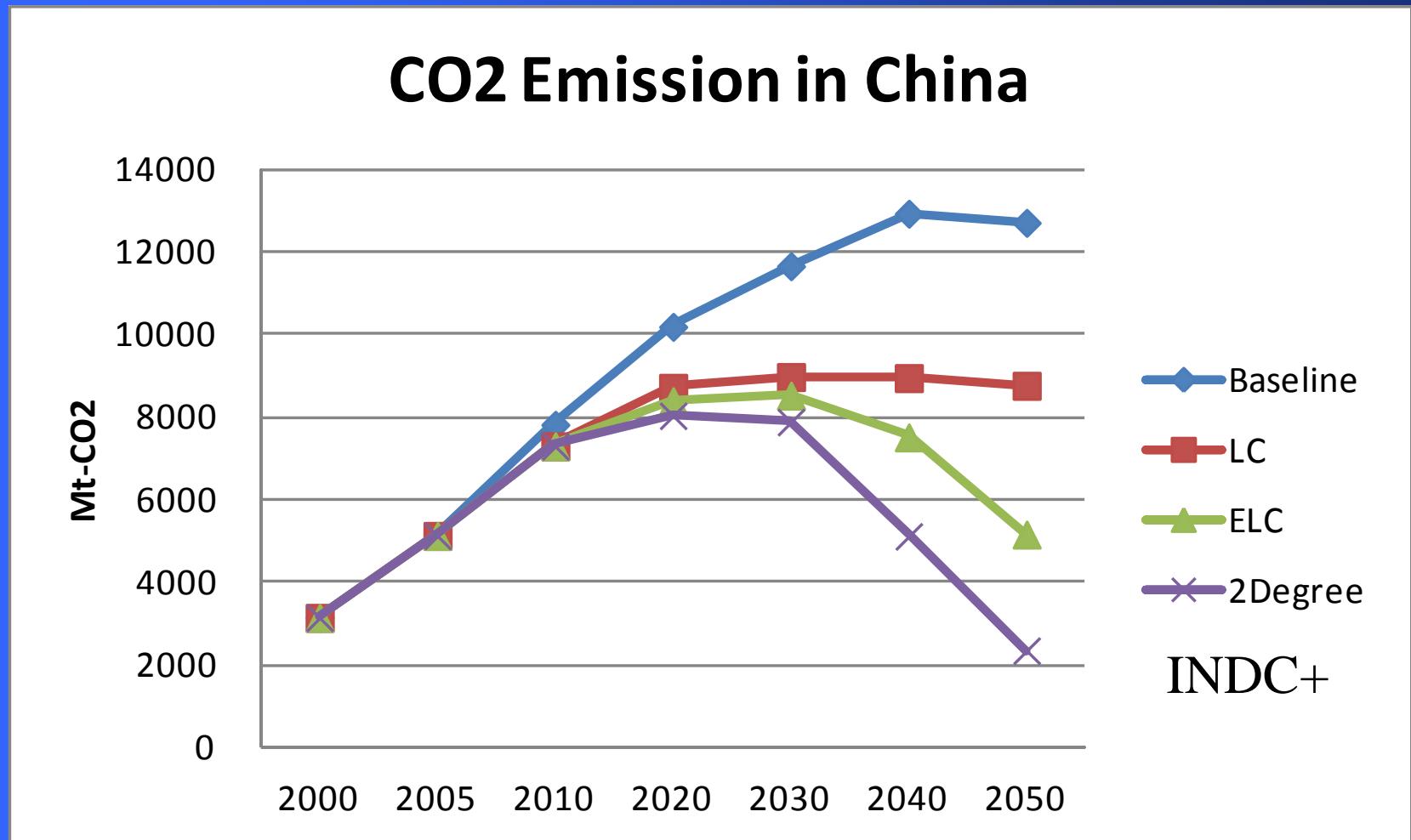
- 20% non-fossil energy in TPE

25%, based on NEA's picture

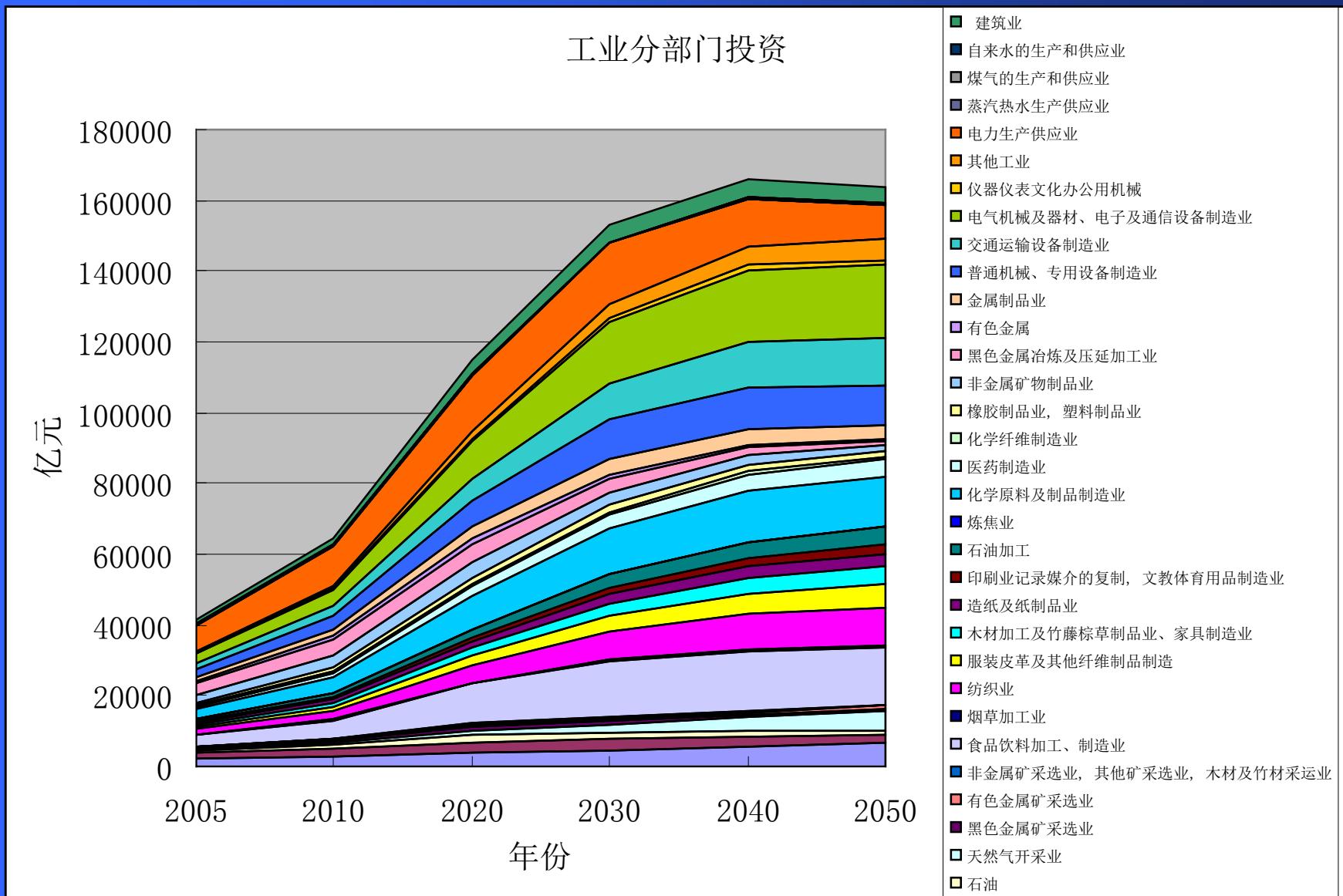
Copenhagen for China: progress

- 40% to 45% carbon intensity reduction in Copenhagen
- 2005-2010: carbon intensity 22% reduction
- 2010-2015: carbon intensity 21.8% reduction
- 2015-2020: 18% reduction based on the 13th Five Year Plan
- Then it is around 50%

Transformation: CO2 emission, a rapid change



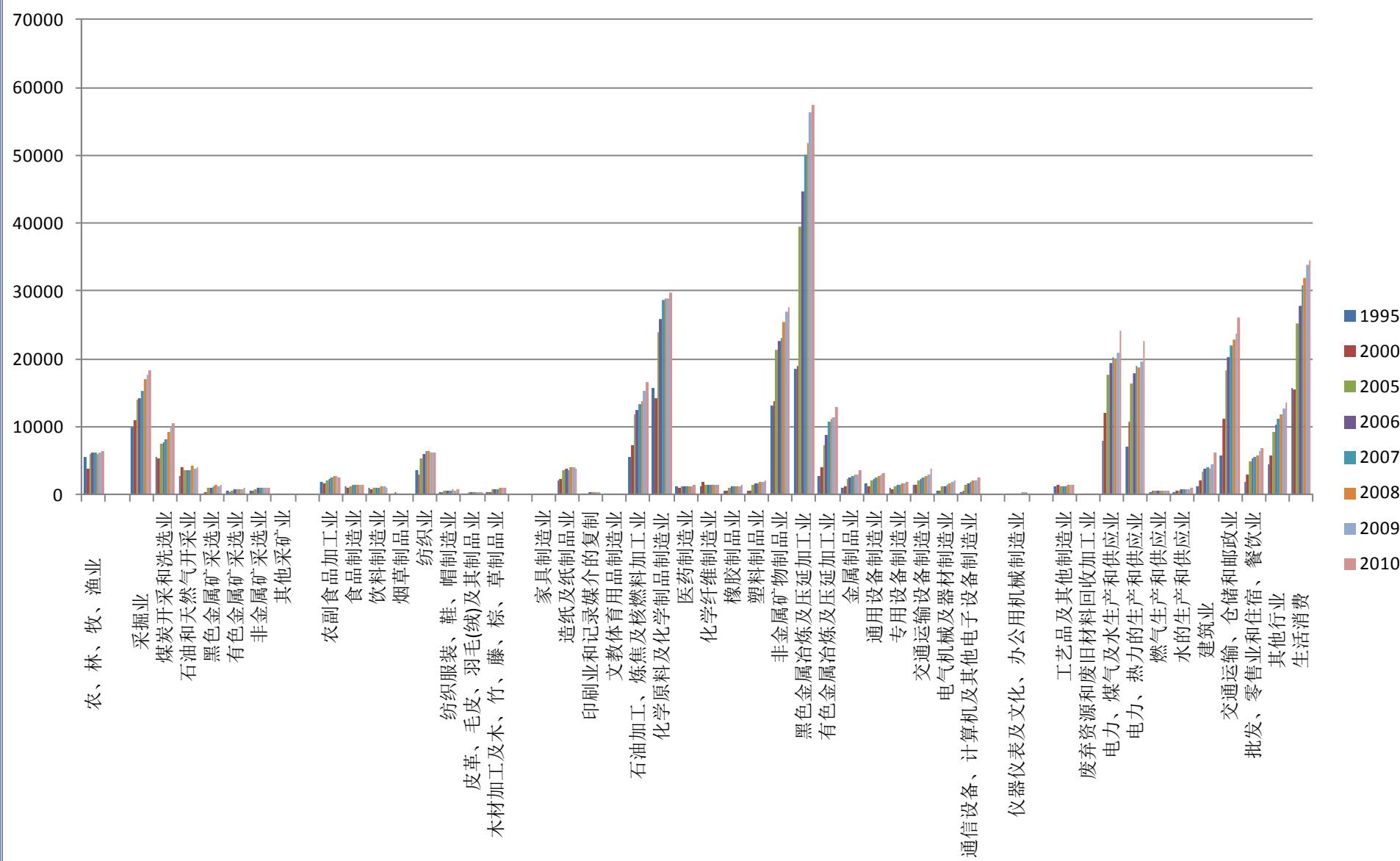
Investment by industrial sectors



Products output in major sectors, Low Carbon and ELC

	Unit	2005	2020	2030	2040	2050
Steel	Million ton	355	610	570	440	360
Cement	Million ton	1060	1600	1600	1200	900
Glass	Million cases	399	650	690	670	580
Copper	Million ton	2. 6	7	7	6. 5	4. 6
Ammonia	Million ton	8. 51	16	16	15	12
Ethylene	Million ton	5. 1	7. 2	7	6. 5	5. 5
Soda Ash	Million ton	14. 67	23	24. 5	23. 5	22
Casutic	Million ton	12. 64	24	25	25	24
Paper	Million ton	62. 05	110	115	120	120
Fertilize	Million ton	52. 2	61	61	61	61
Aluminum	Million ton	7. 56	34	36	36	33
Paper	Million ton	46. 3	50	50	50	45
Calcium c	Million ton	8. 5	10	8	7	4

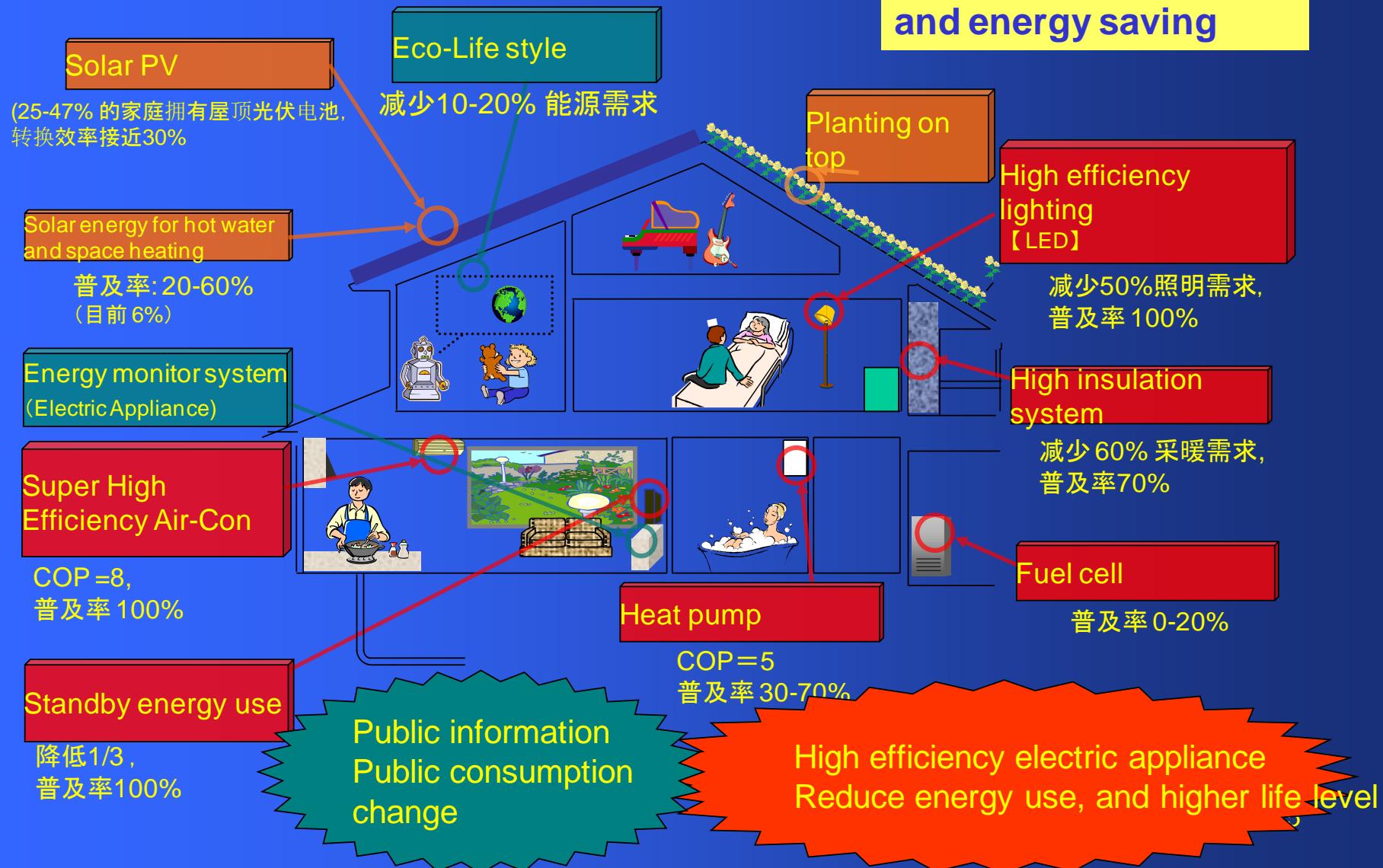
分部门能源消费量, Energy demand by sector, 1995-2010



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

Low Carbon House in 2050: comfortable and energy saving



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服装城

迷你挑

团购

夺宝岛

在线游戏

办中银京东卡



全部结果 > “平板电视机”

所有类目

相关搜索：平板电视 | 电视机 | 电视 | 液晶电视 | 平板电脑 | 冰箱

大家电 (313)

亚振电器 (977)

网购上京东
省钱又放心

荣耀四核

热门搜索：新一代APU 跑步机

网购上京东
省钱又放心

灯泡

热门搜索：新一代AP

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全部结果 > “LED平板电视机”

所有类目

大家电 (253)

平板电视 (248)

家电配件 (5)

推广商品

乐华 (ROWA) LED23C310A 23英寸 LED液晶电视 USB+HDMI 液晶显示
¥999.00

惊爆价

“LED平板电视机” 找到253件相关商品

品牌：京东方 (BOE)

夏普 (sharp)

长虹 (CHANGHONG)

价格：0-2199 2200-3799 3800-

品类：LED背光电视 LCD背光电视

排序：相关度 销量 价格 评论数

库存：全国 仅显示有货 商品类型：



热卖

全部商品分类

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服装城

迷你挑

全部结果 > “灯泡”

所有类目

灯具 (691)

节能灯 (143)

LED灯 (365)

装饰灯 (15)

台灯 (10)

氛围照明 (13)

吸顶灯 (76)

应急灯/手电 (2)

五金电器 (2)

吊灯 (58)

落地灯 (7)

五金家装 (40)

改装配件 (84)

相关搜索：节能灯泡 | 节能灯 | 灯 | led

“灯泡” 找到1068件相关商品

品牌：飞利浦 (Philips)

麦辉 (MAWUI)

蒙特丽

价格：0-69 70-199 200-499

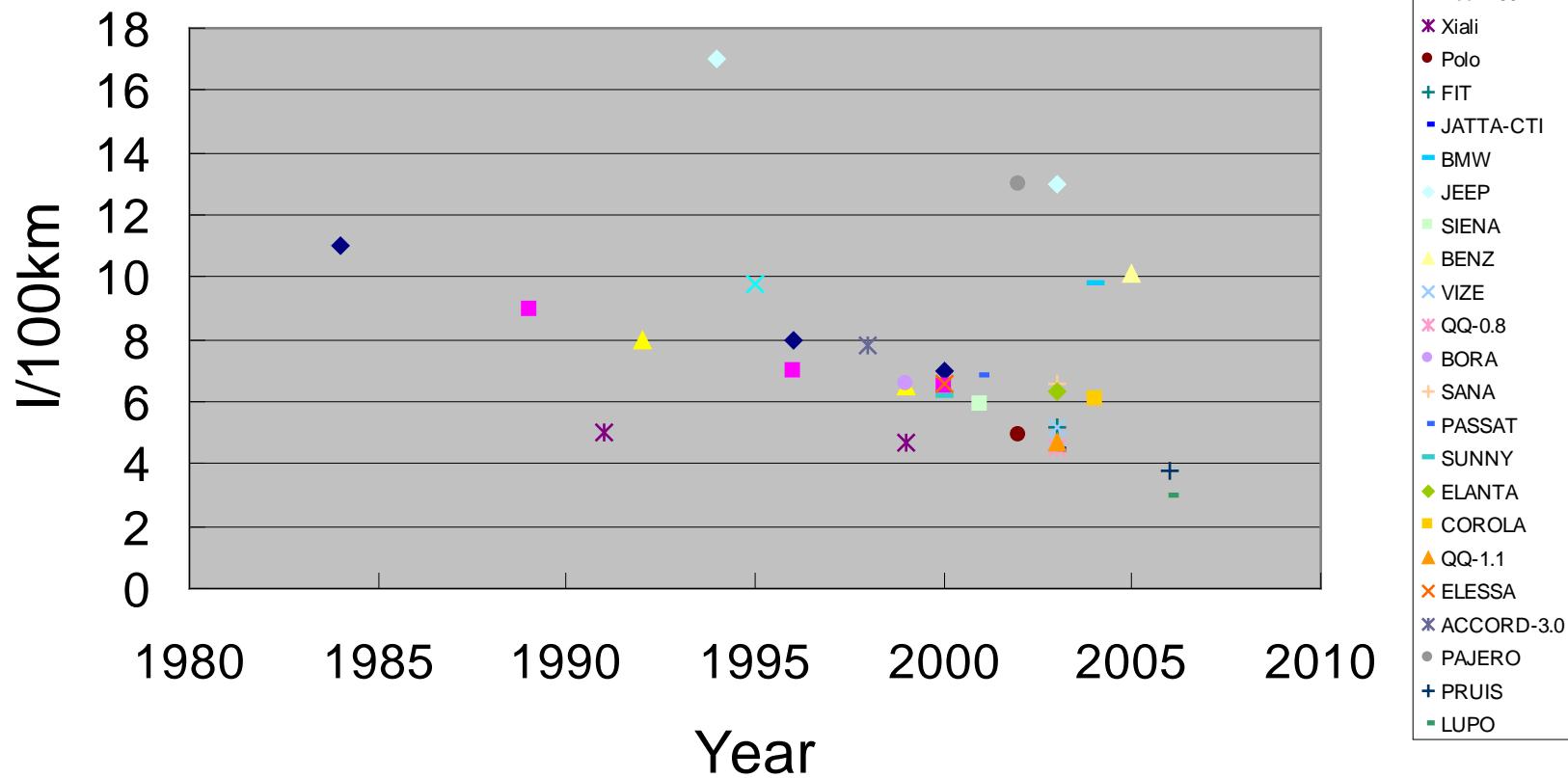
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库存：全国 仅显示有货 商品类型：

Transport, Low carbon scenario

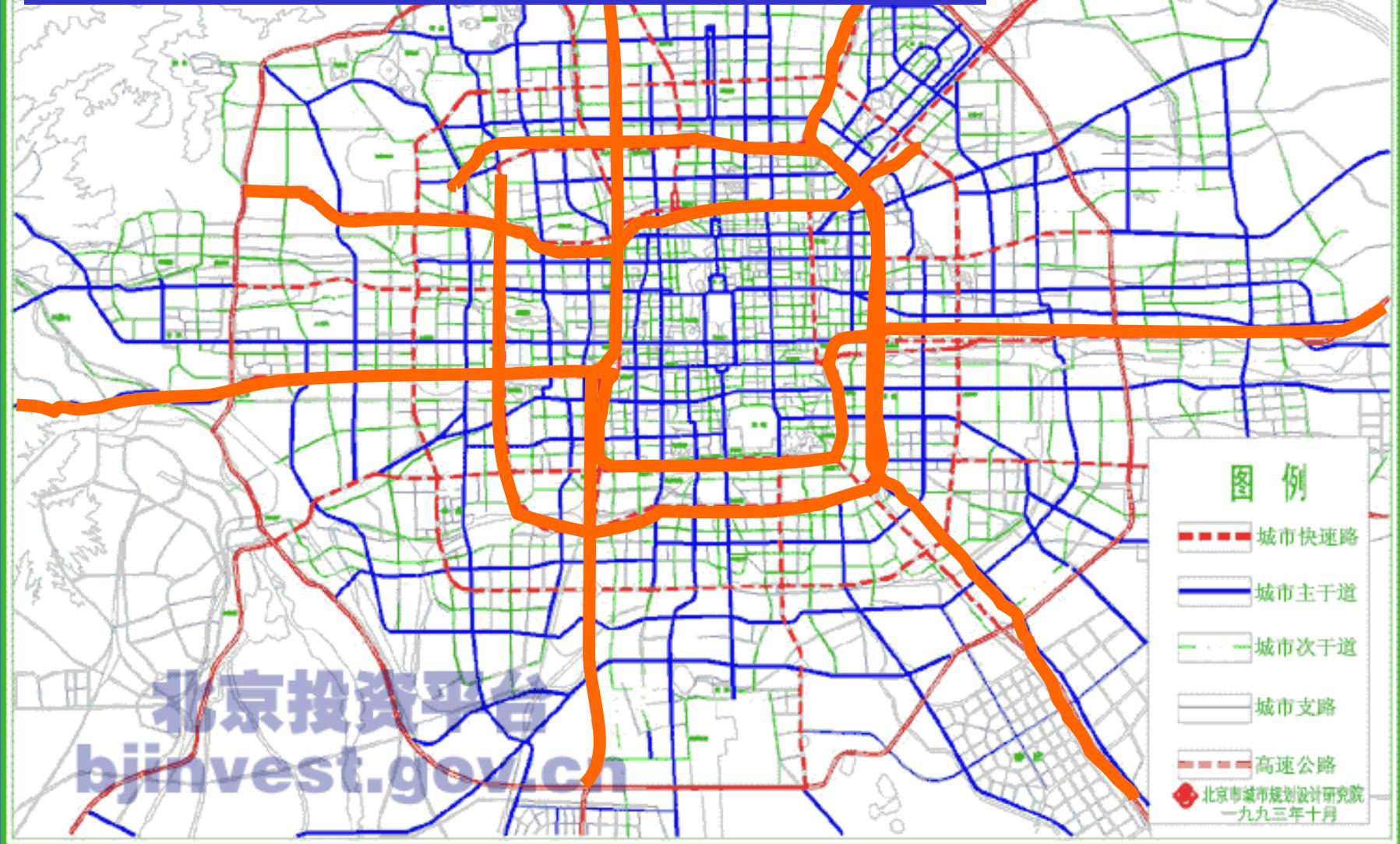
		2005	2010	2020	2030	2040	2050
Family car ownership, per 100HH	Urban	3.37	14	36	65	77	78
	Rural	0.08	0.2	8	38	70	90
Family car annual travel distance, km		9500	9500	9300	8635	8300	7480
Average engin size of family cars, litter		1.7	1.6	1.6	1.6	1.5	1.4
Fuel efficiency of car, L/100km		9.2	8.9	7.1	5.9	4.8	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%

Car Fuel Efficiency in China



北京市区道路网规划方案

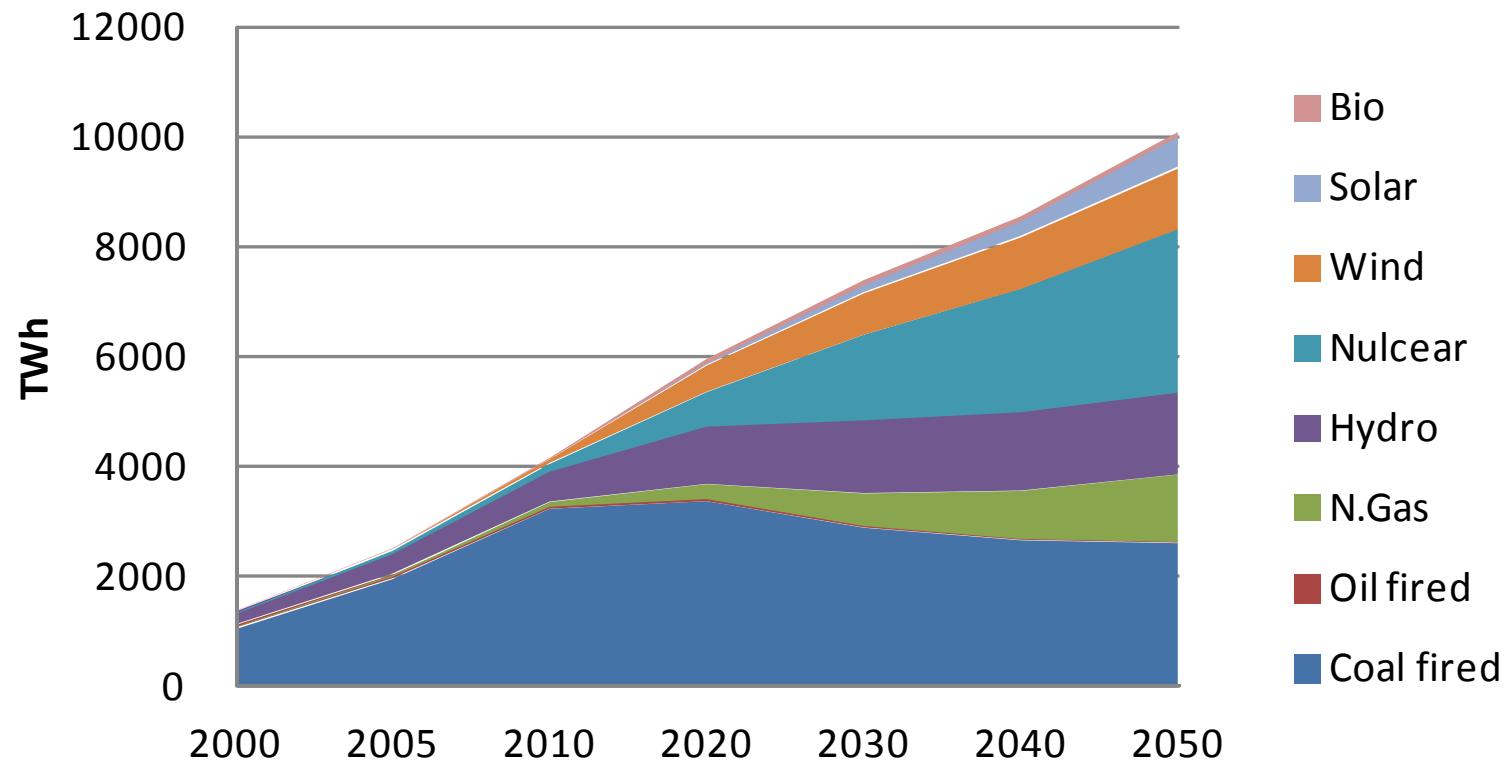
Rapid bus: using existing rapid road



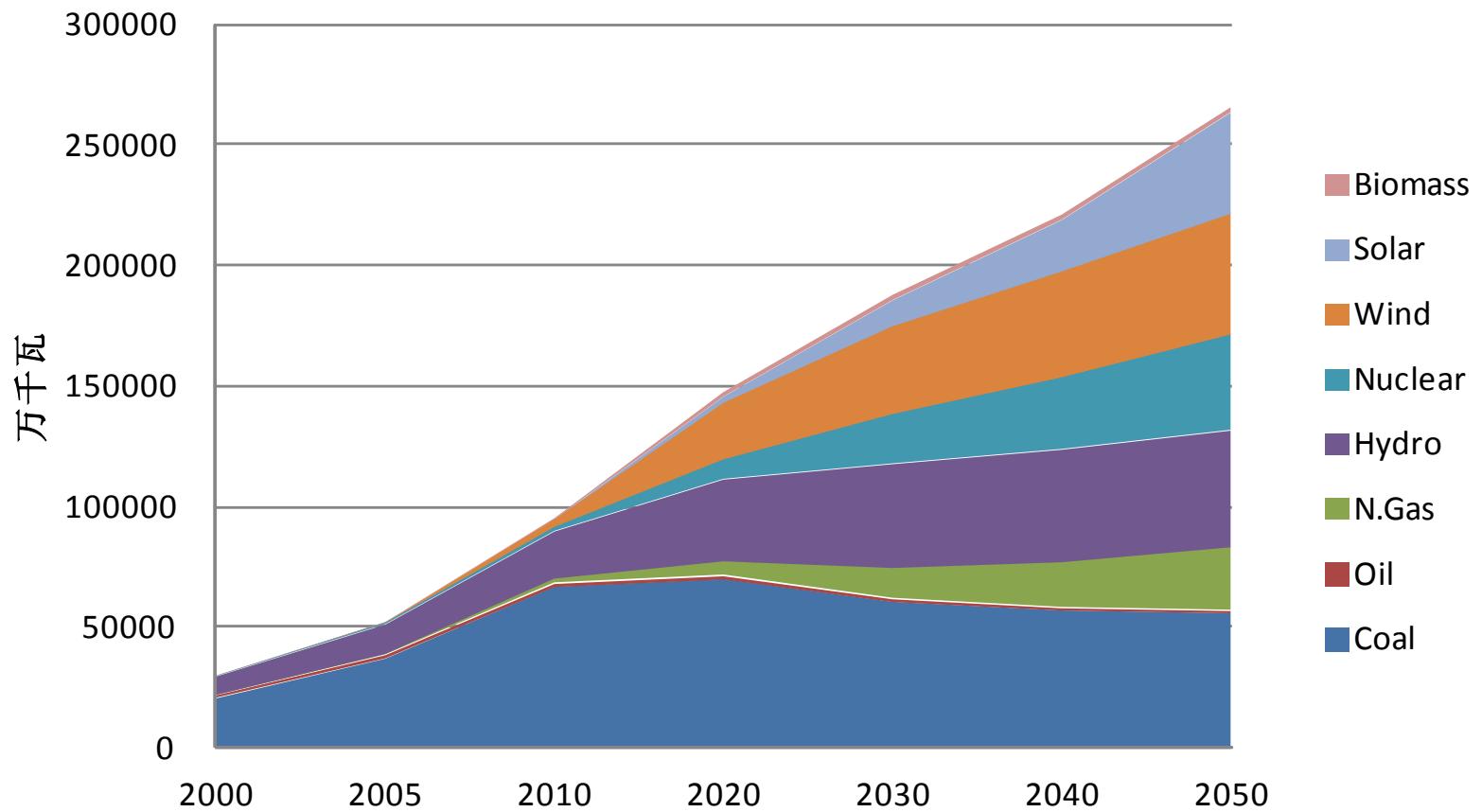
Stockholm: bicycle is coming back



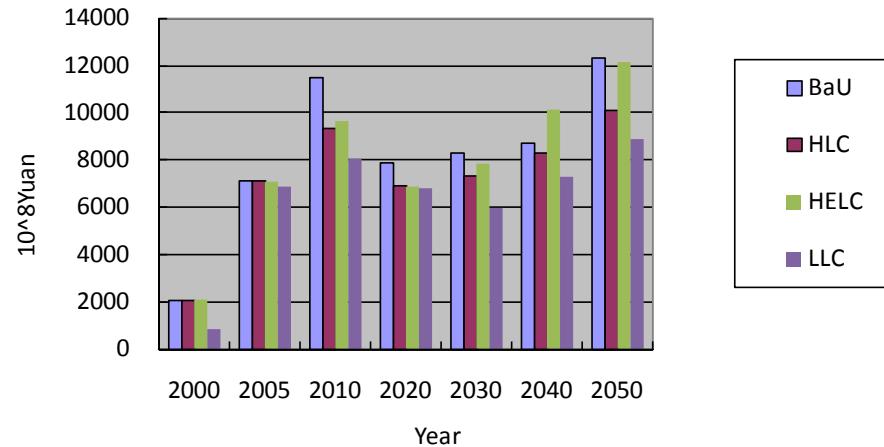
Power Generation



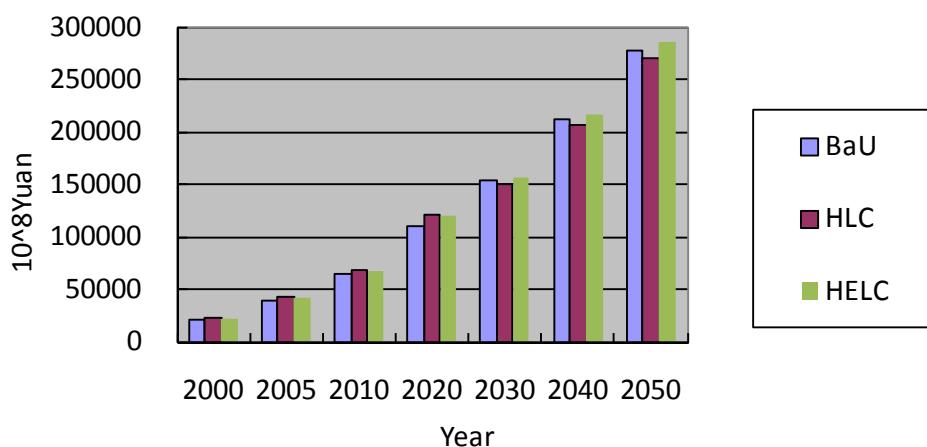
Power Generation Capacity



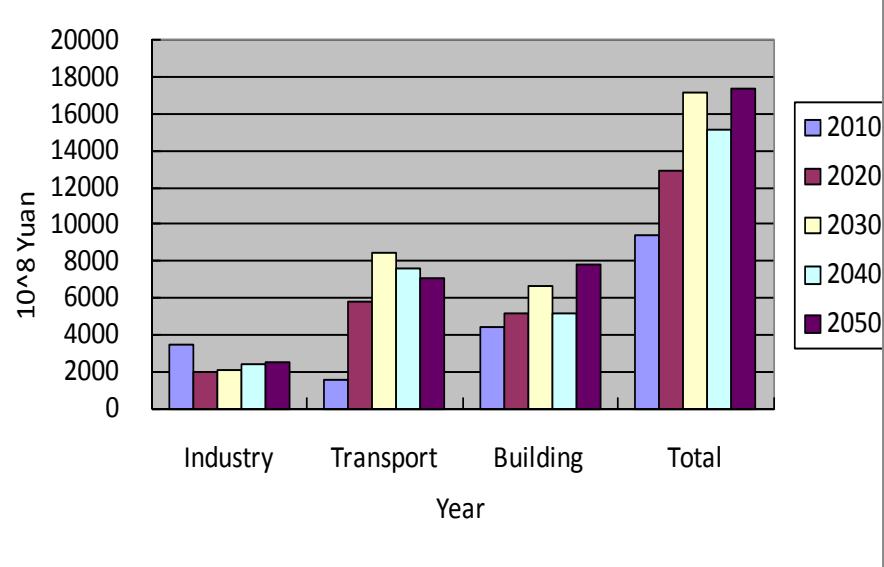
Investment in Energy Industry in China



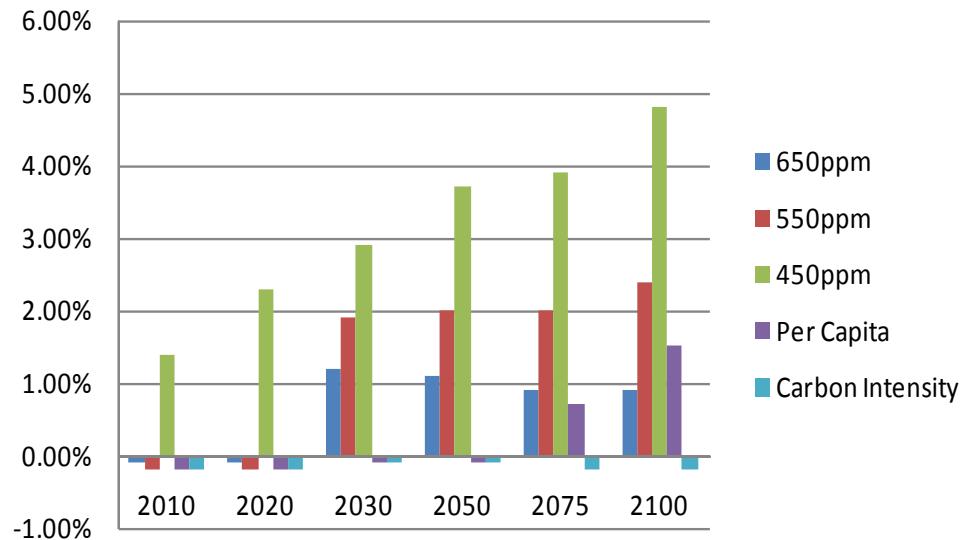
Energy Expenditures in China



Additional Investment in end use sectors in ELC

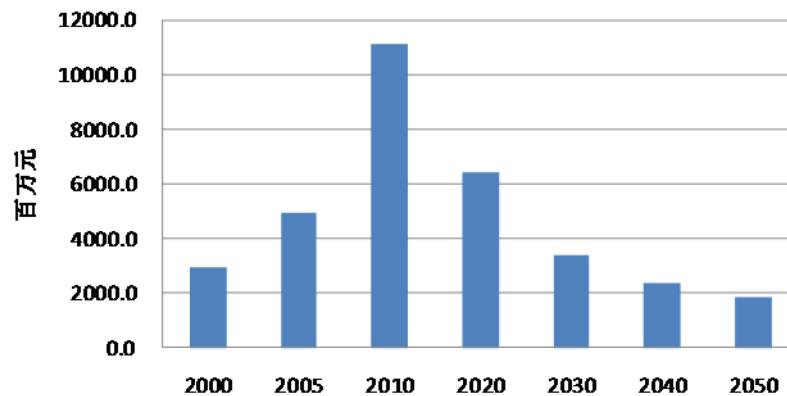


GDP Loss, %

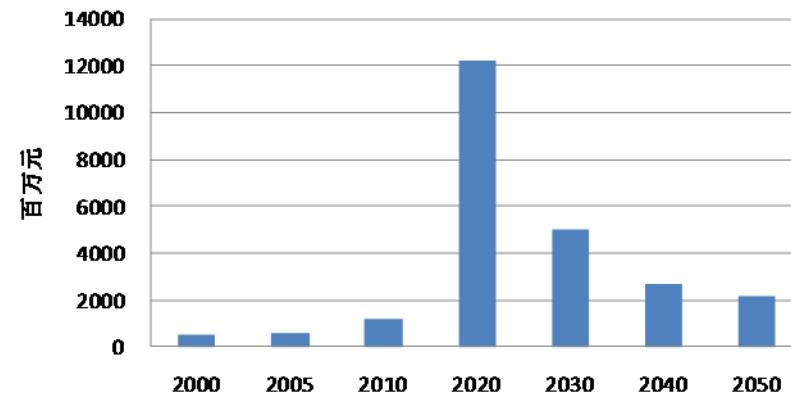


Fixed Investment for Pollution Control, million yuan

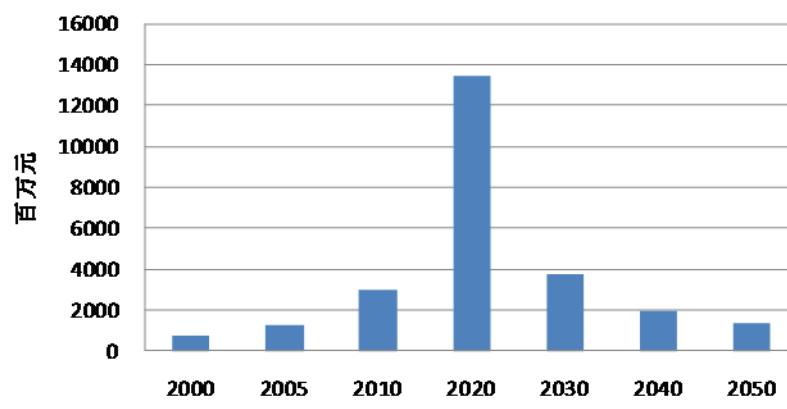
SO₂减排固定投资



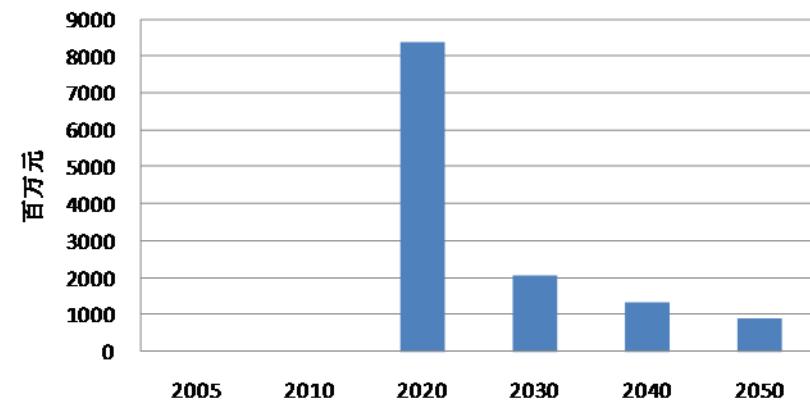
PM2.5减排固定投资



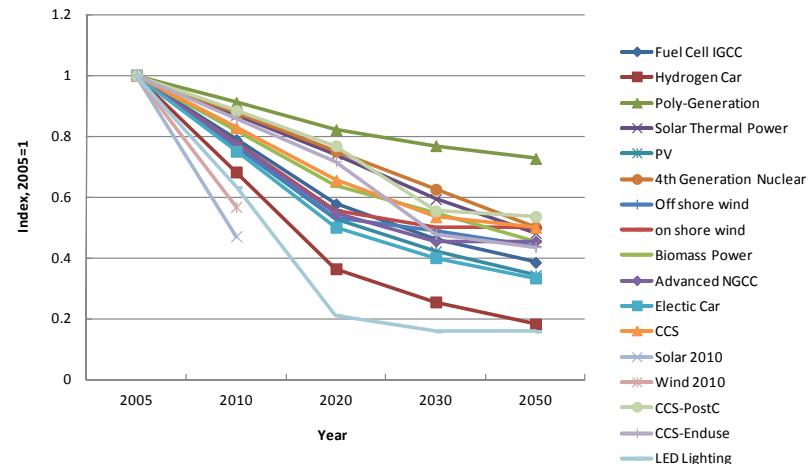
NO_x减排固定投资



汞减排固定投资



Technology learning curve



荣威E50的长/宽/高分别为3569/1551/1540mm，其定位为A00级紧凑型车。



Price: US\$38000

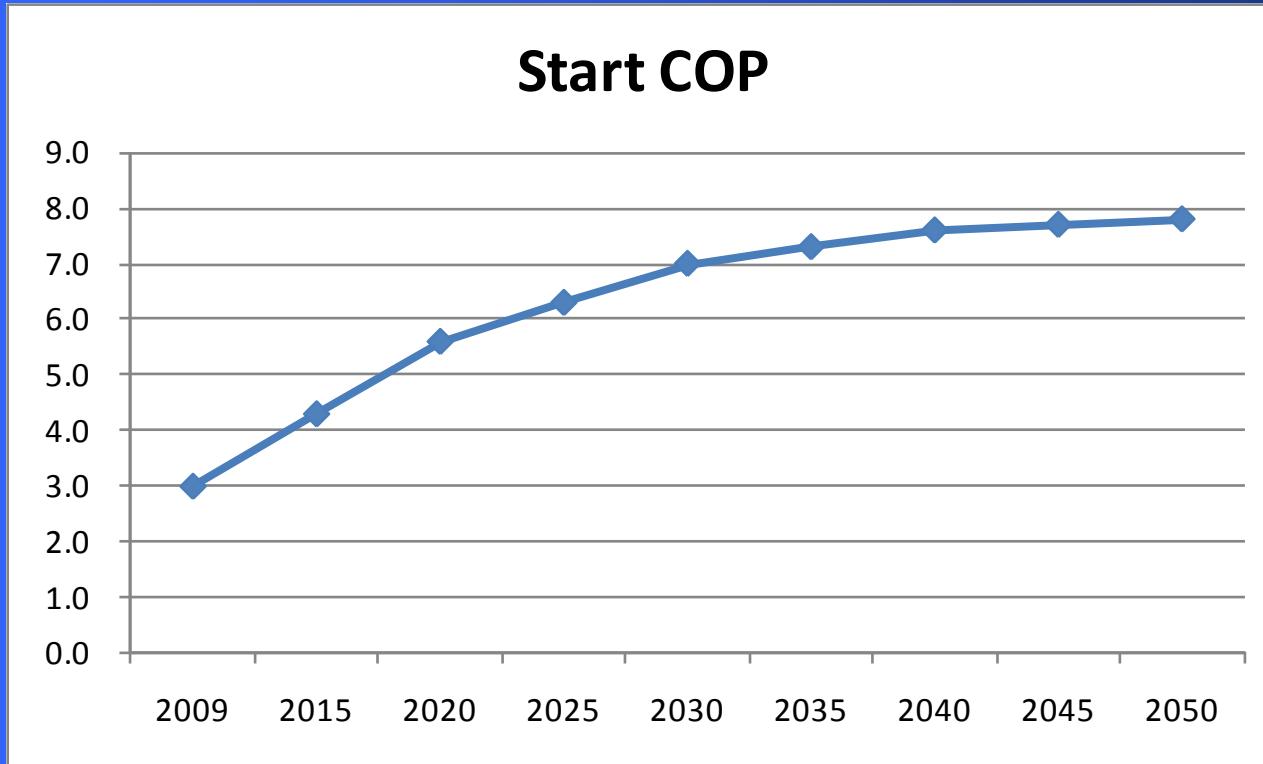
Subsidy: US\$15000(Shanghai), no need to apply number plate(cost US\$10000)
US\$18000(Beijing), no need to apply number plate(By Oct. 2012, 1.1 million people apply for 20000number plates per month),



By 2020, Wind 200GW to 250GW, Solar 50WG

Policy roadmap: Super high efficiency air conditioner

- Efficiency Standard: COP, MEPS
- Government Planning
- Subsidy



Renewable Energy

- Renewable Energy Planning 2006: wind 30GW, Solar 2GW by 2020
- 2009 Energy Bureau: Wind 80WG
- 2010 Energy Planning: Wind 150 GW, Solar 20GW by 2020
- 2013, the 12th Five Year Plan: 20GW of solar PV by 2015, 150GW wind
- February 2013, 35GW PV by 2015
- Now: Wind 200GW to 300GW, Solar 50WG to 120 GW
- Based on the conclusion from Chinese Academy for Engineering, grid in China could adopt these renewable energy power generation in short term.

Natural Gas Scenarios

- In 2010, Natural Gas use 107.2BCM, while 12.2BCM imported.
- In our low carbon scenario: by 2030, 370BCM
- NEA's planning: 260BCM by 2015
- Expecting: 420BCM by 2020

The New Five Year Plan on Air Pollution Control

- From 2013 to 2017
- Target: 30% improvement of air pollution
- A package of policies
- In which: reducing coal use in key areas including Beijing-Tianjin-Hebei region, Yangtze Delta Regions, Pearl River Delta Region
- Clean oil supply for vehicle, upgrade emission standard and oil quality
- Regulation on diffusion on high efficiency cars

The expected big changes in energy system in China

- Coal consumption start to decrease, coal industry should be ready for it, and make own long-term strategy: local manufacture, export/import, security, clean coal use.
- Much more natural gas demand, need to work out for the supply
- Much faster progress on renewable energy, both centralized and distributed
- Grid should be reconstructed to support the system
- Energy price increase, to cover energy environment externality.
- Large scale of nuclear in
- Much lower growth rate for energy demand in China

Figure 4. Renewable Power Capacities in World, EU-28, BRICS, and Top Six Countries, 2013

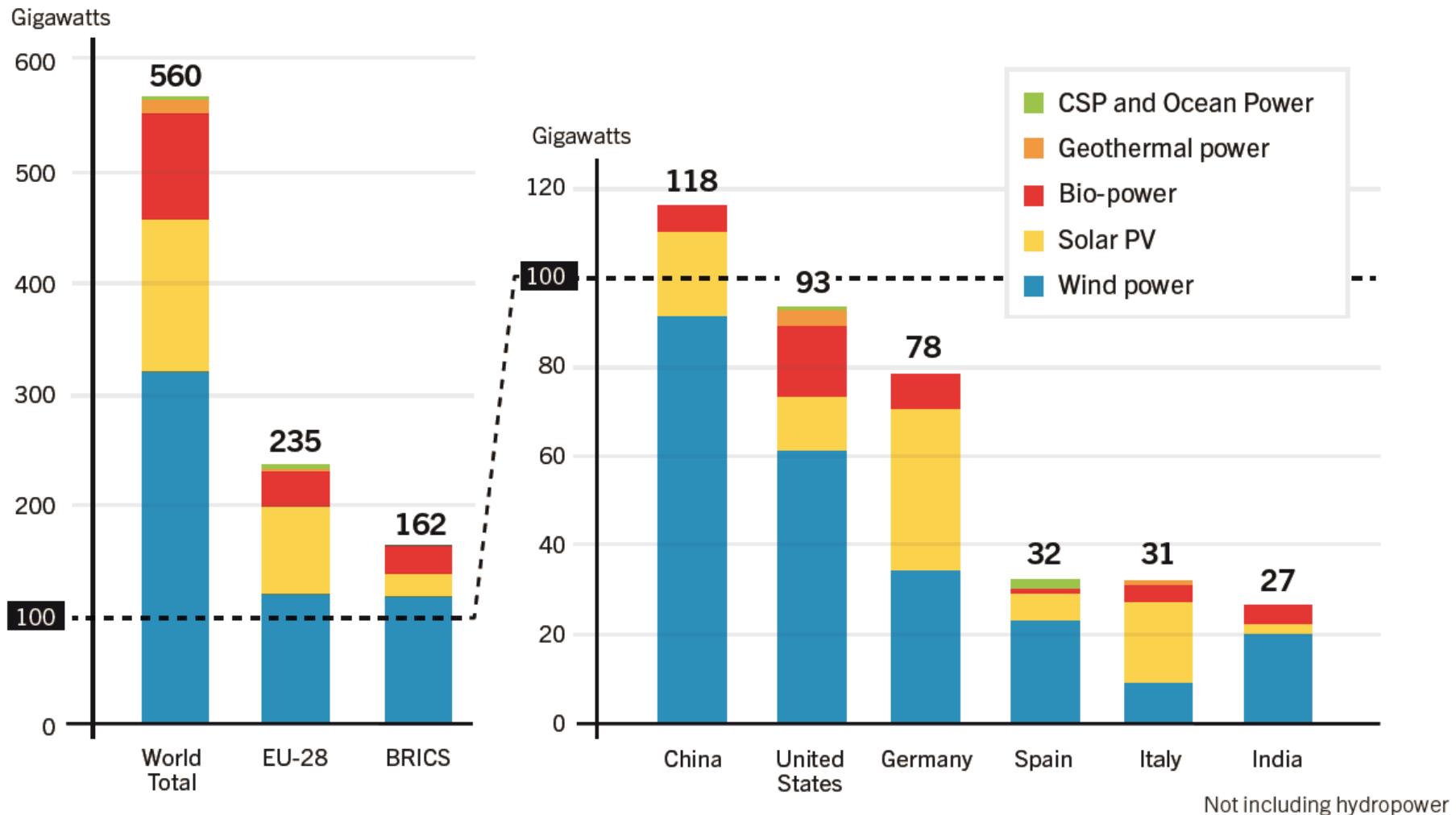


Figure 11. Hydropower Capacity and Additions, Top Six Countries for Capacity Added, 2013

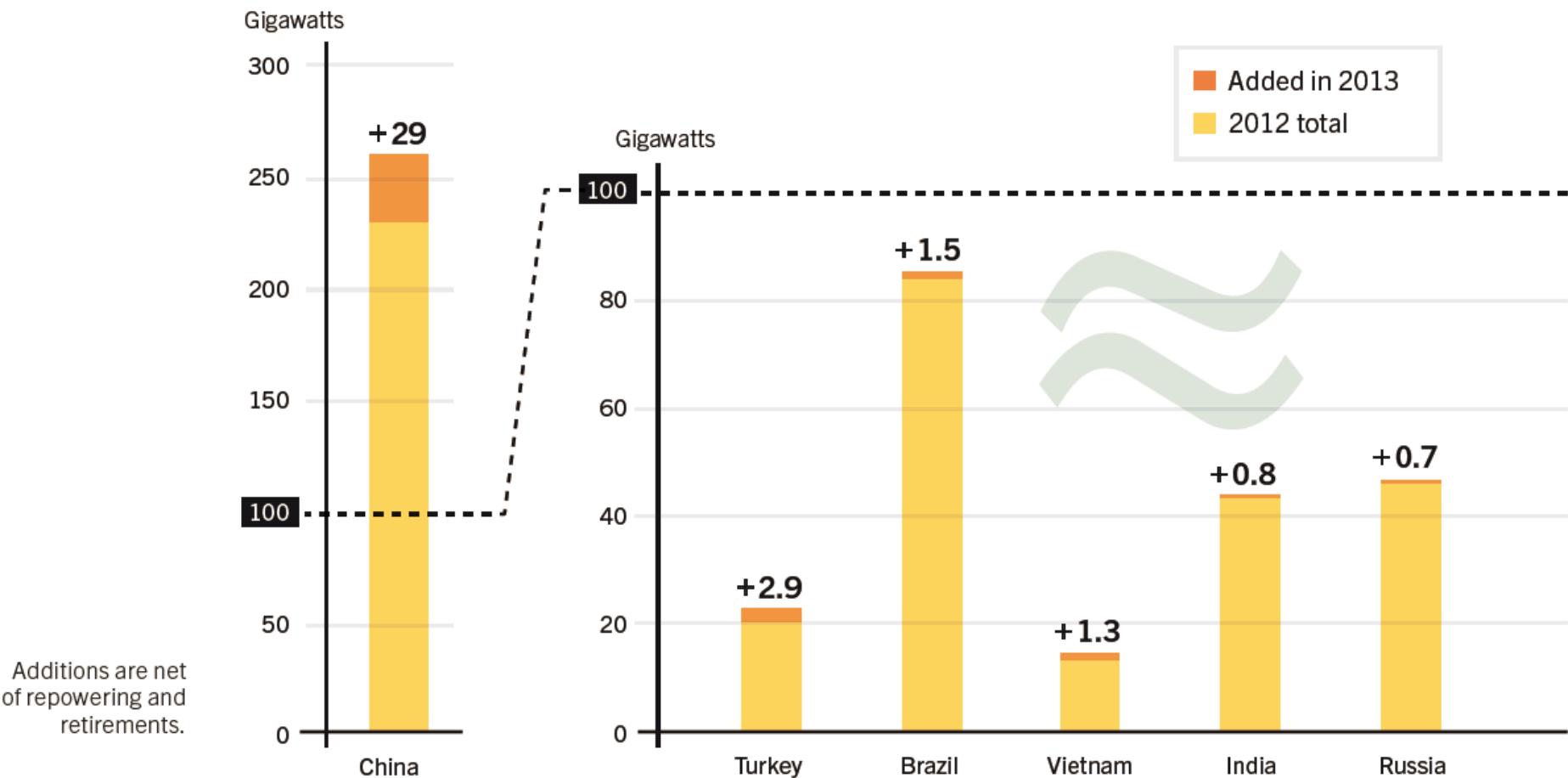


Figure 13. Solar PV Capacity and Additions, Top 10 Countries, 2013

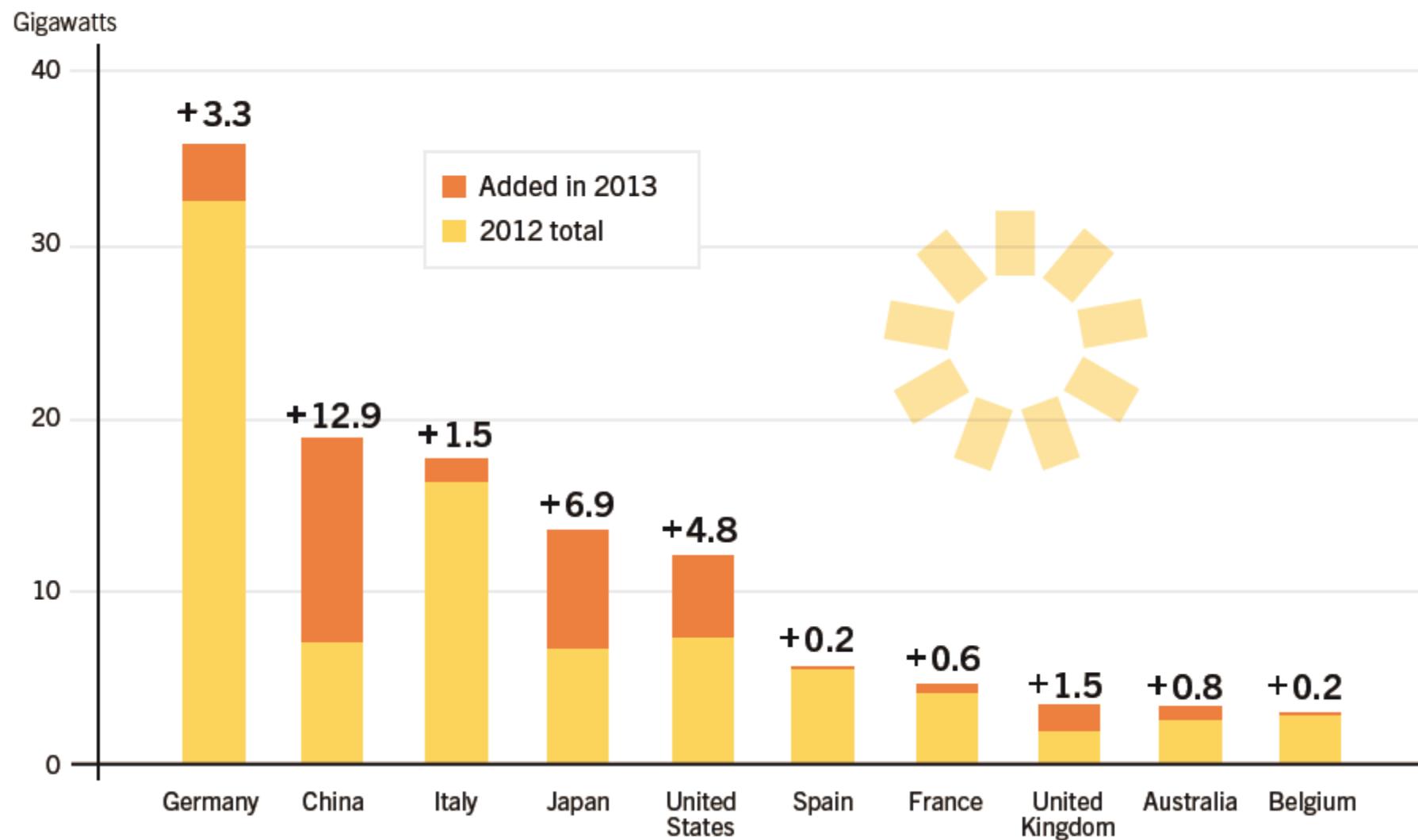


Figure 16. Solar Water Heating Collectors Global Capacity, Shares of Top 10 Countries, 2012

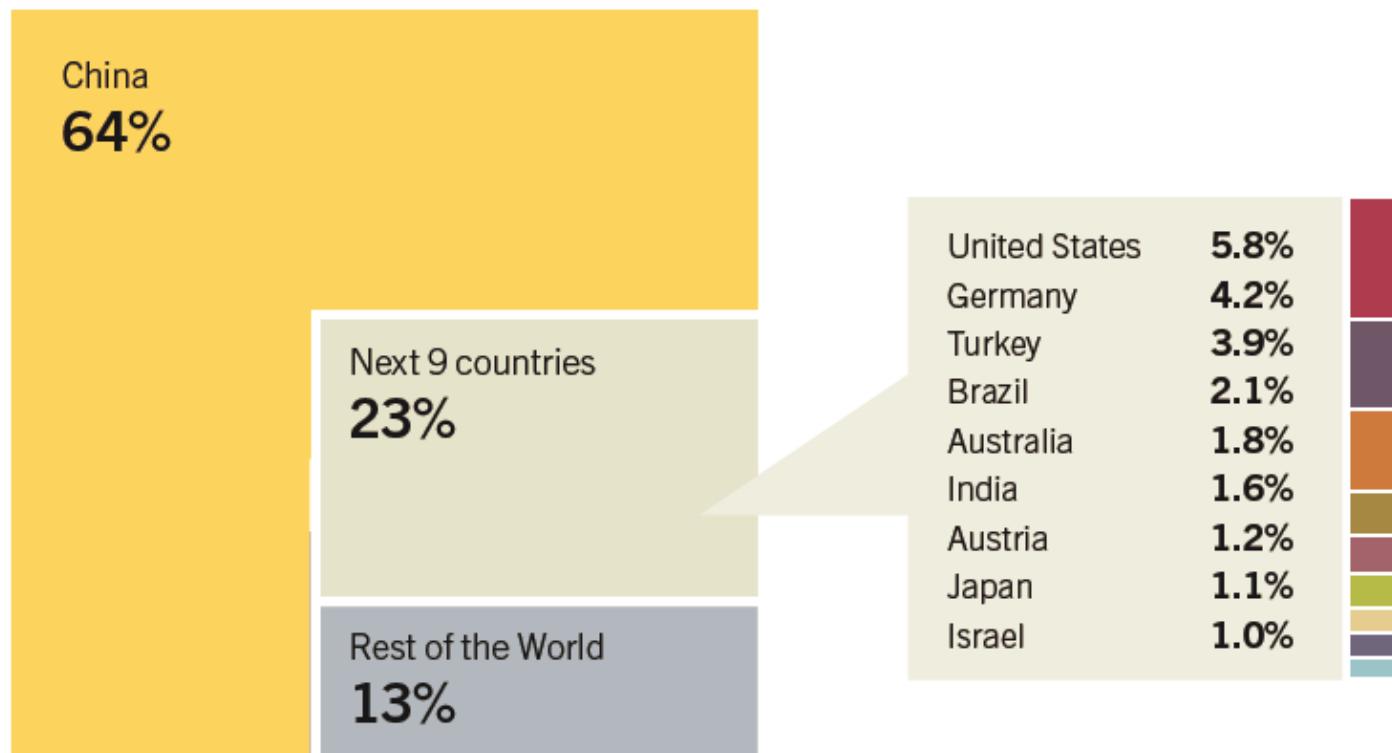
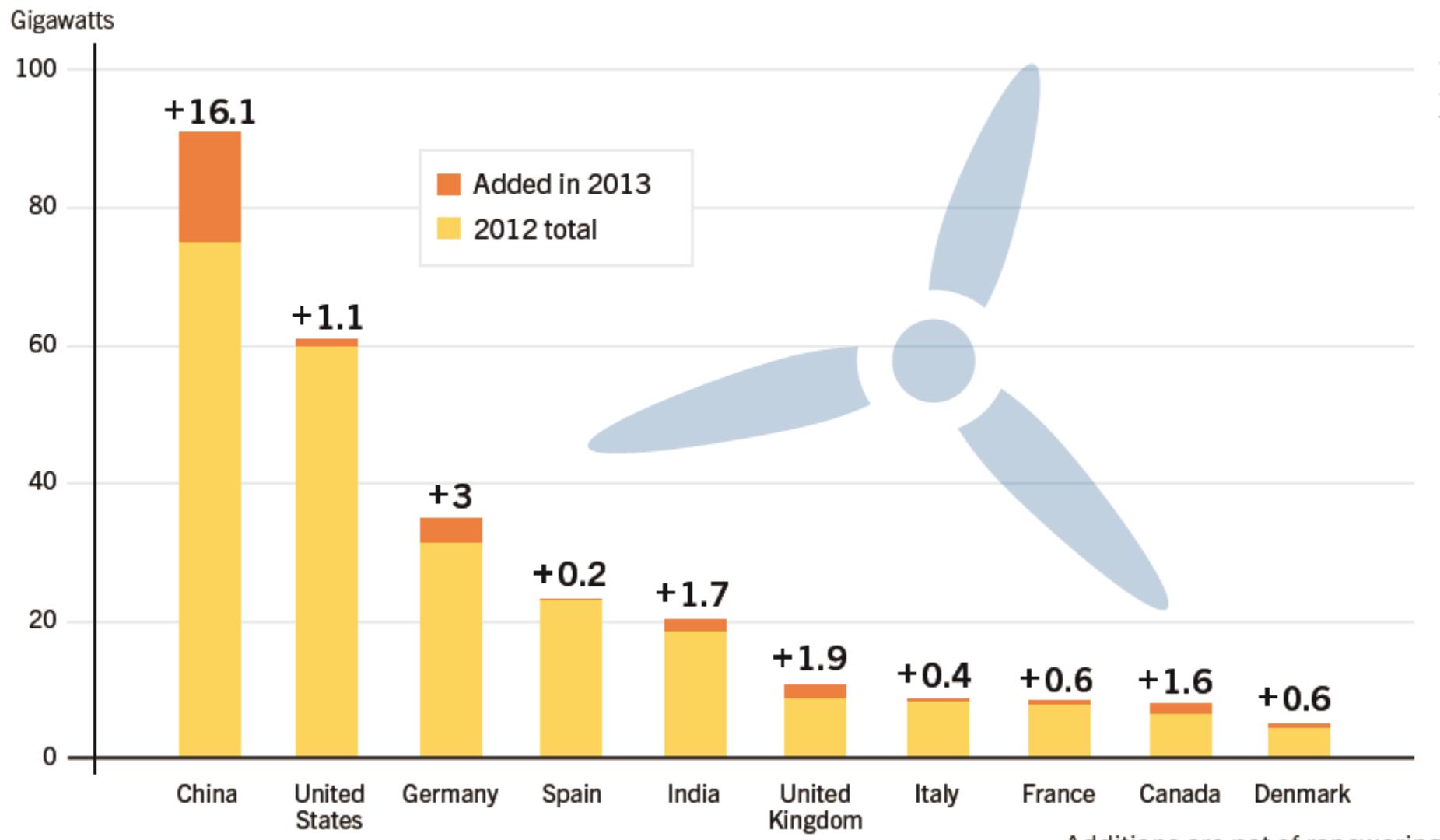


Figure 20. Wind Power Capacity and Additions, Top 10 Countries, 2013



The New China-US Announcement: keywords

- Considering global 2 degree target
- China: peak by 2030, make effort to peak earlier
- US: 26-28% emission reduction by 2025 compared with that in 2005
- Both Will make more strict target in future

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