

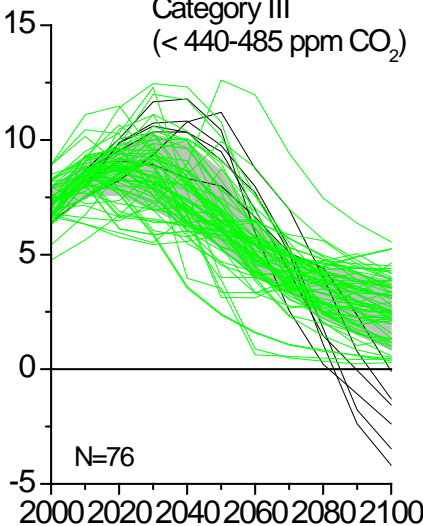
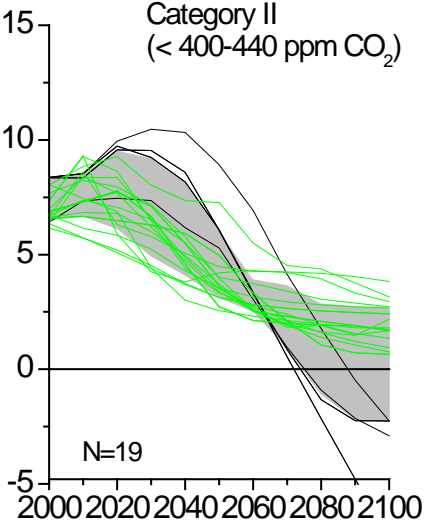
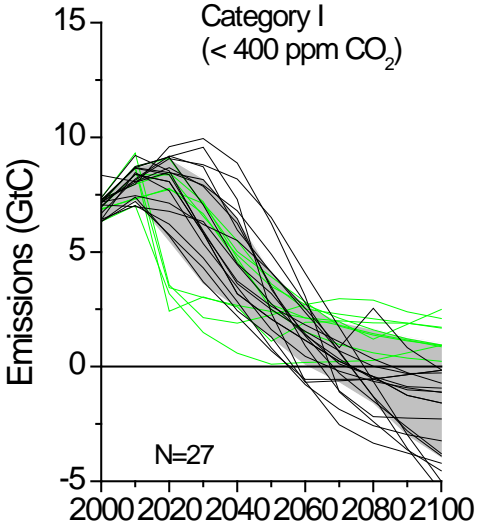
**China's Low Carbon and Energy Transition**  
**-Peaking CO2 emission in 2020 to 2022 –**  
**-We NEED Rapid Transition -**

Jiang Kejun

Energy Research Institute  
Peking University

2016 EIA ENERGY CONFERENCE  
July 11-12, 2016

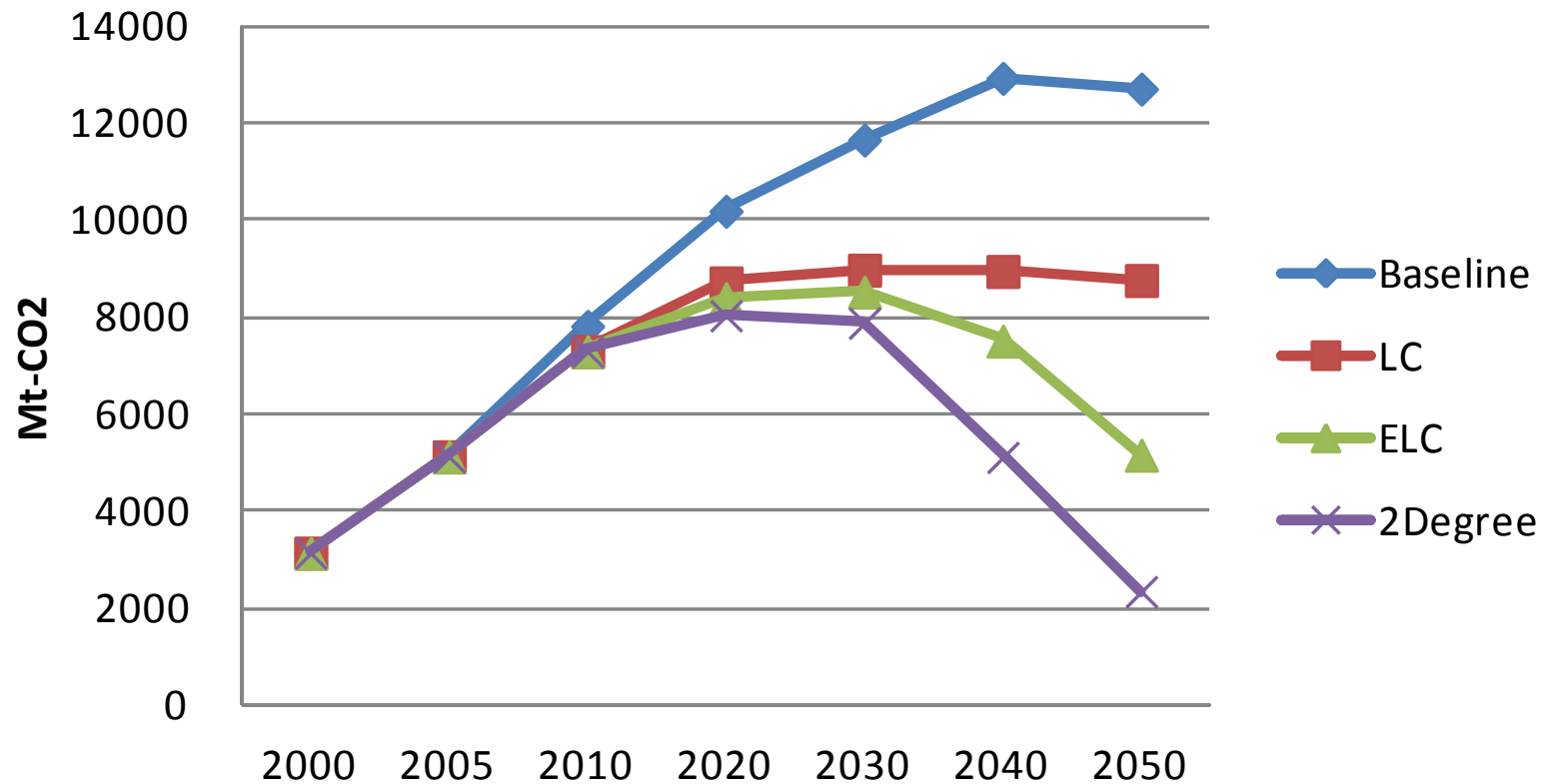
# Keyword: Transition – mitigation to reach some climate change targets



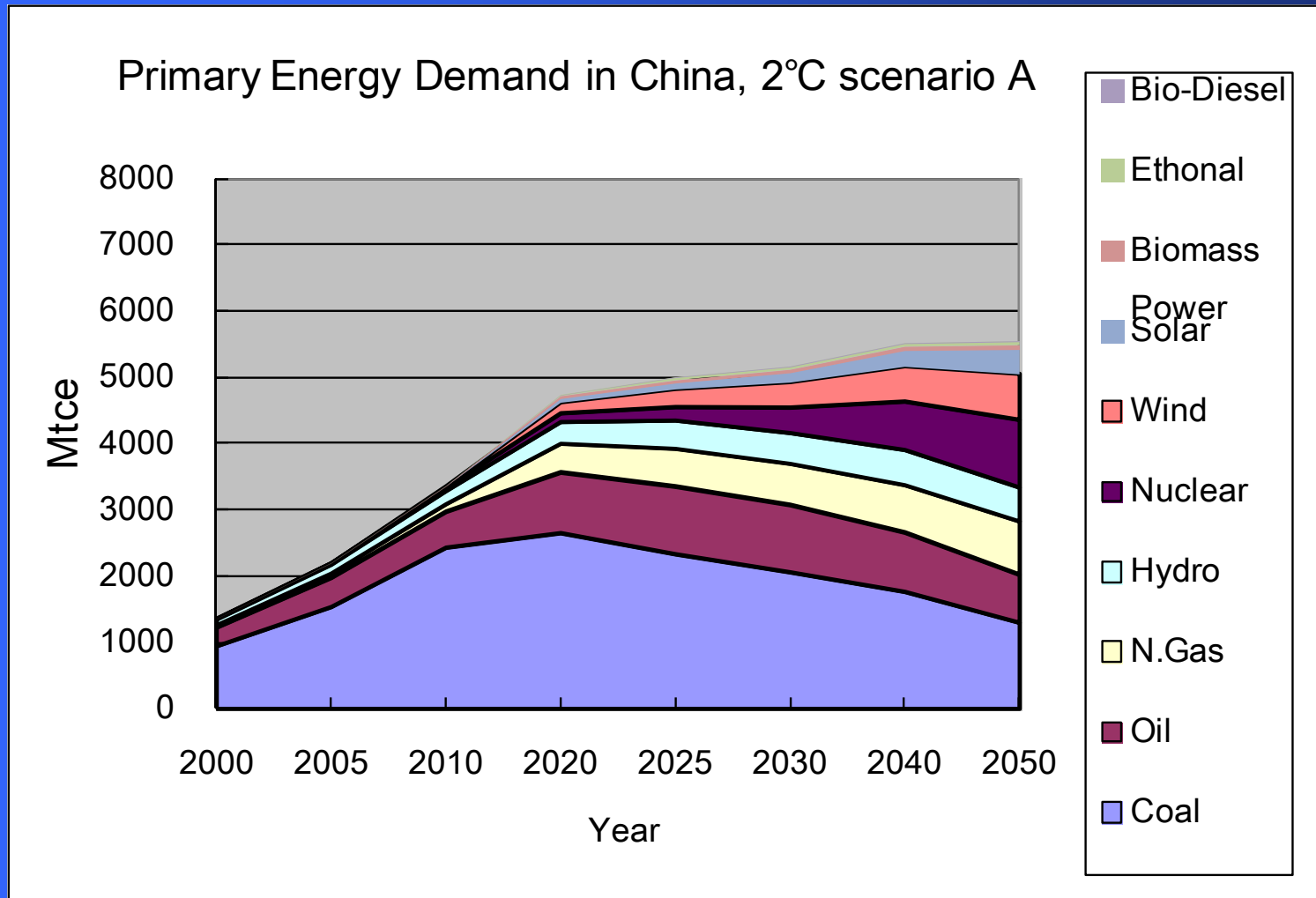
— without neg. emissions  
— with neg. emissions

## Transformation: CO2 emission, a rapid change

### CO2 Emission in China

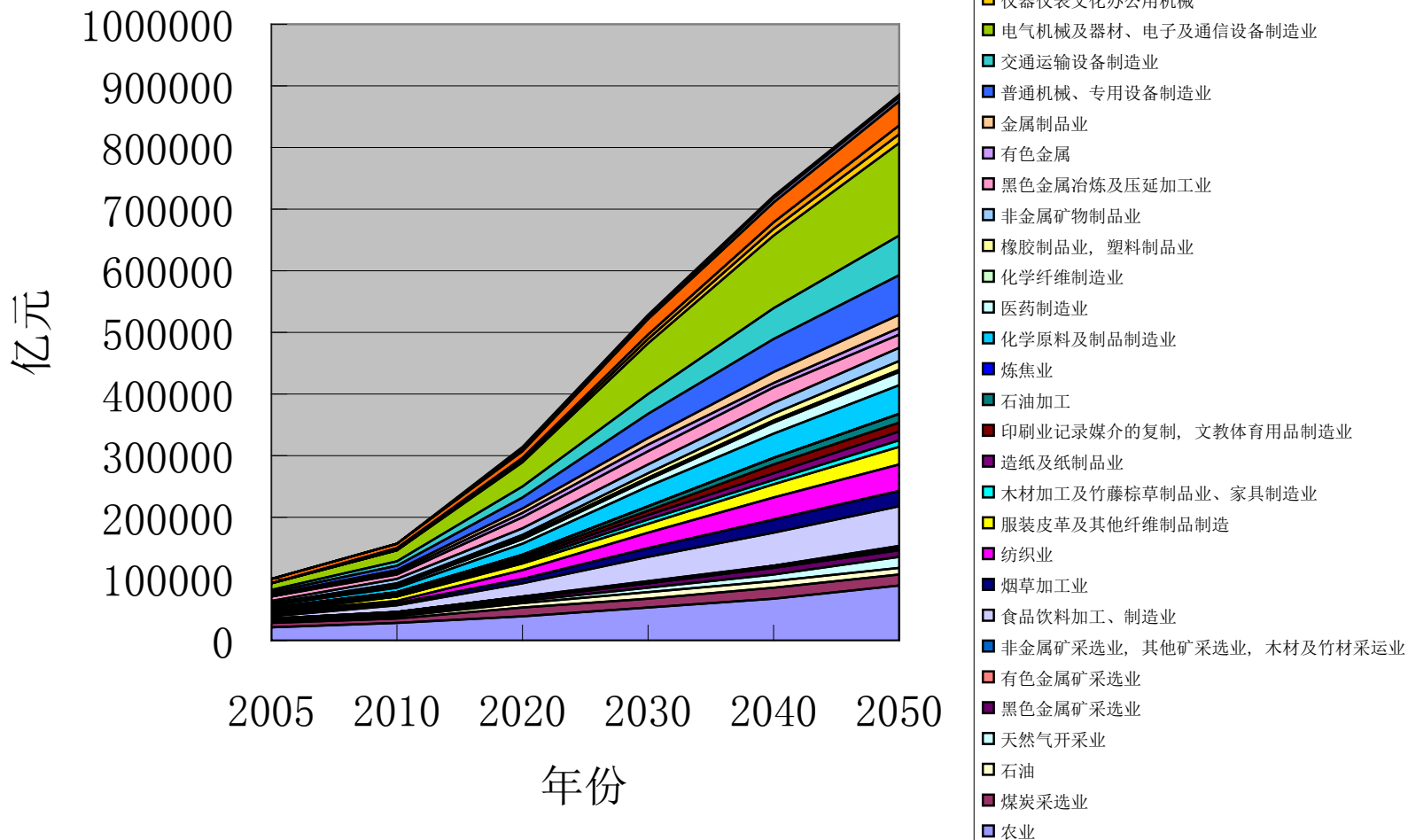


# We Need Rapid Transition : Put that into 13<sup>th</sup> Five Year Plan Primary Energy Demand

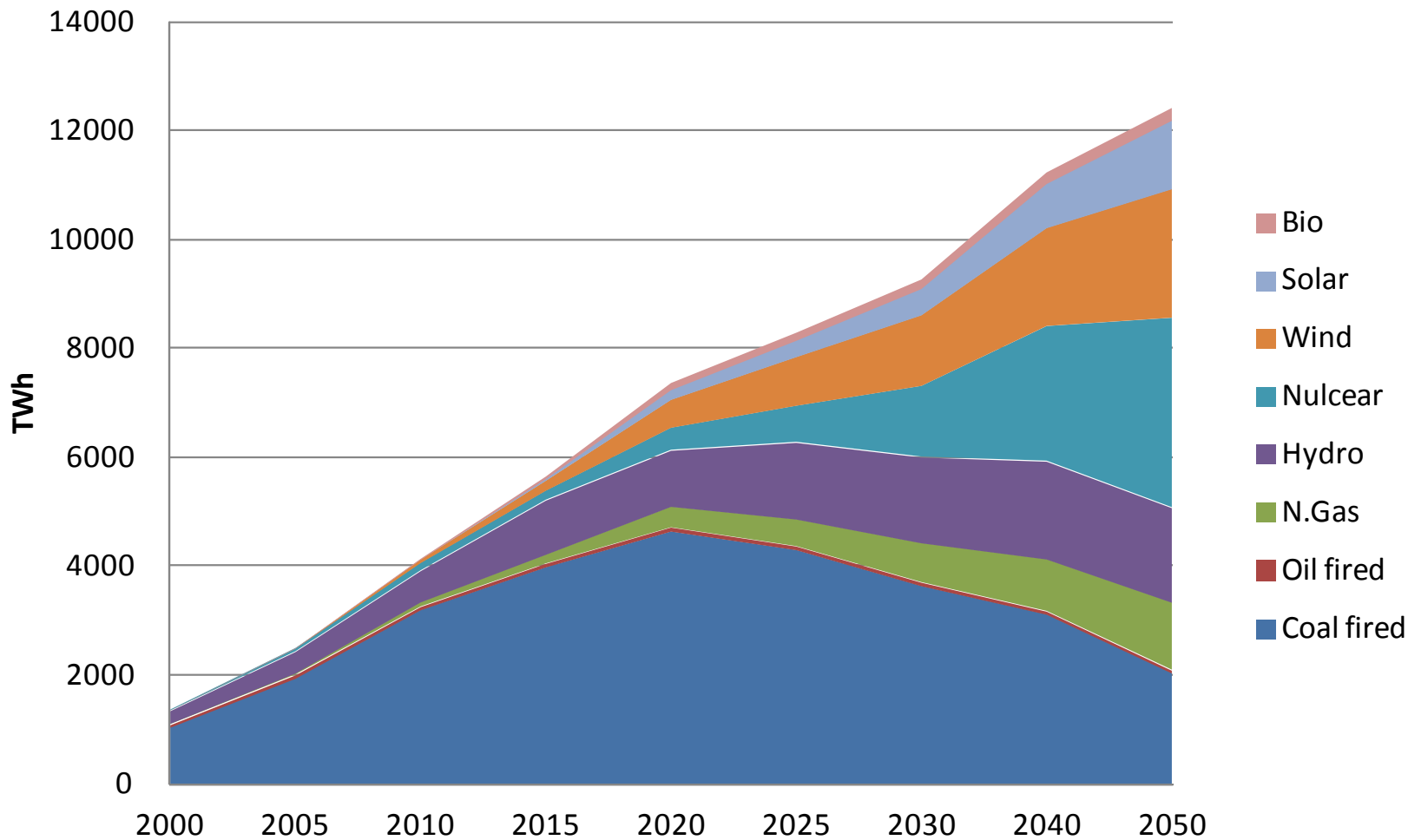


# GDP by sectors

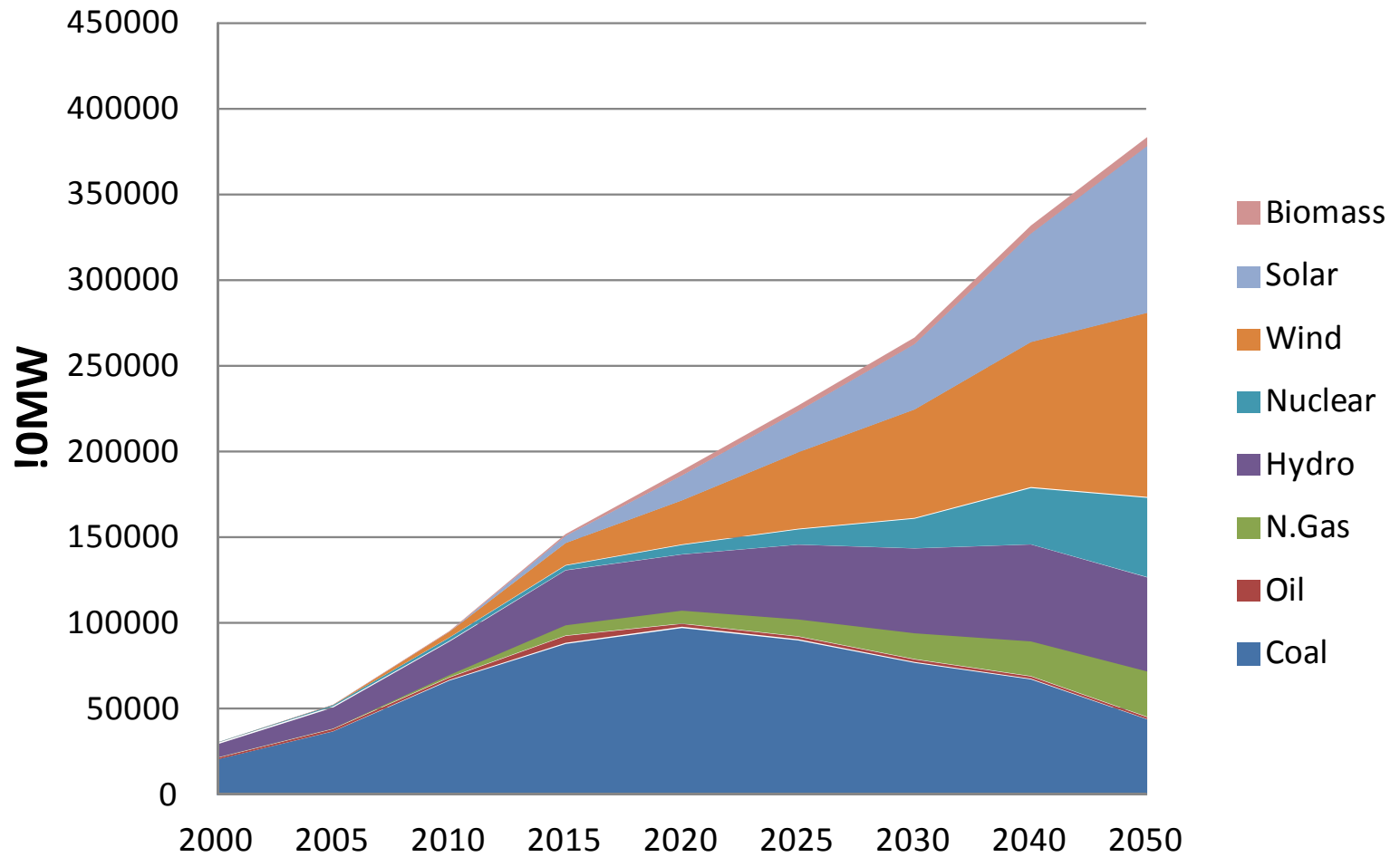
## GDP部门结构



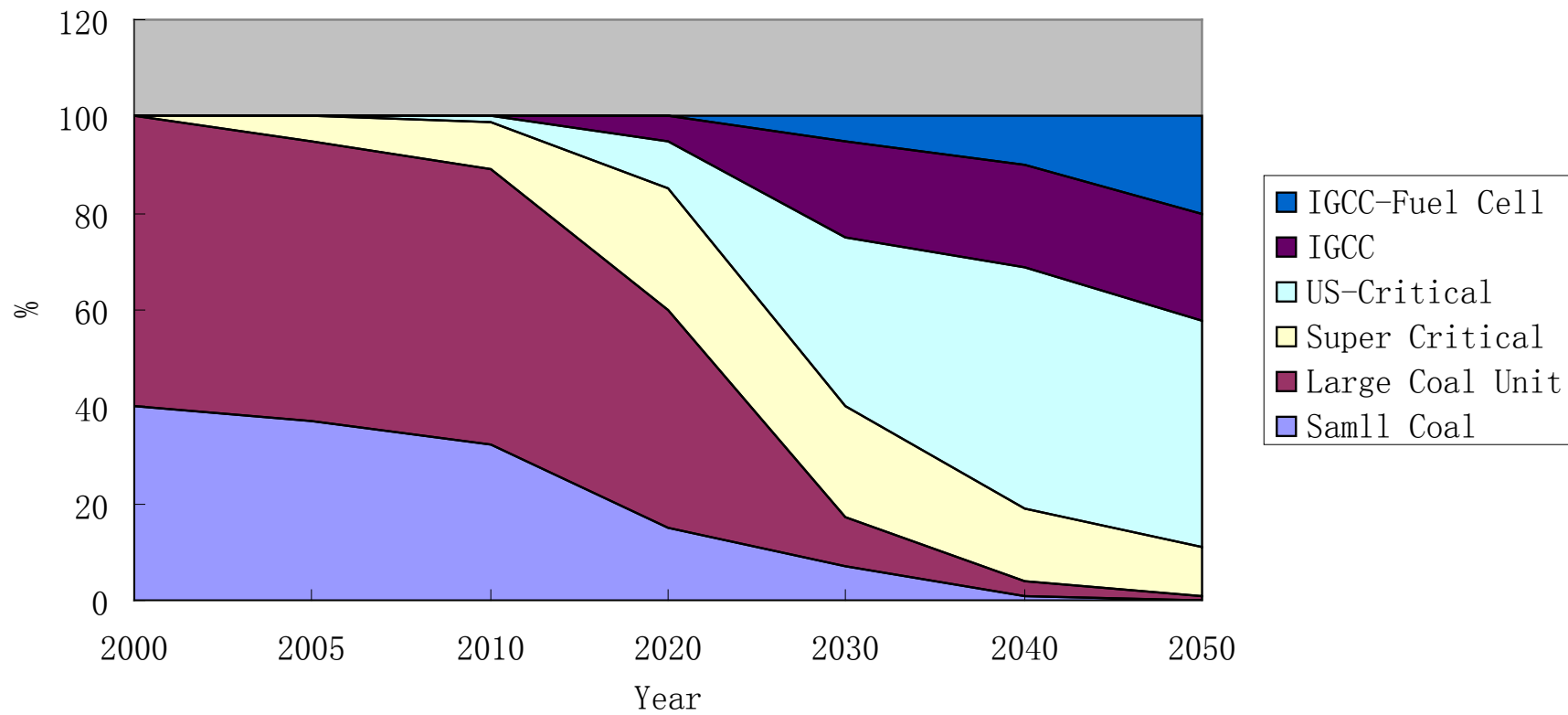
# Power Generation, 2°C Scenario A



# Installed Capacity, 2 °C Scenario A

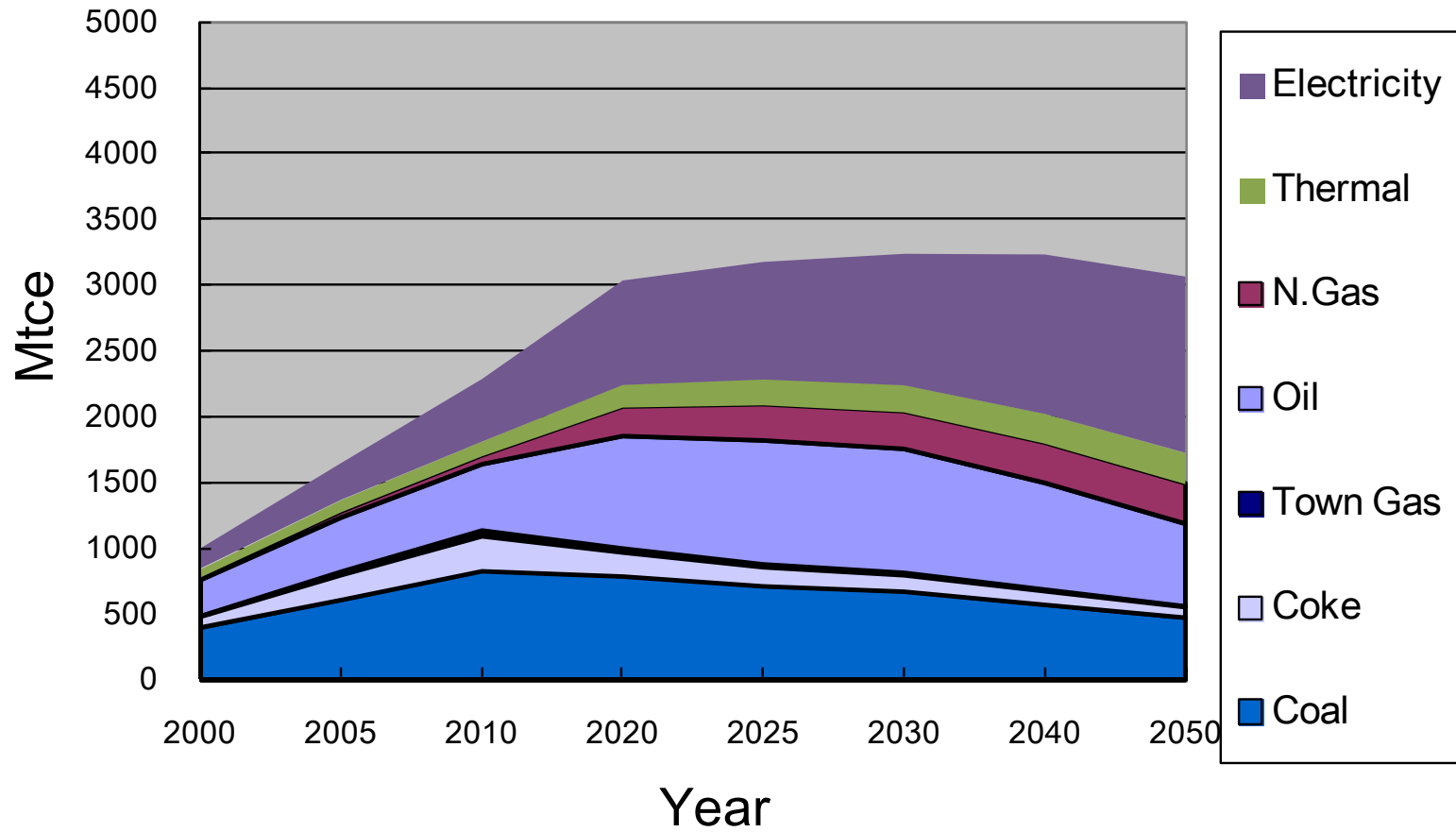


CCS future

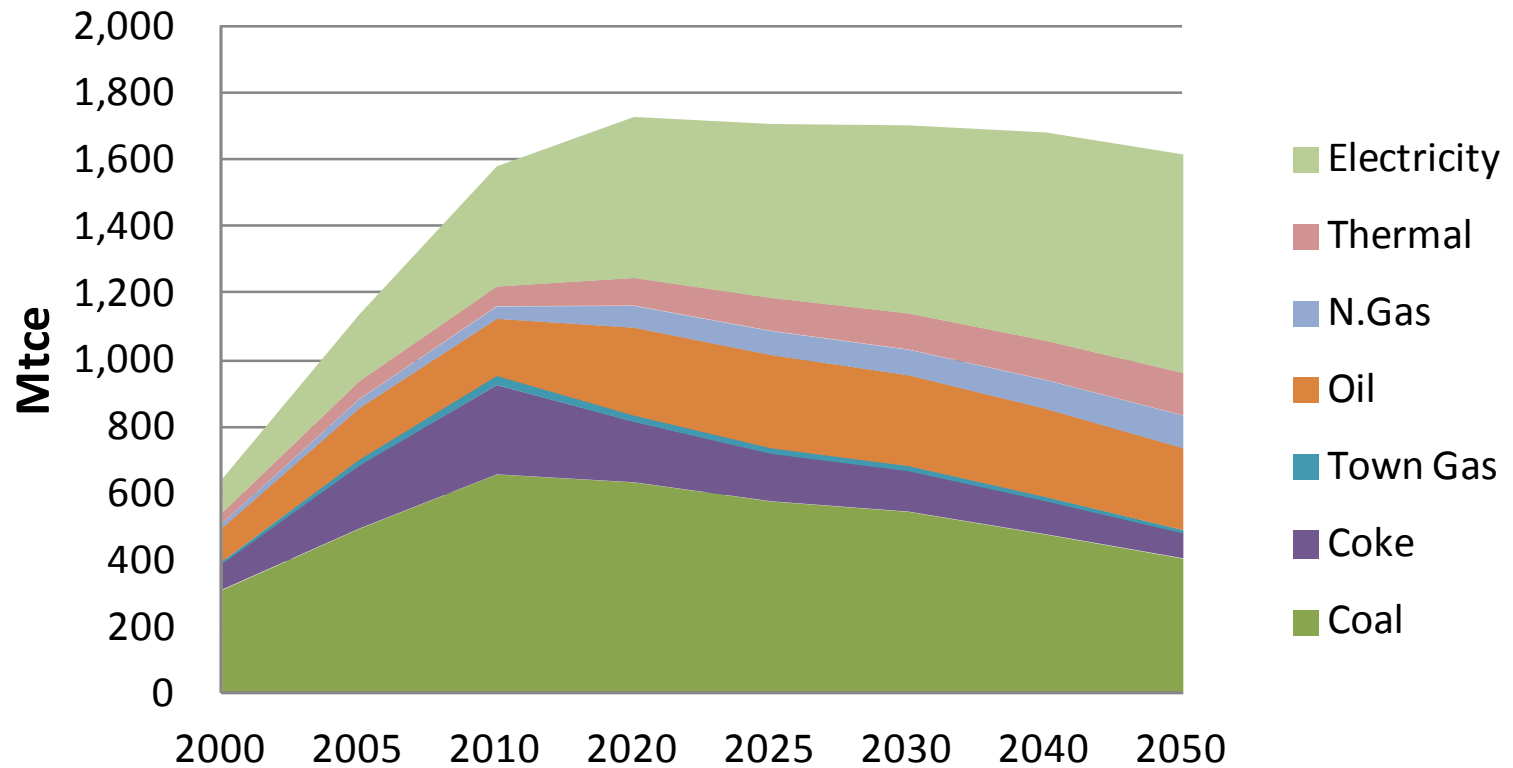




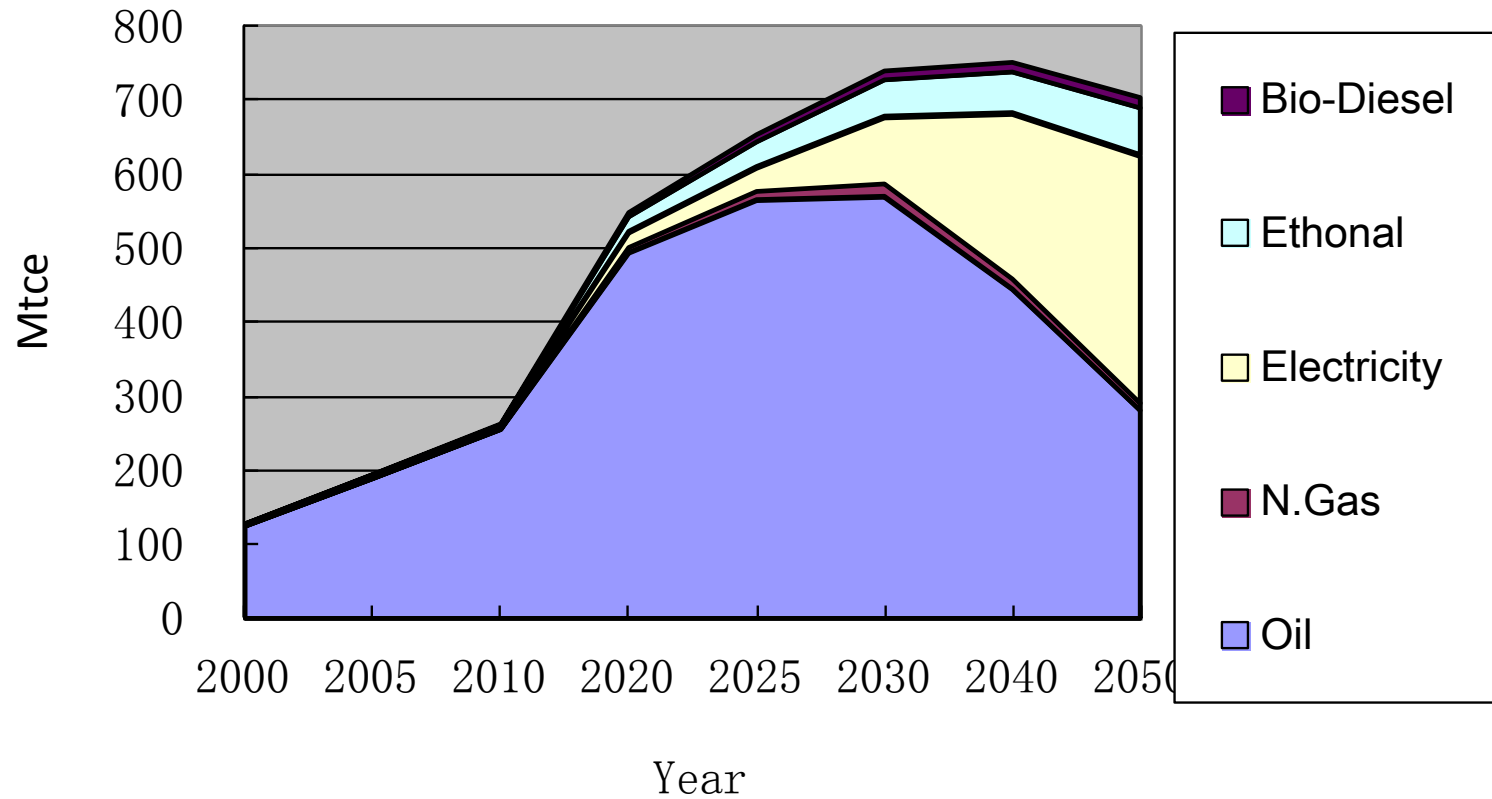
# Final Energy Demand, 2 degree scenario



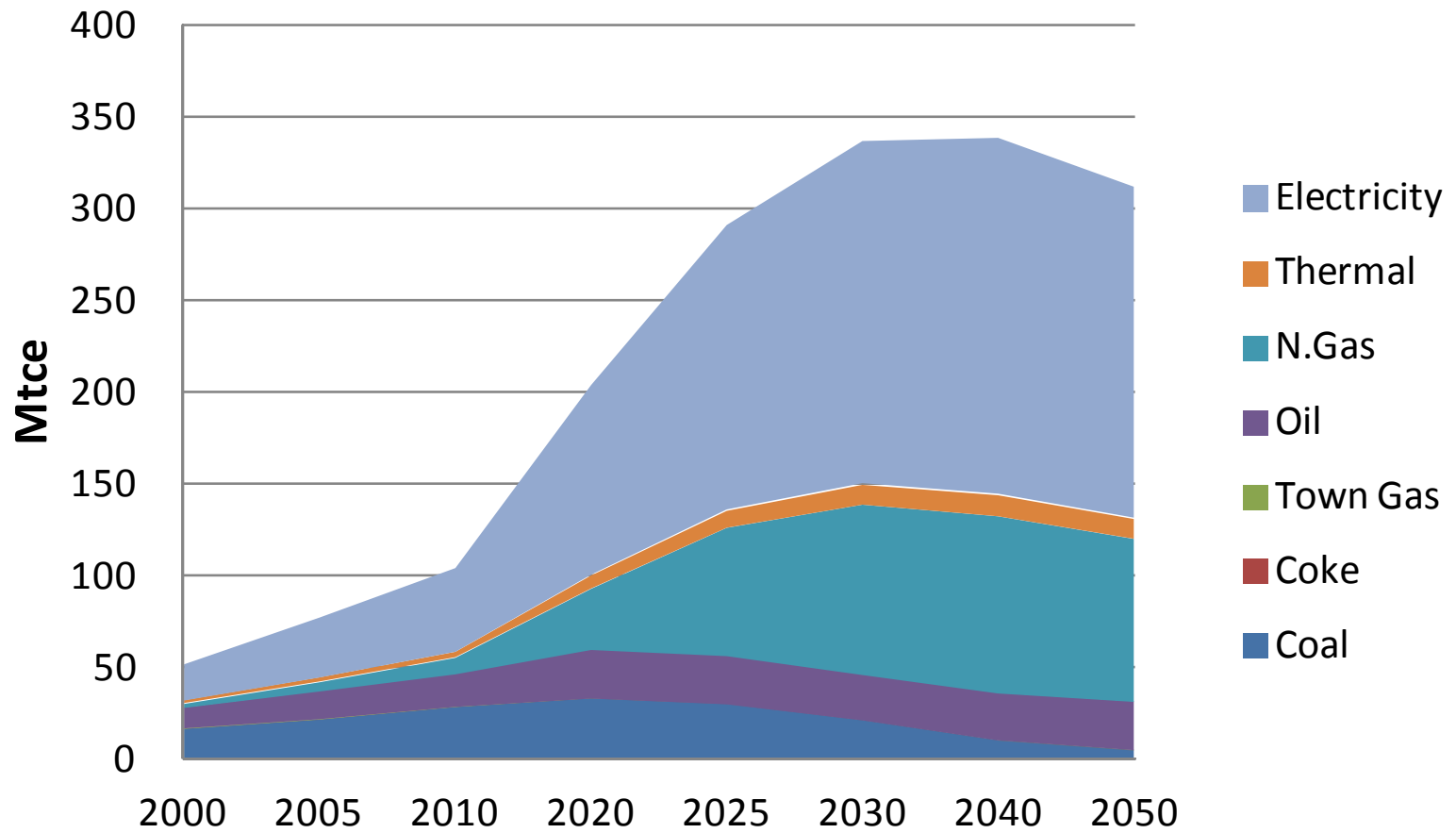
# Final Energy Demand in Industry, 2°C Scenario A



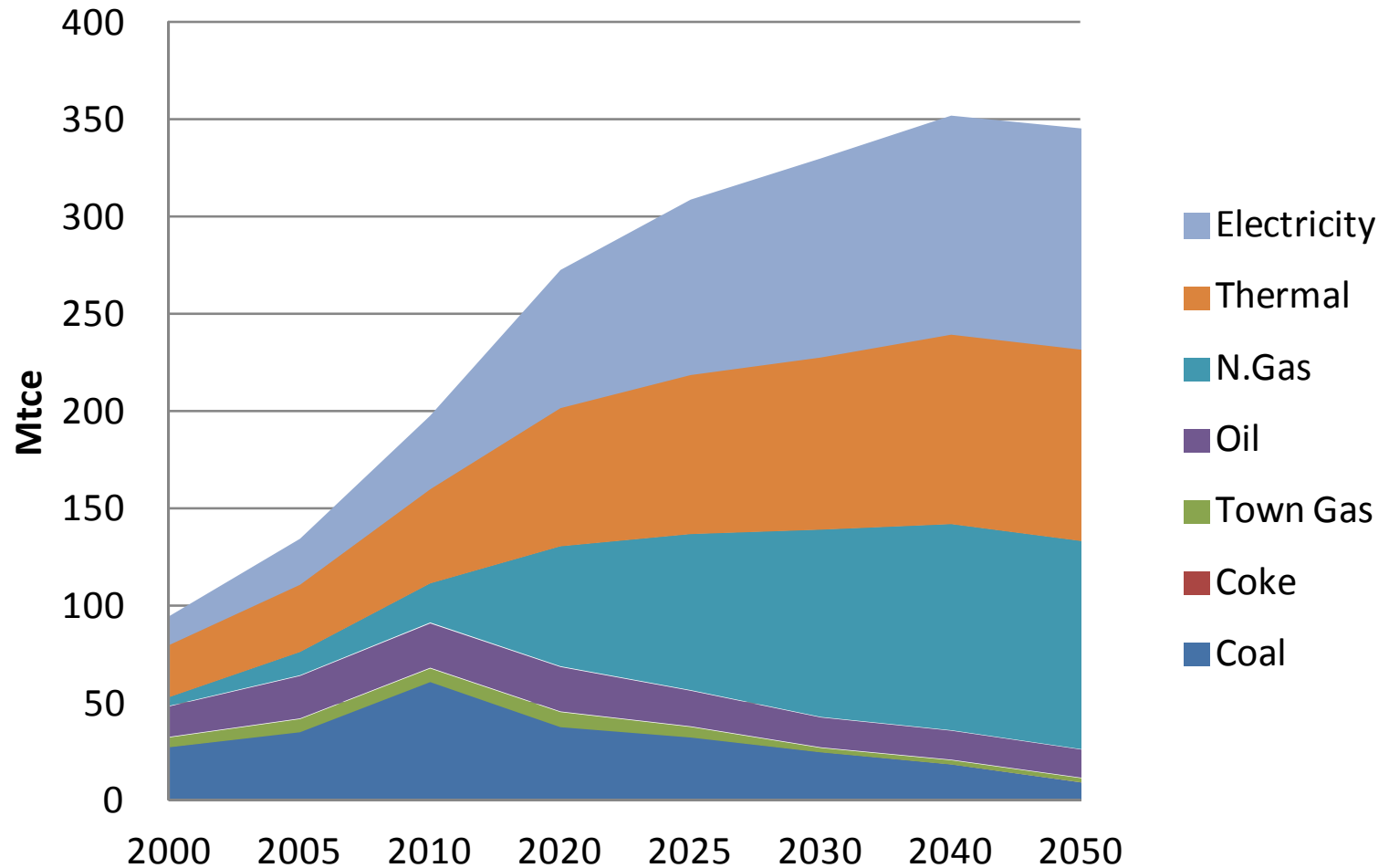
## Transport Energy Demand: 2 degree scenario



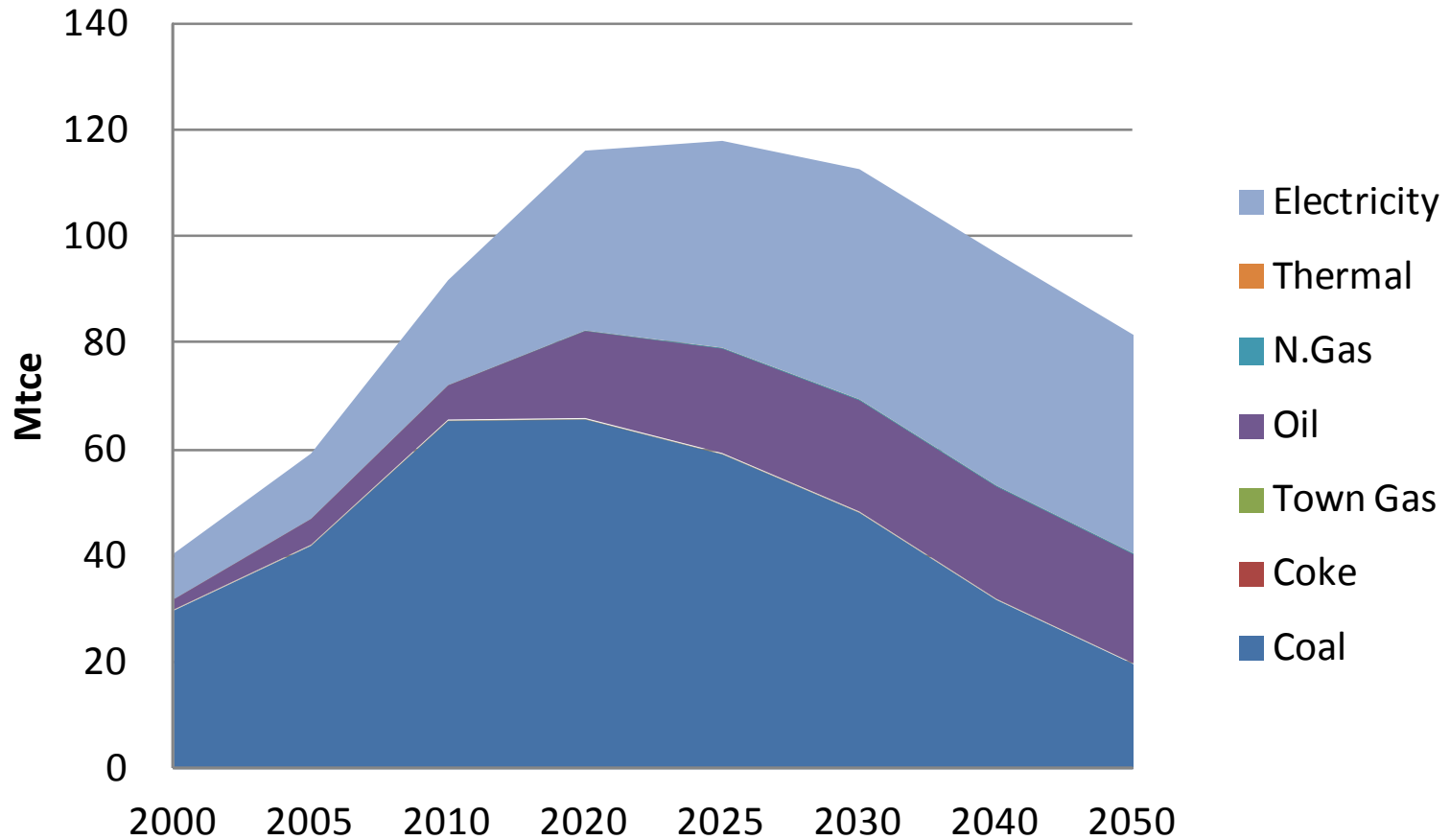
# Tertiary Sector Energy Demand



# 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

买五送一 亮韵美LED灯泡e14尖泡蜡



买五送一



亮韵美LED灯泡E27 LED灯具节能灯大螺口  
球泡光源QPJ014 3W白光 3W单品买五送

¥5.80 直降

★★★★★ 已有10077人评价

北京有货



3w

云科技 应照明



佛山照明 LED灯泡 3W超炫E27暖白光球  
泡 2支装

¥30.00 直降

★★★★★ 已有3205人评价

北京有货



¥6.9  
参考价: ¥55.0



V瓦特沃LED灯泡球泡E27大螺口LED光源 3  
W 3w贴片正白 3W (继续狂欢 3w 6.9

¥6.90 直降

★★★★★ 已有1181人评价

北京有货



佛山照明 LED灯泡 3W透明全柱E14暖白  
光尖泡 5支装

¥109.00 直降

★★★★★ 已有547人评价

北京有货



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



☑️航天铝制散热器☑️LED  
☑️3W☑️正白☑️E27球泡

劲爆  
特价



尚仕达 LED节能灯泡 超高亮LED球泡光源  
3w/5w/7w e27螺口灯 lamp 3W球泡-JDC1

¥5.70 直降

★★★★★ 已有400人评价



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



全民  
百货



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450人评价

返回顶部





# 中国能效标识

## CHINA ENERGY LABEL

生产者名称 合肥美菱股份有限公司  
规格型号 BCD-186DHA



耗电量 (千瓦时/24小时) **0.25**

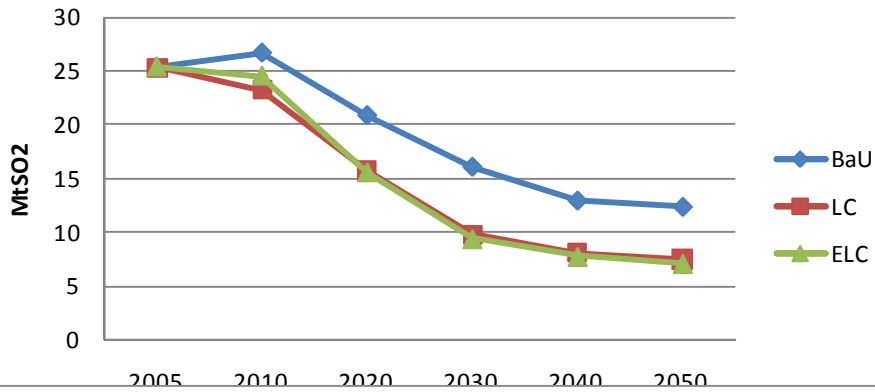
冷藏室容积 (升) 132

冷冻室容积 (升) 54

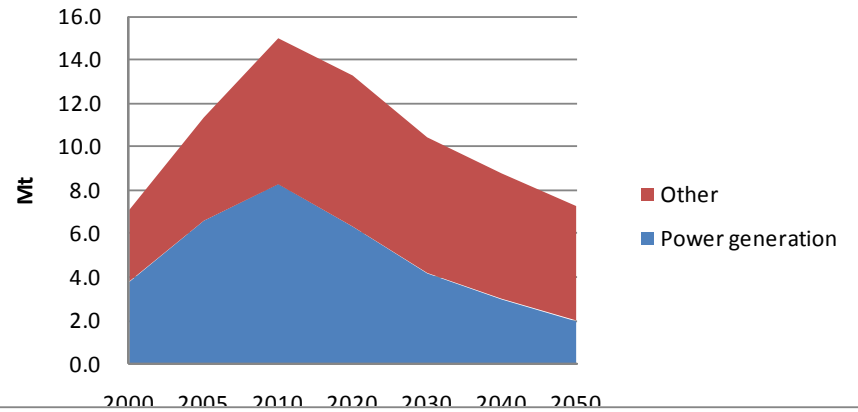
依据国家标准: GB 12021.2-2008



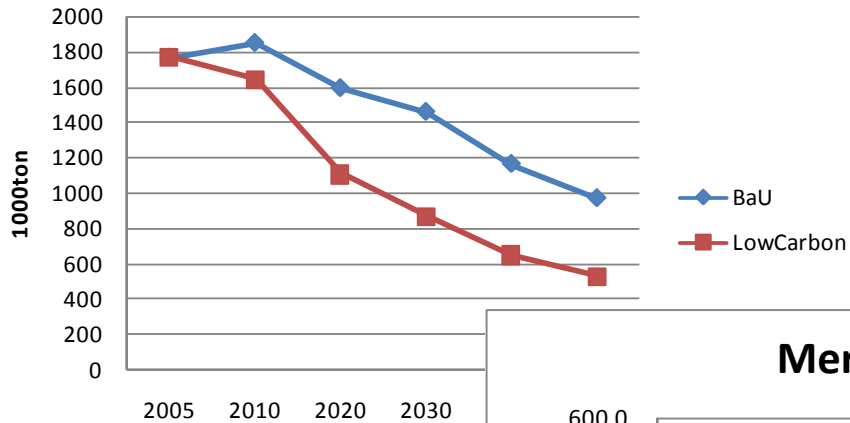
### SO2 Emission



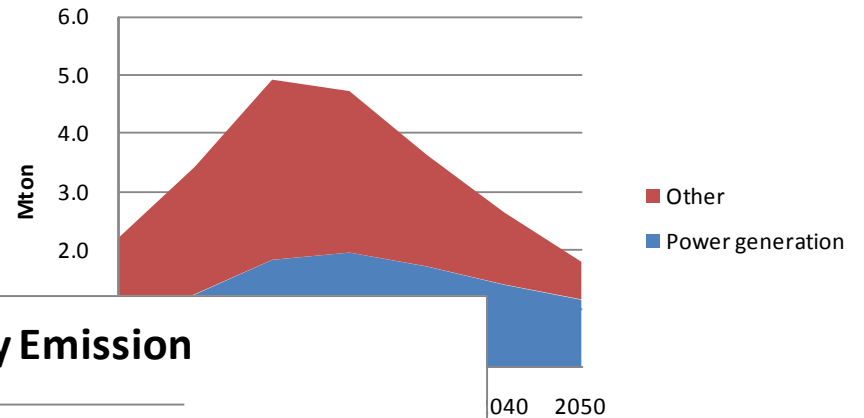
### NOx Emission in China, ELC scenario



### Black Carbon Emission in China



### PM2.5 Emission



### Mercury Emission

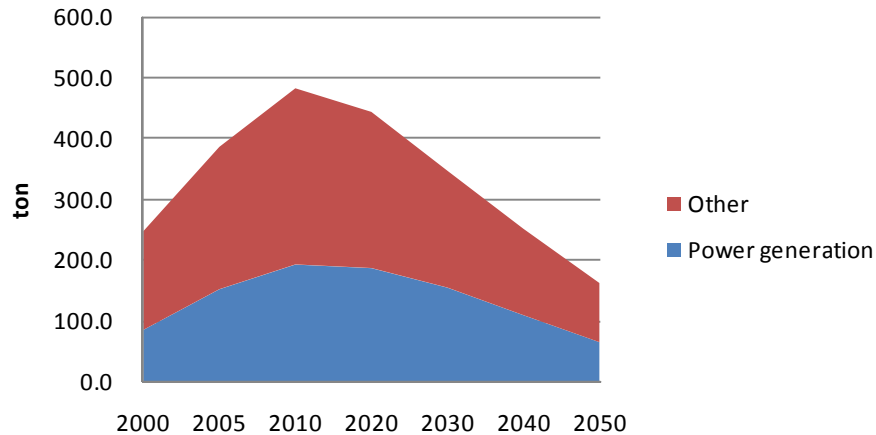
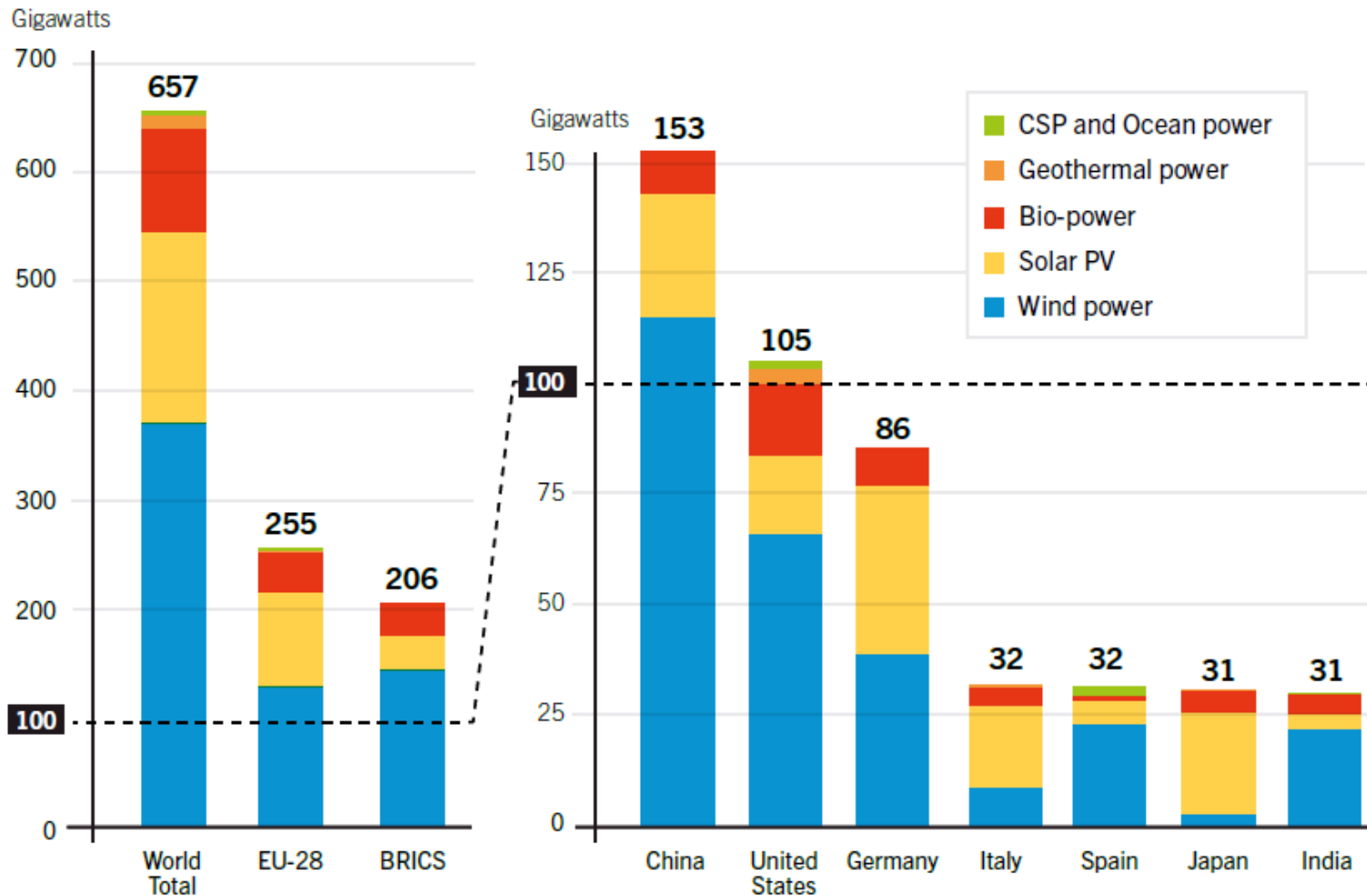


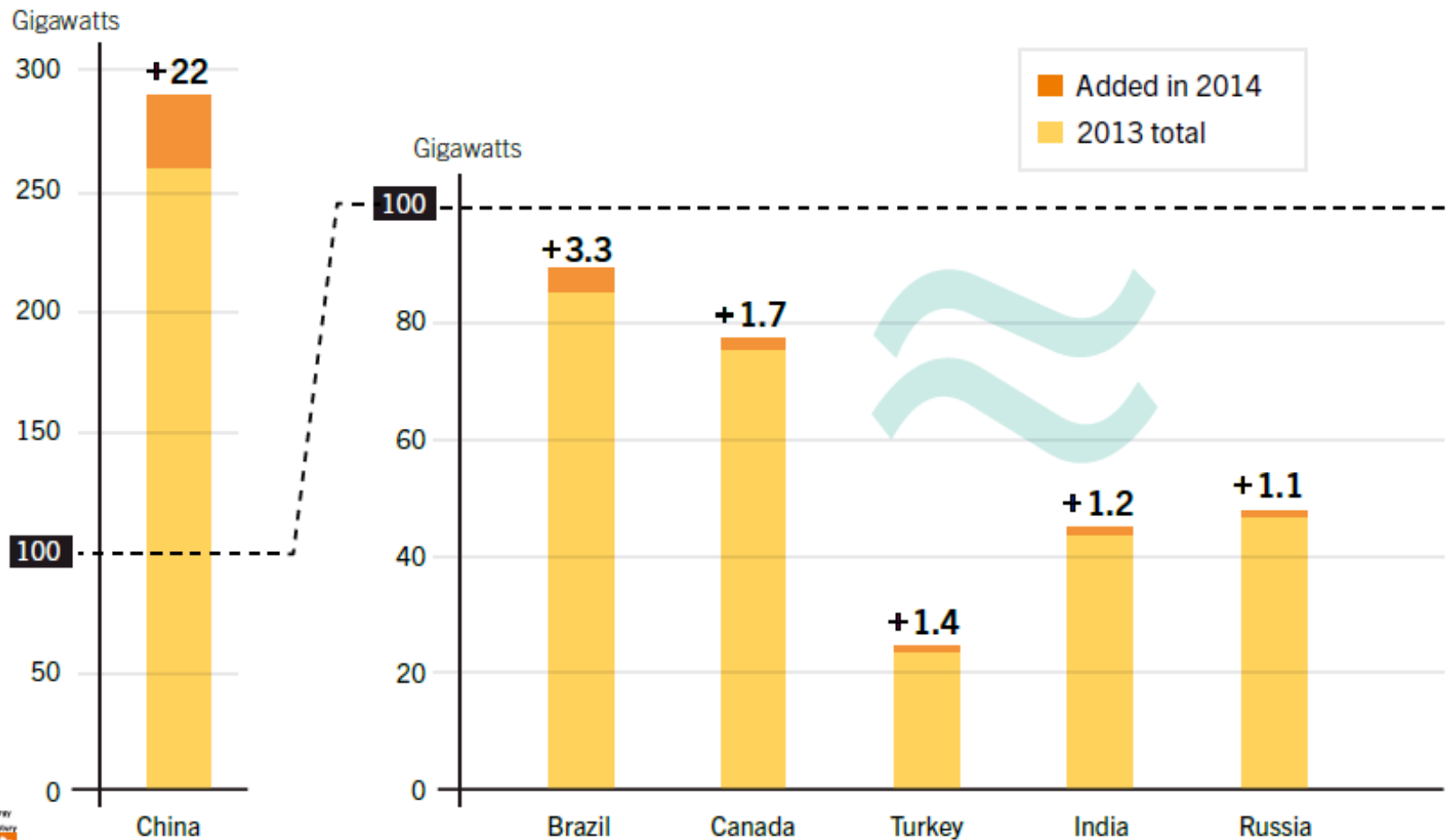
Figure 4. Renewable Power Capacities\* in World, EU-28, BRICS, and Top Seven Countries, 2014



Source  
See En  
for this

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

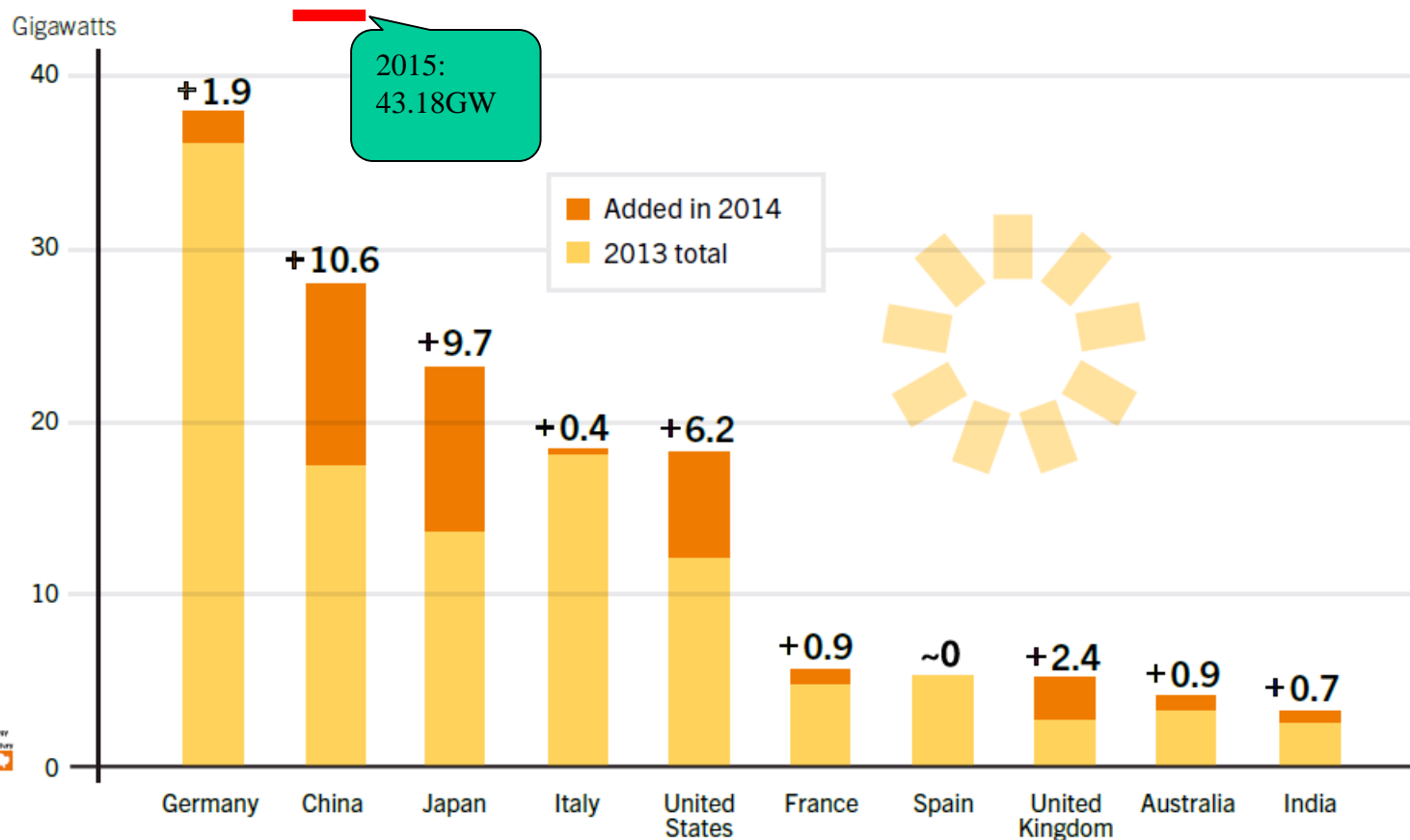
Figure 15. Hydropower Capacity and Additions, Top Six Countries for Capacity Added, 2014



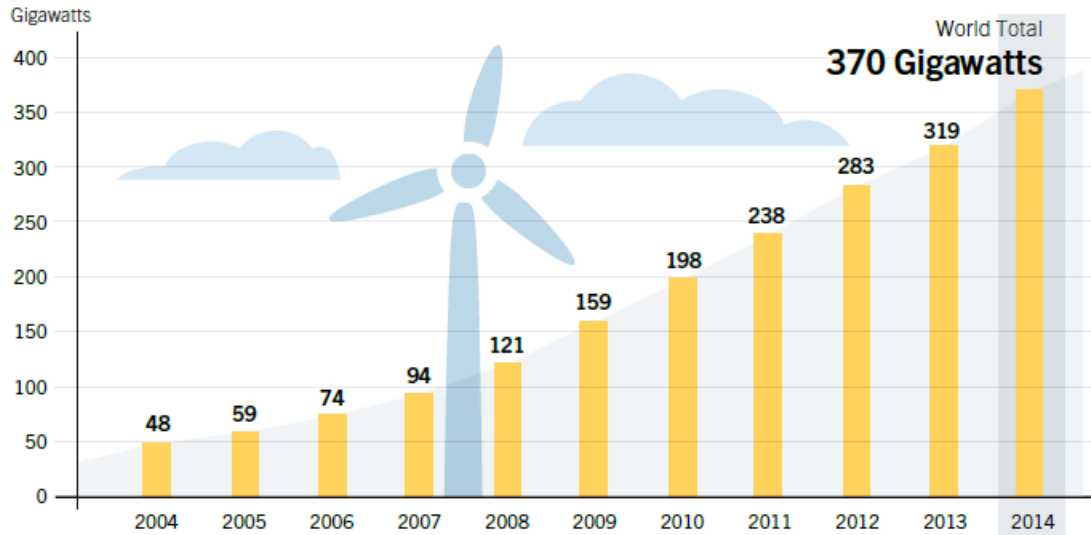


# 40 GW added in 2014

Solar PV Capacity and Additions, Top 10 Countries, 2014



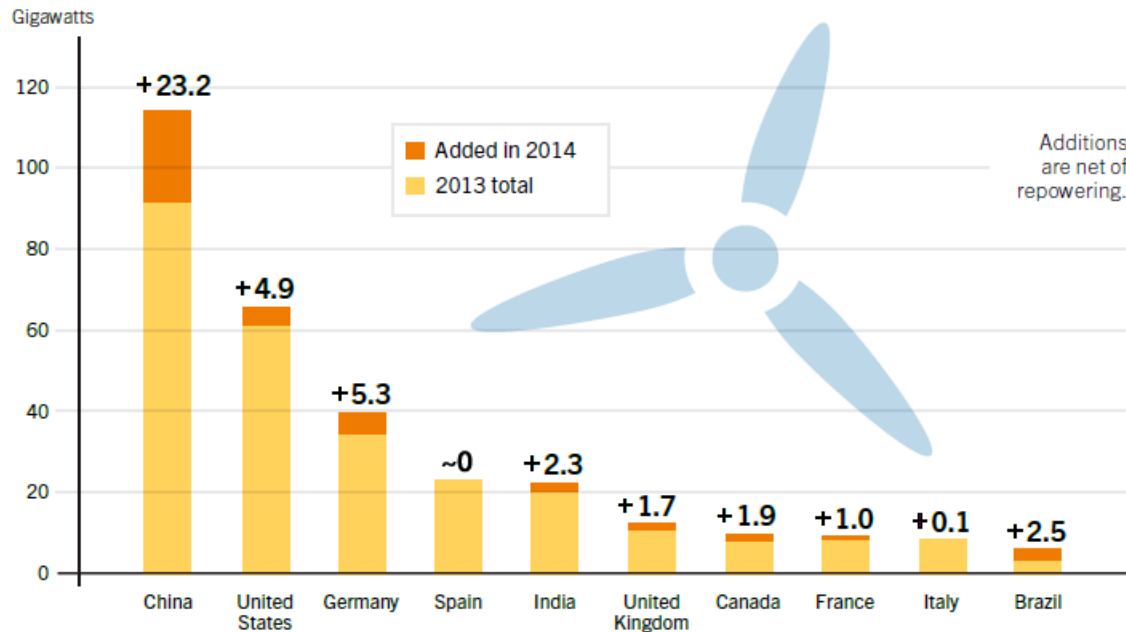
## Wind Power Global Capacity, 2004–2014



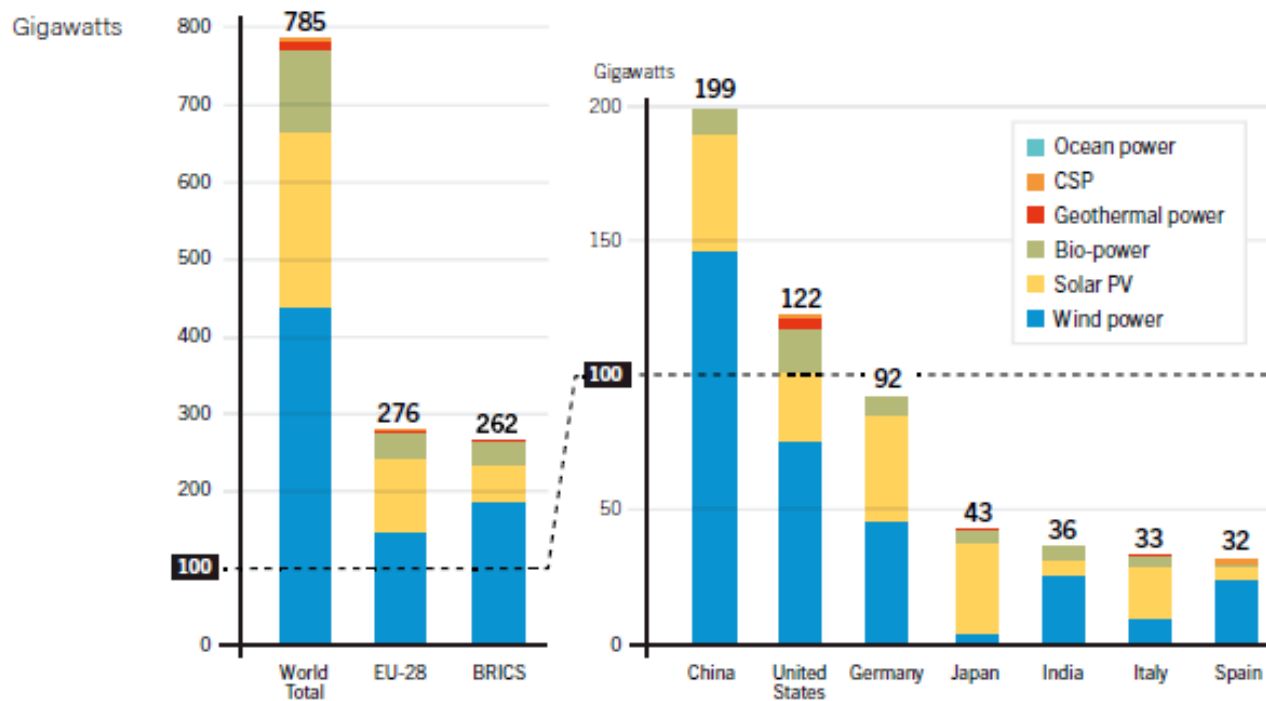
**51 GW  
ADDED  
in 2014**

**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



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

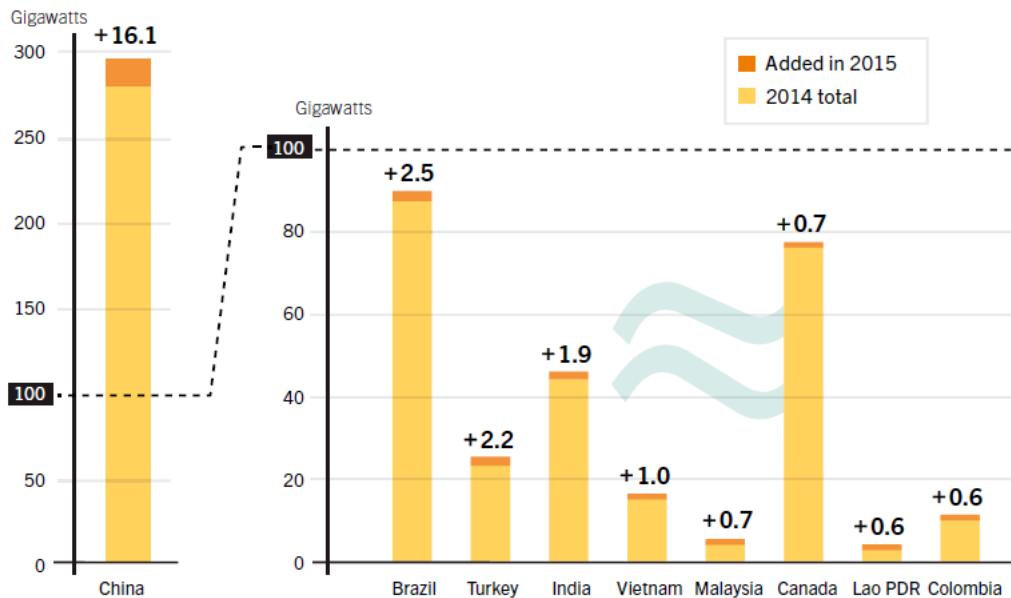


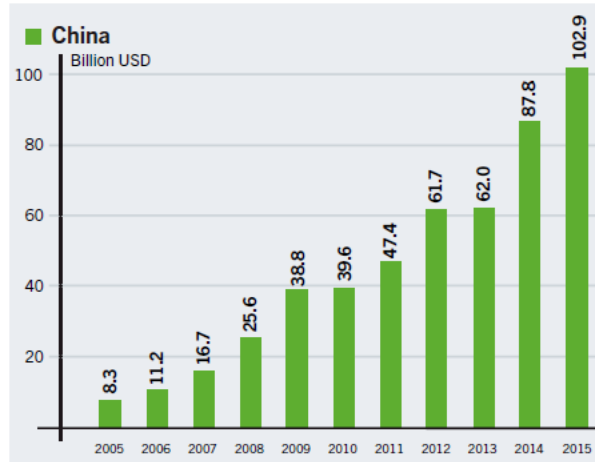
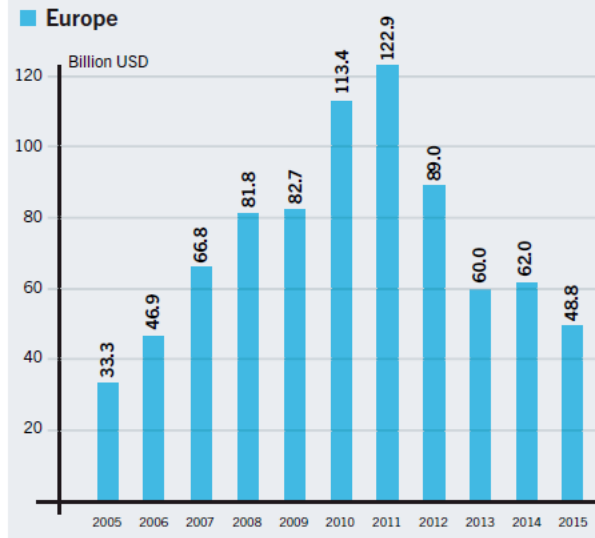
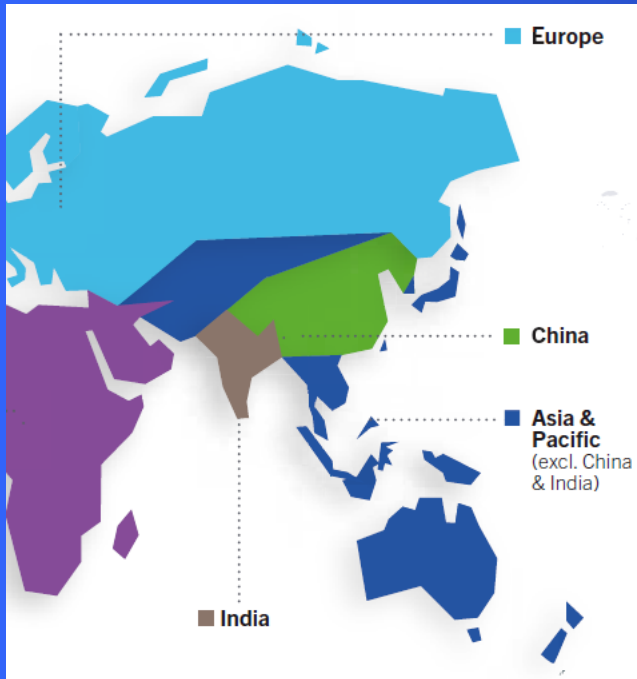
*\*Not including hydropower (see Reference Table R2 for data including hydropower). The five BRICS countries are Brazil, the Russian Federation, India, China and South Africa.*

# GLOBAL CAPACITY REACHED 1,064 GW



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

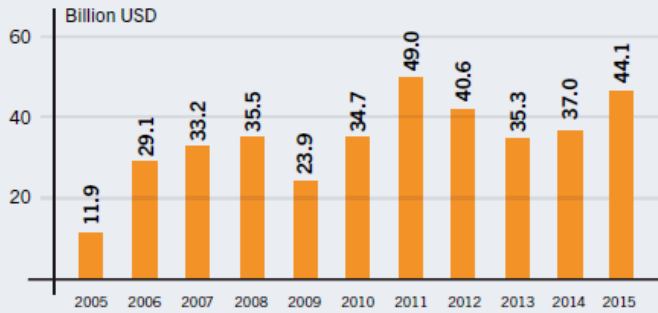




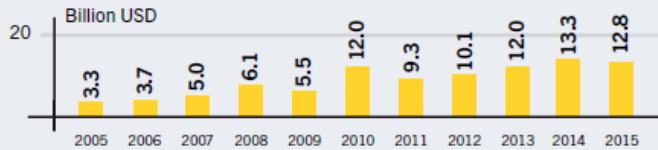


## Global New Investment in Renewable Power and Fuels, by Country/Region, 2004-2015

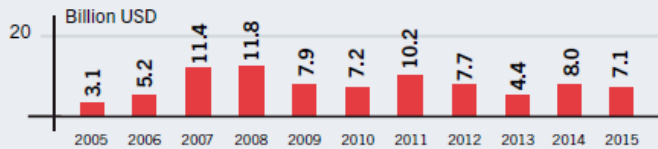
### United States



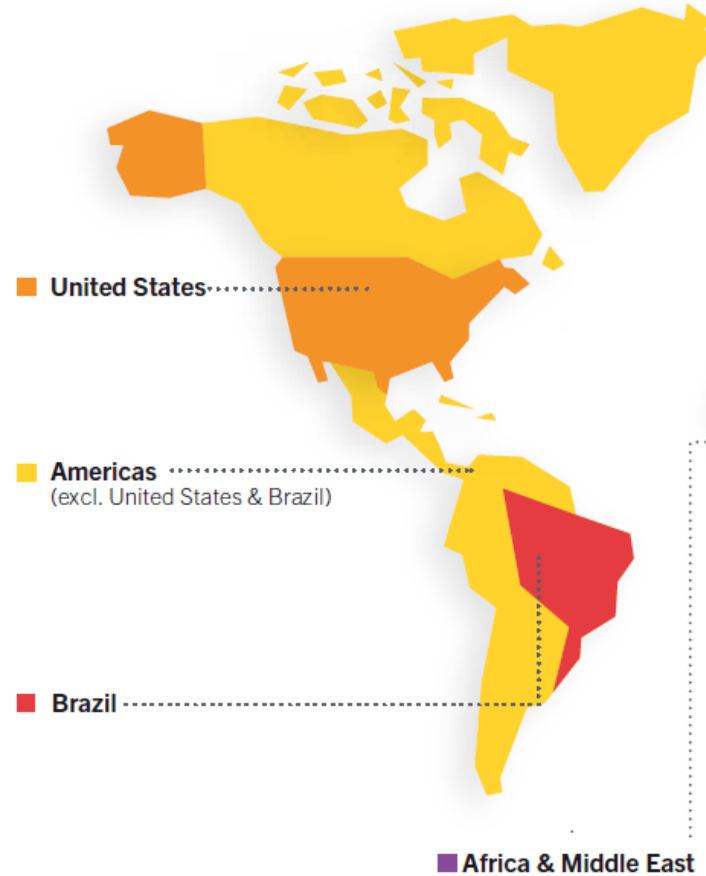
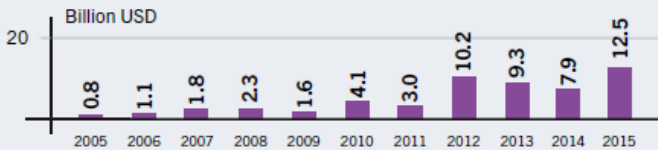
### Americas (excl. United States & Brazil)



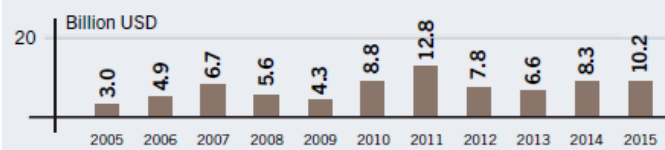
### Brazil

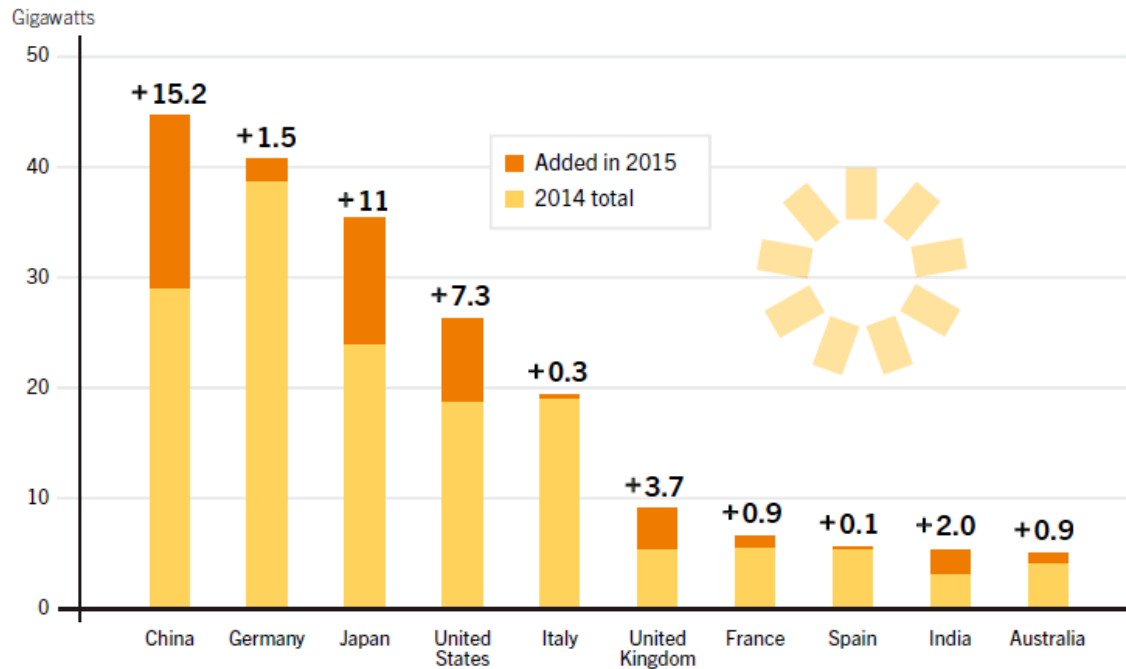


### Africa & Middle East



### India





**50 GW**  
**ADDED IN 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

---

- 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

# INDC+/NDC

## for China, and others

## INDC of China in Paris

---

- Peak CO<sub>2</sub> 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

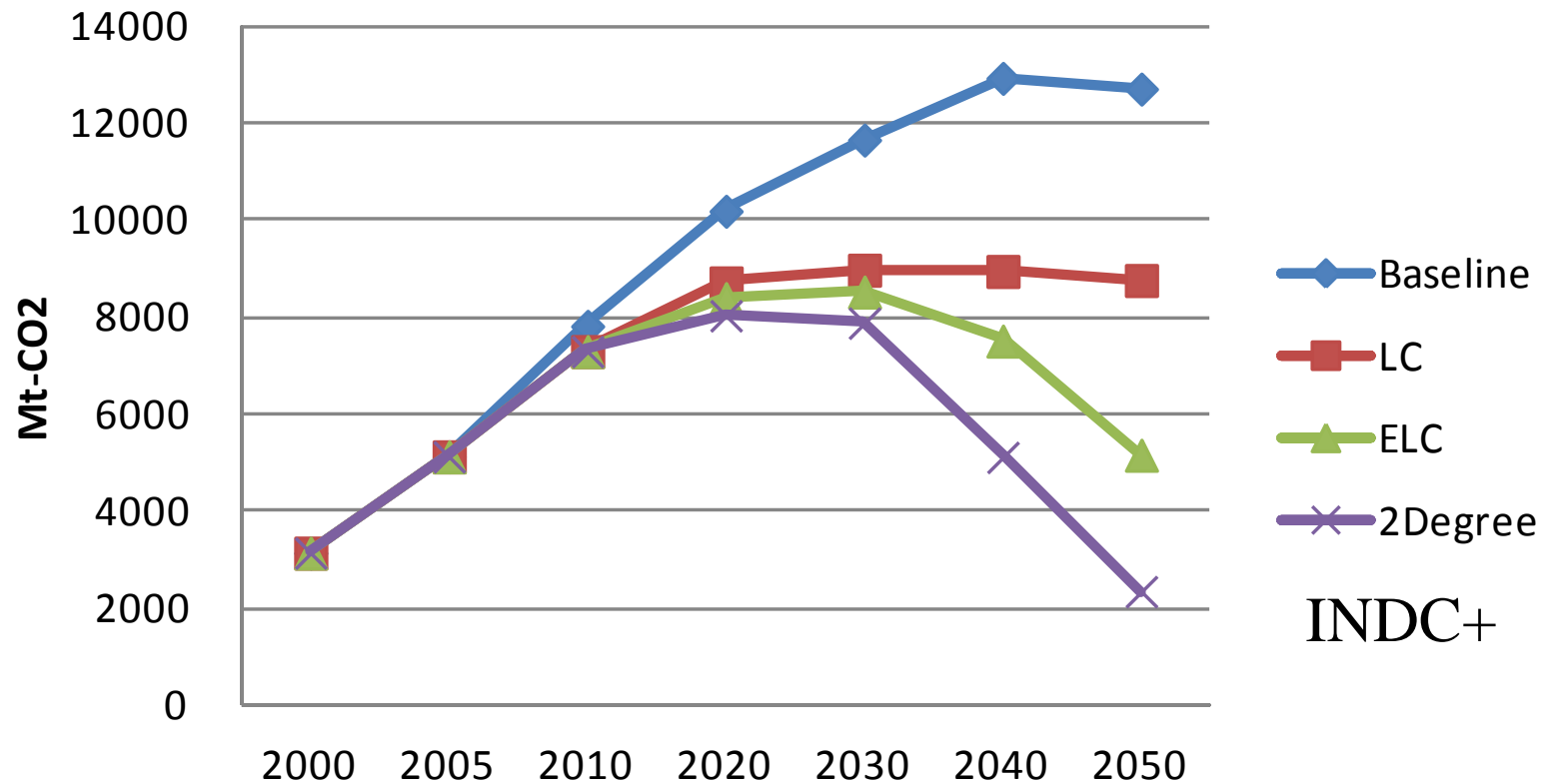
---

- 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 13<sup>th</sup> Five Year Plan
- Then it is around 50%

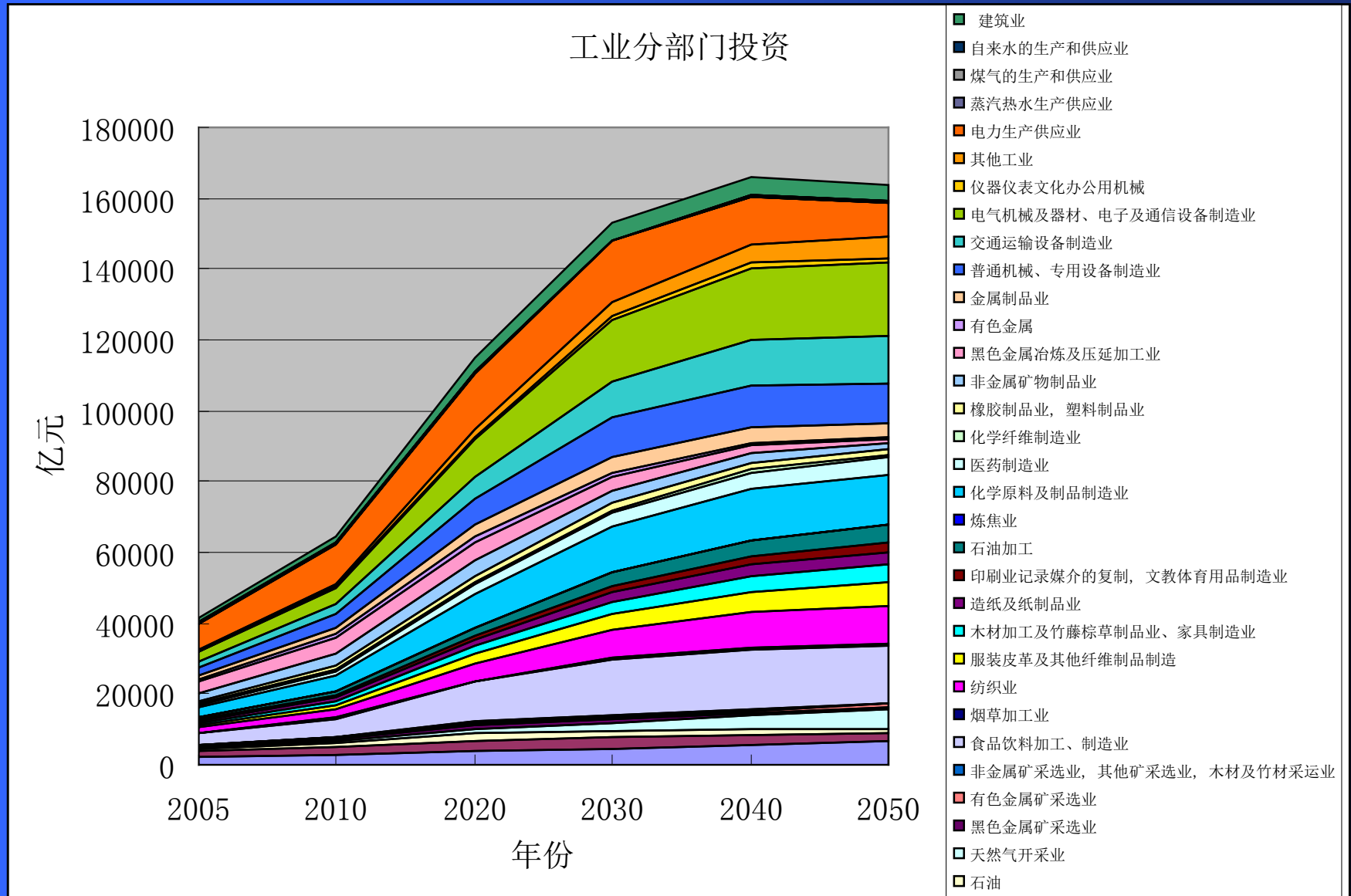


## Transformation: CO2 emission, a rapid change

### CO2 Emission in China



# 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

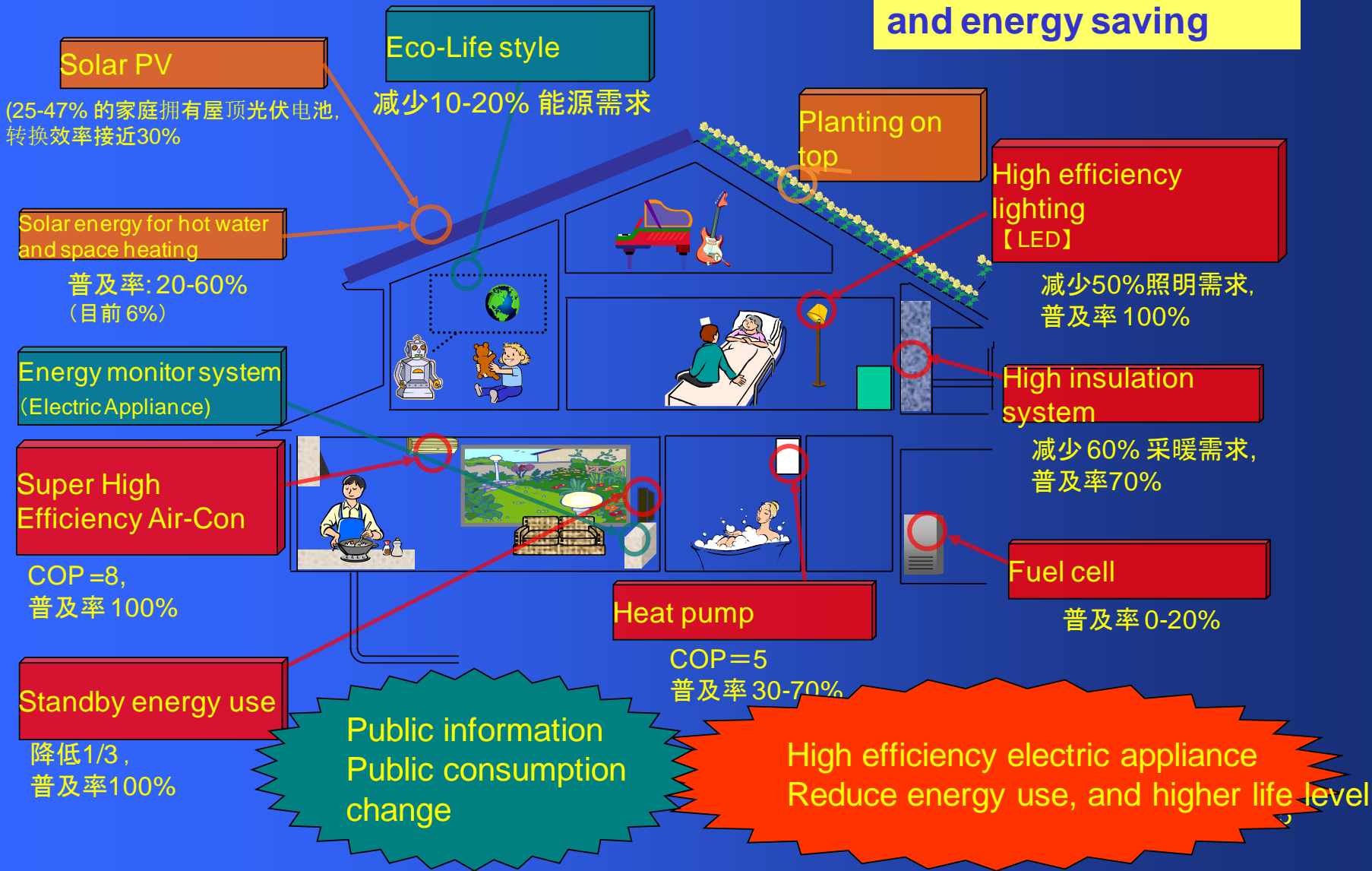


## Unit energy use for key products, LCS Scenario

	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

# Solar Energy

# Low Carbon House in 2050: comfortable and energy saving



全部结果 > “平板电视机”

所有类目

大家电 (313)

平板电视 (277)

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

“平板电视机” 找到321件相关商品

网购上京东 省钱又放心

荣耀四核

热门搜索：新一代APU 跑

网购上京东 省钱又放心

灯泡

热门搜索：新一代AP

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)

“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：相关性 销量 价格 评论数

库存：全国 仅显示有货 商品类型：

推广商品



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



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 70-199 200-49

排序：相关性 销量 价格 评论数

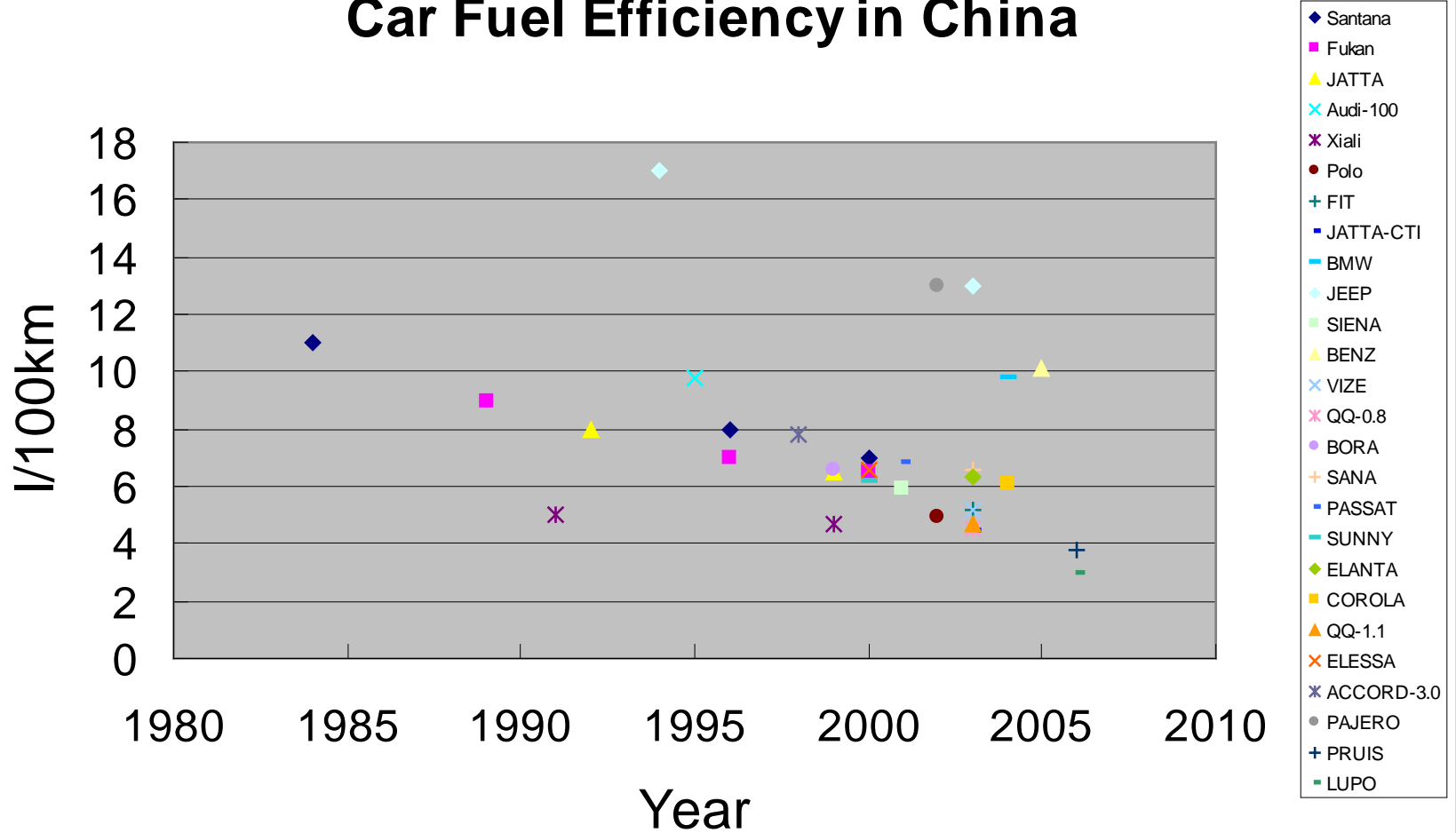
库存：全国 仅显示有货 商品类型：

## 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 engine size of family cars, liter		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%

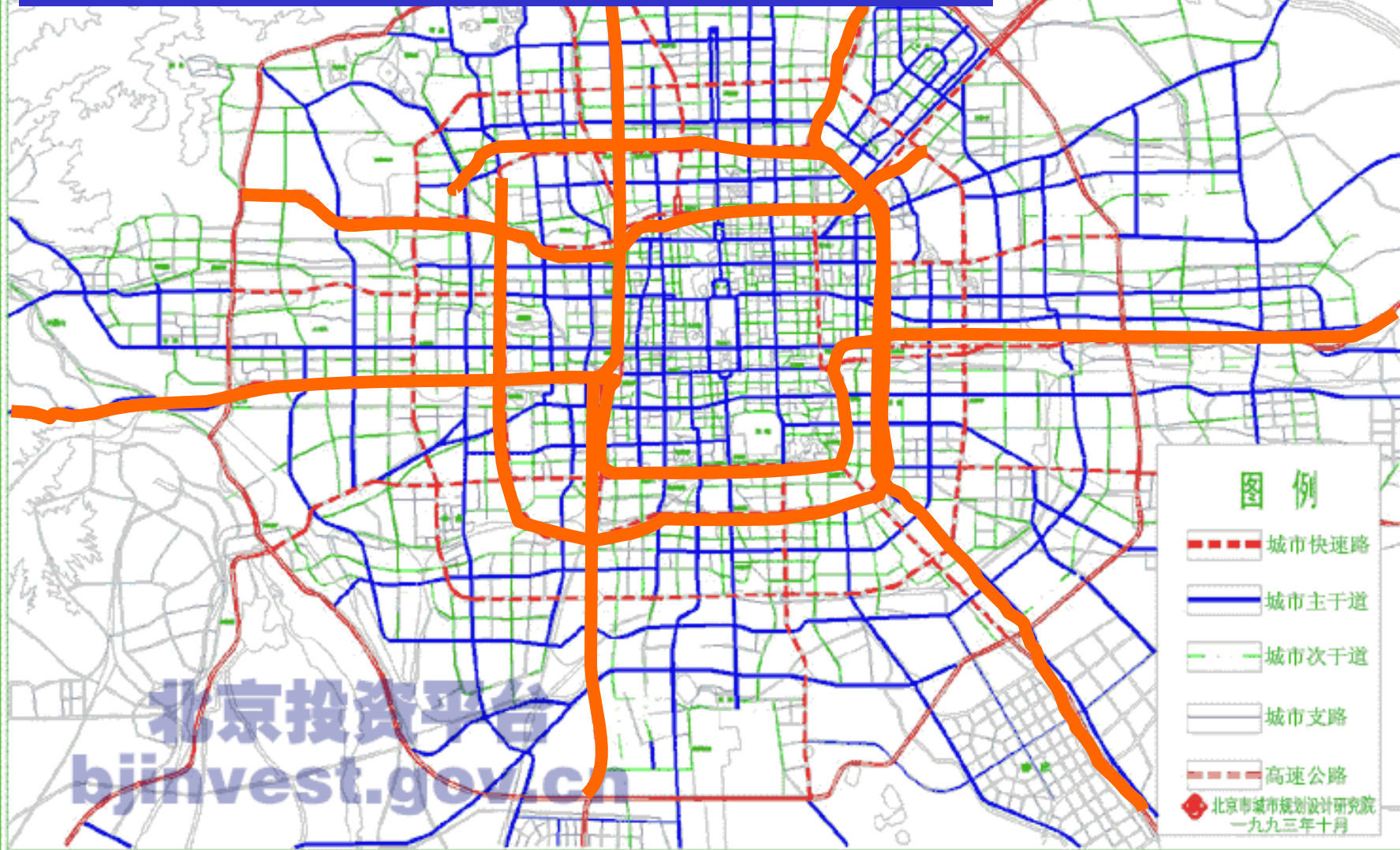


# Car Fuel Efficiency in China



# 北京市区道路网规划方案

Rapid bus: using existing rapid road



北京投资平台

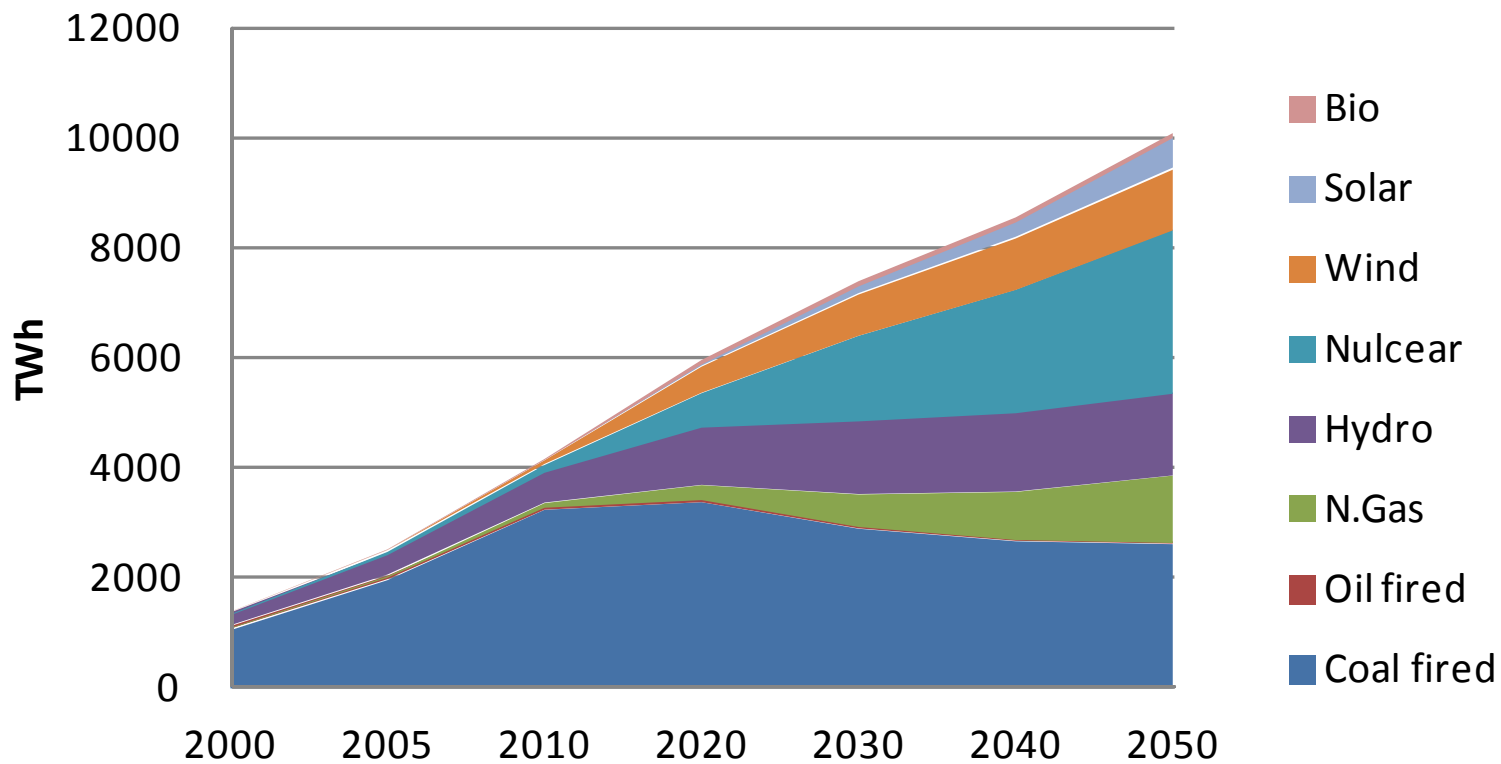
[bjinvest.gov.cn](http://bjinvest.gov.cn)



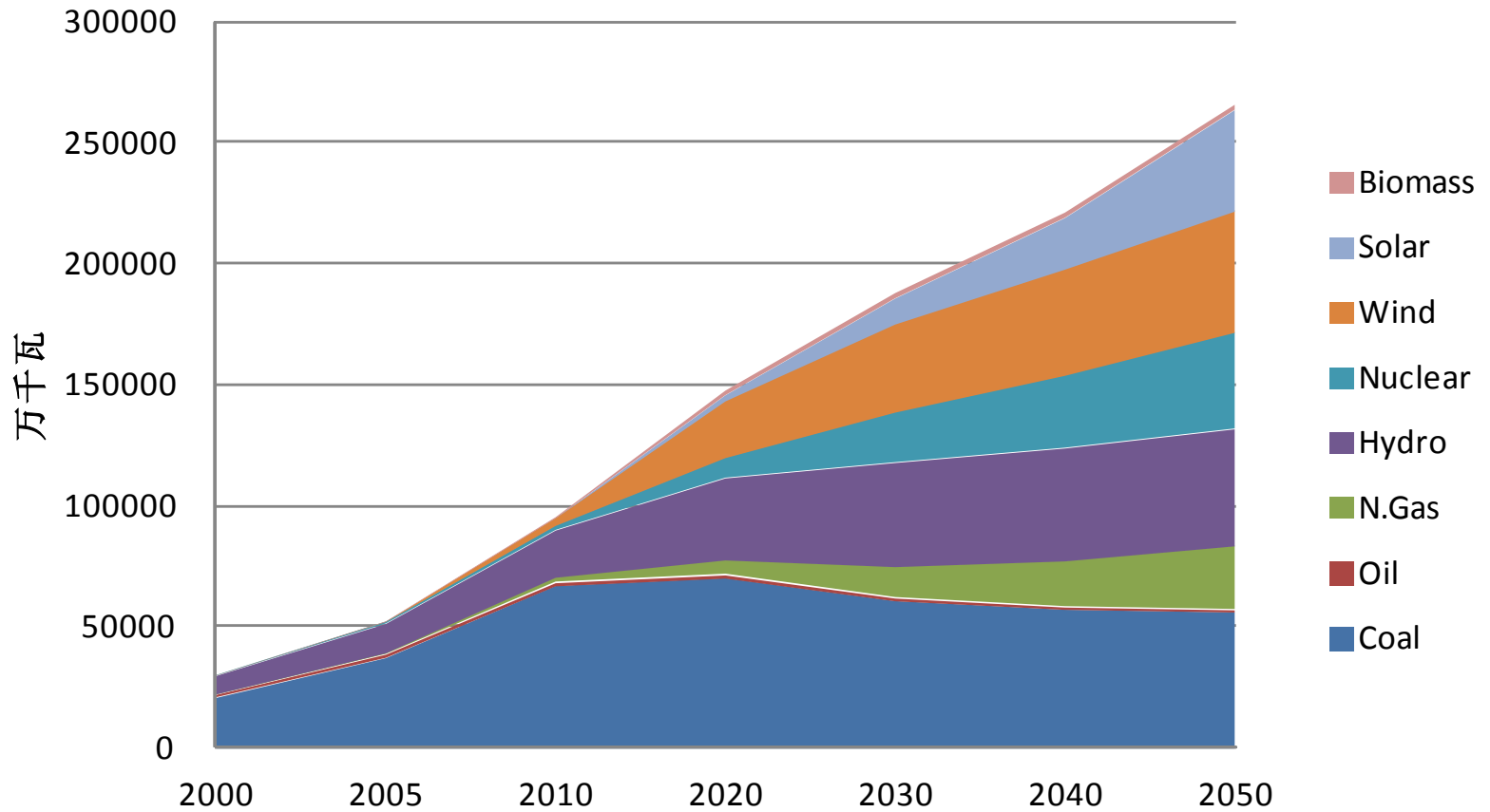
# Stockholm: bicycle is coming back



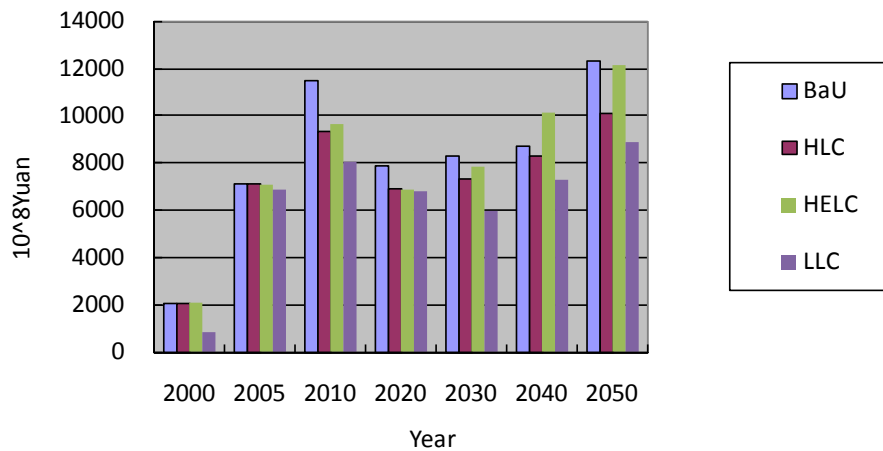
# Power Generation



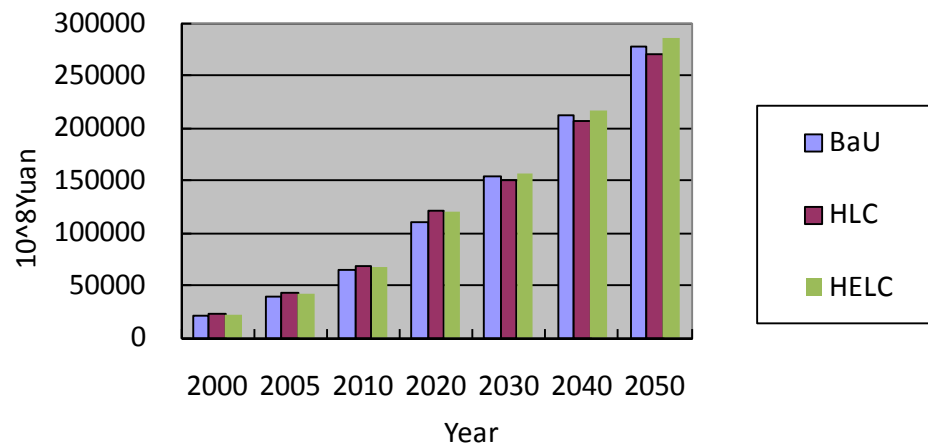
# Power Generation Capacity



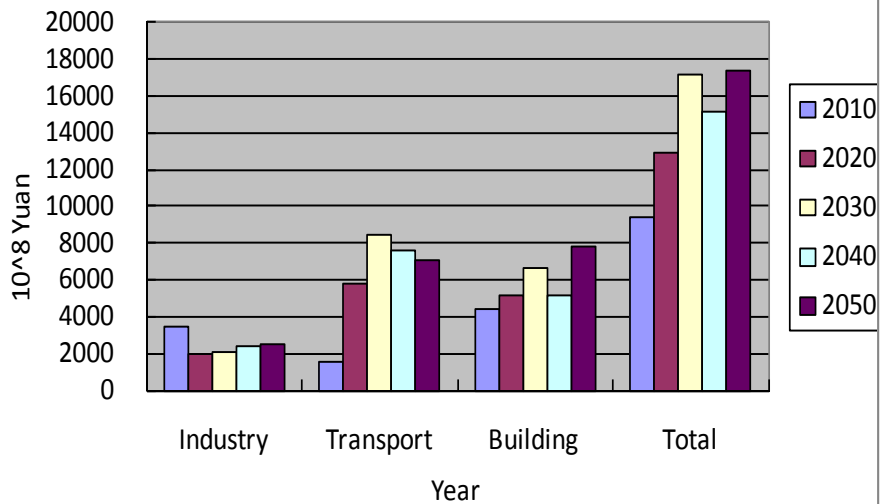
### Investment in Energy Industry in China



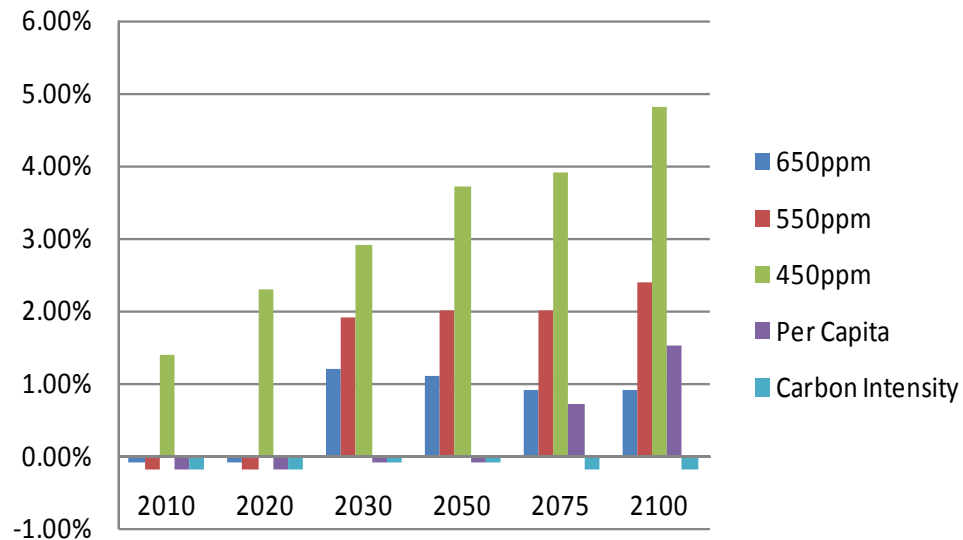
### Energy Expenditures in China



### Additional Investment in end use sectors in ELC

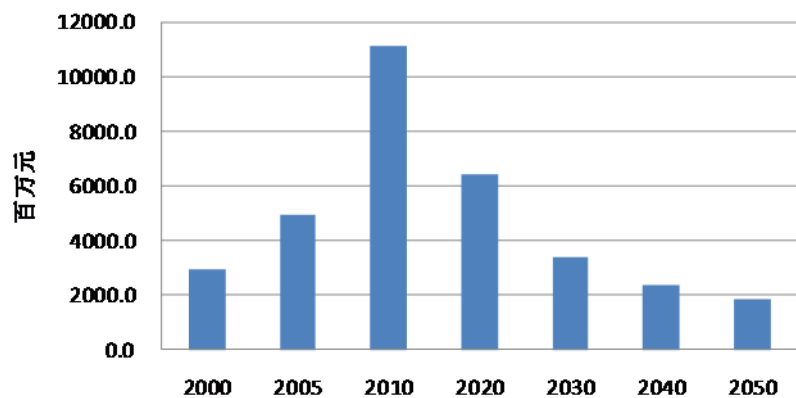


### GDP Loss, %

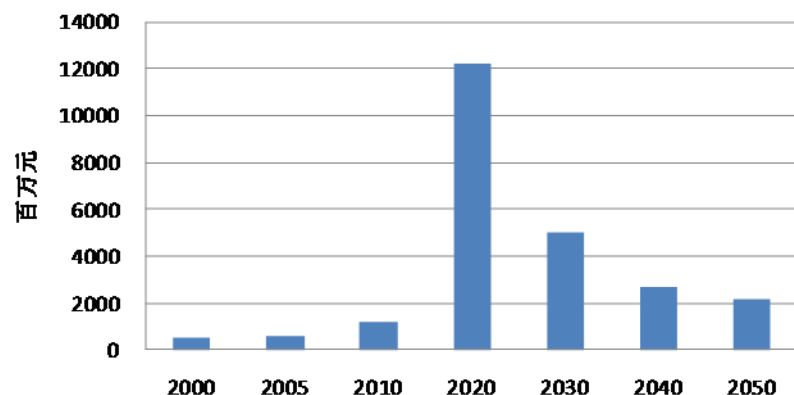


# Fixed Investment for Pollution Control, million yuan

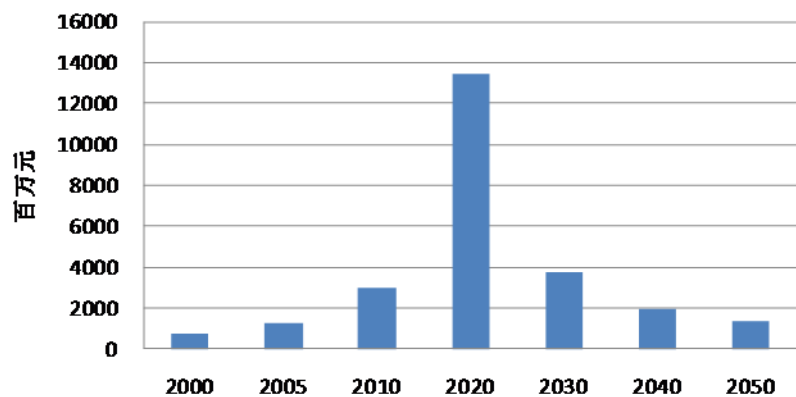
## SO<sub>2</sub>减排固定投资



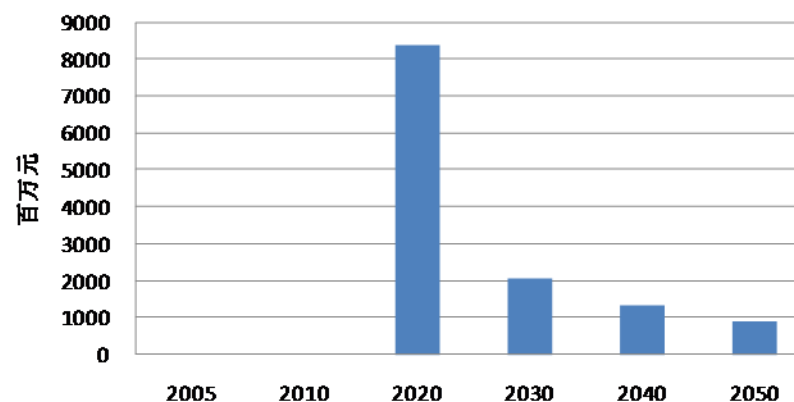
## PM<sub>2.5</sub>减排固定投资



## NO<sub>x</sub>减排固定投资

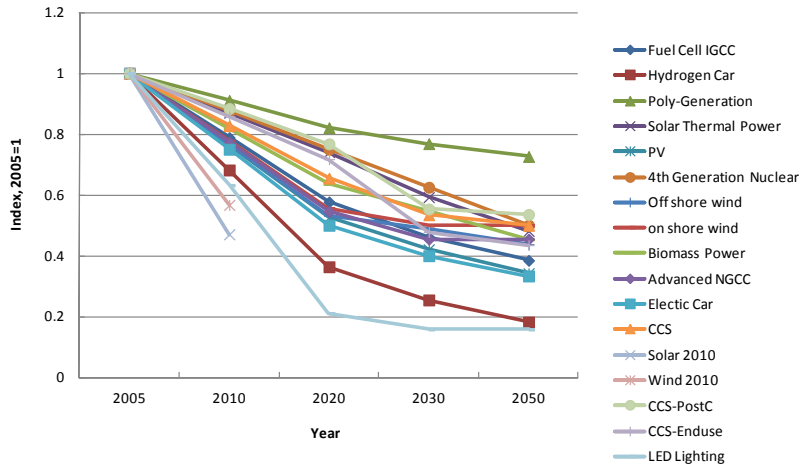


## 汞减排固定投资





### 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),

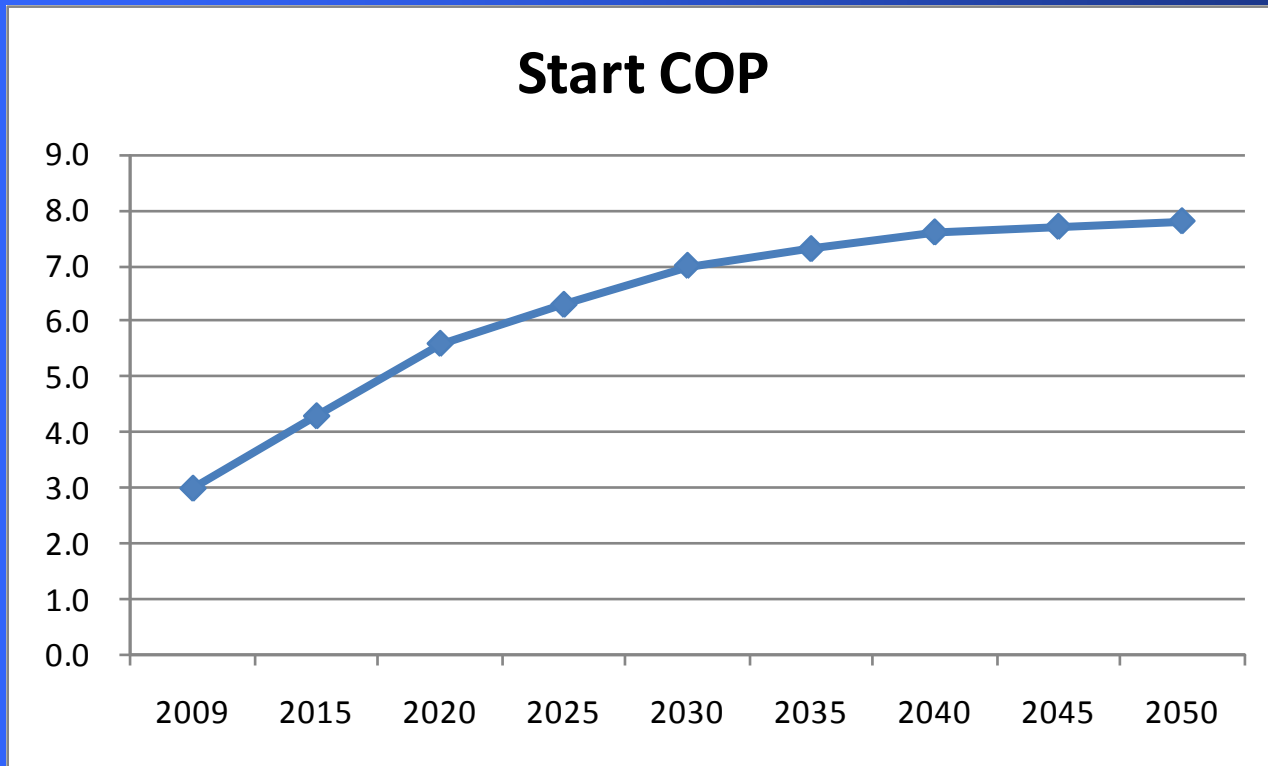
By 2020, Wind 200GW to 250GW, Solar 50WG



# 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 12<sup>th</sup> 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

---

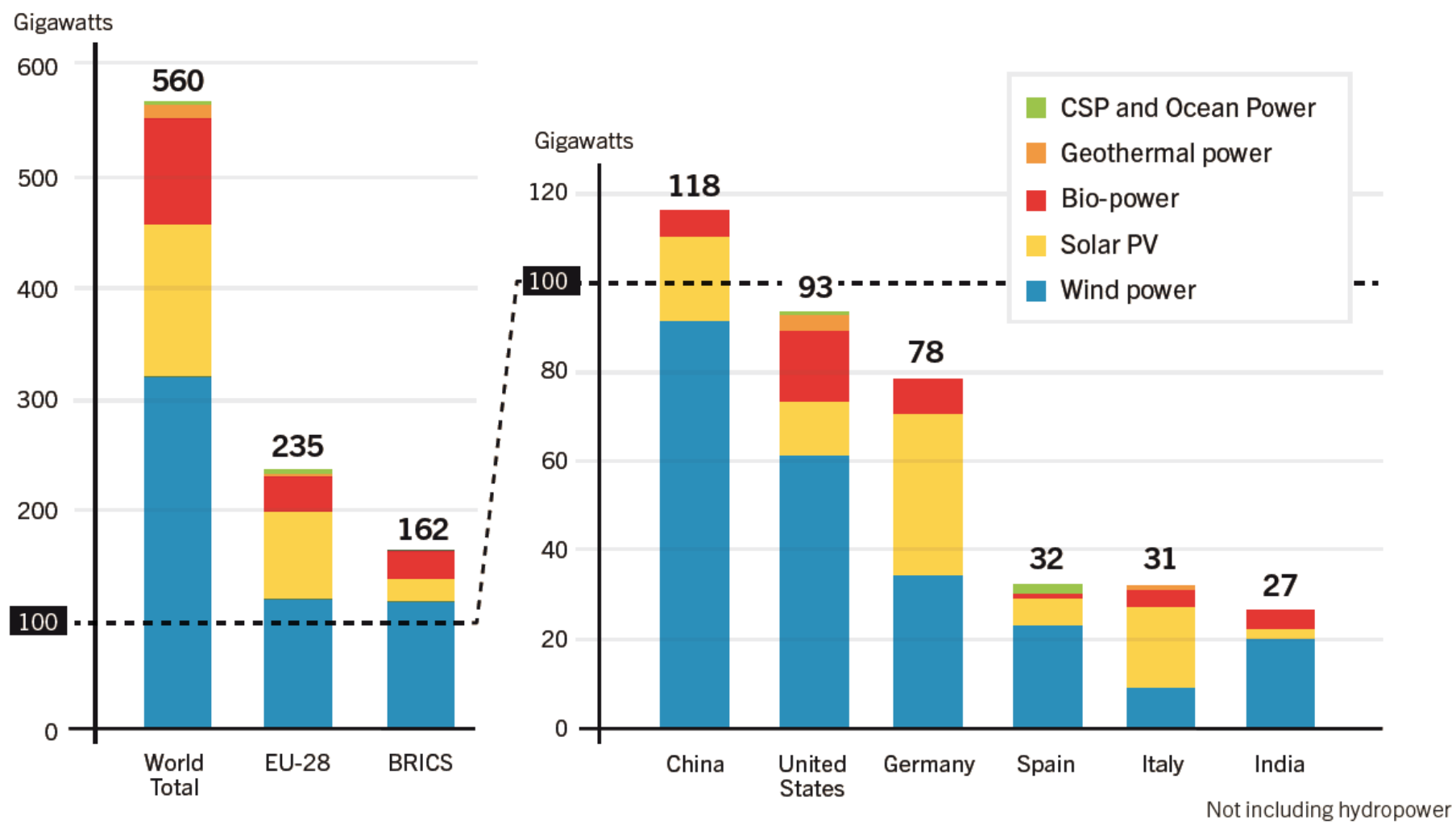
- From 2013 to 2017
- Target: 30% improvement of air pollution
- A package of policies
- In which: reducing coal use in key areas including Beijing-Tianjin-Hebei region, Yangtze Delta Regions, Pearl River Delta Region
- Clean oil supply for vehicle, upgrade emission standard and oil quality
- Regulation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

## The expected big changes in energy system in China

---

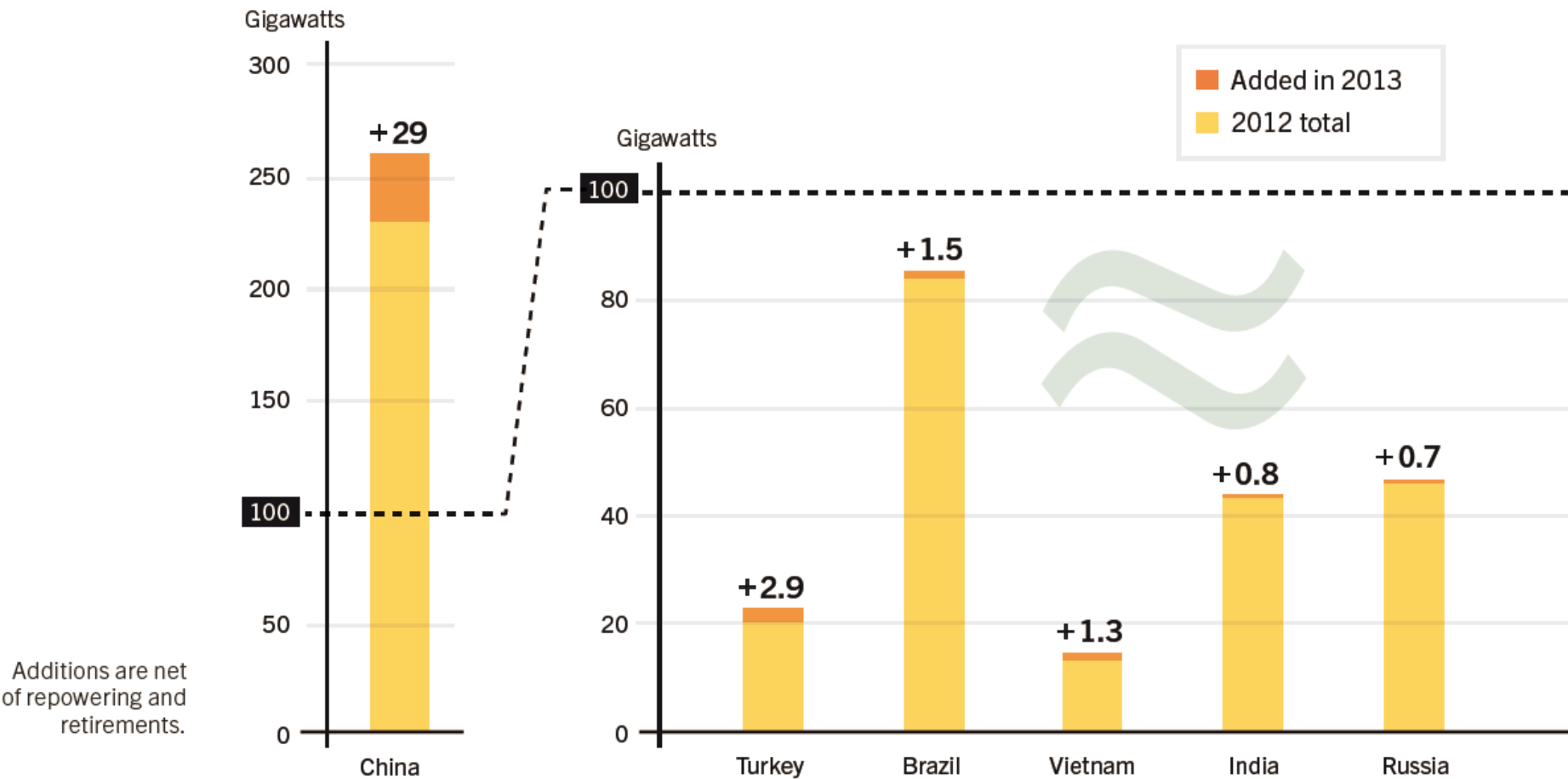
- Coal consumption start to decrease, coal industry should be ready for it, and make own long-term strategy: local manufacture, export/import, security, clean coal use.
- Much more natural gas demand, need to work out for the supply
- Much faster progress on renewable energy, both centralized and distributed
- 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

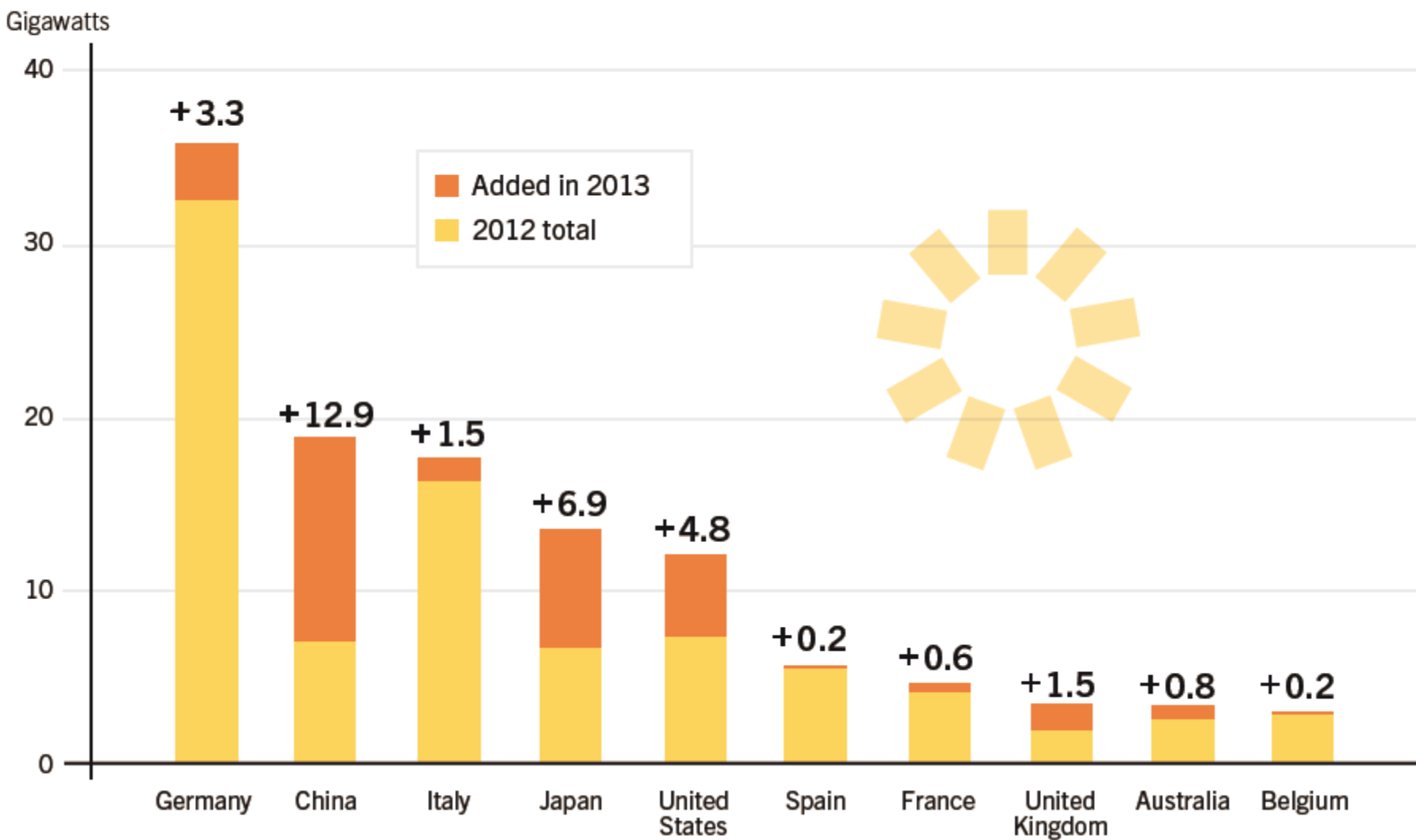


Not including hydropower

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

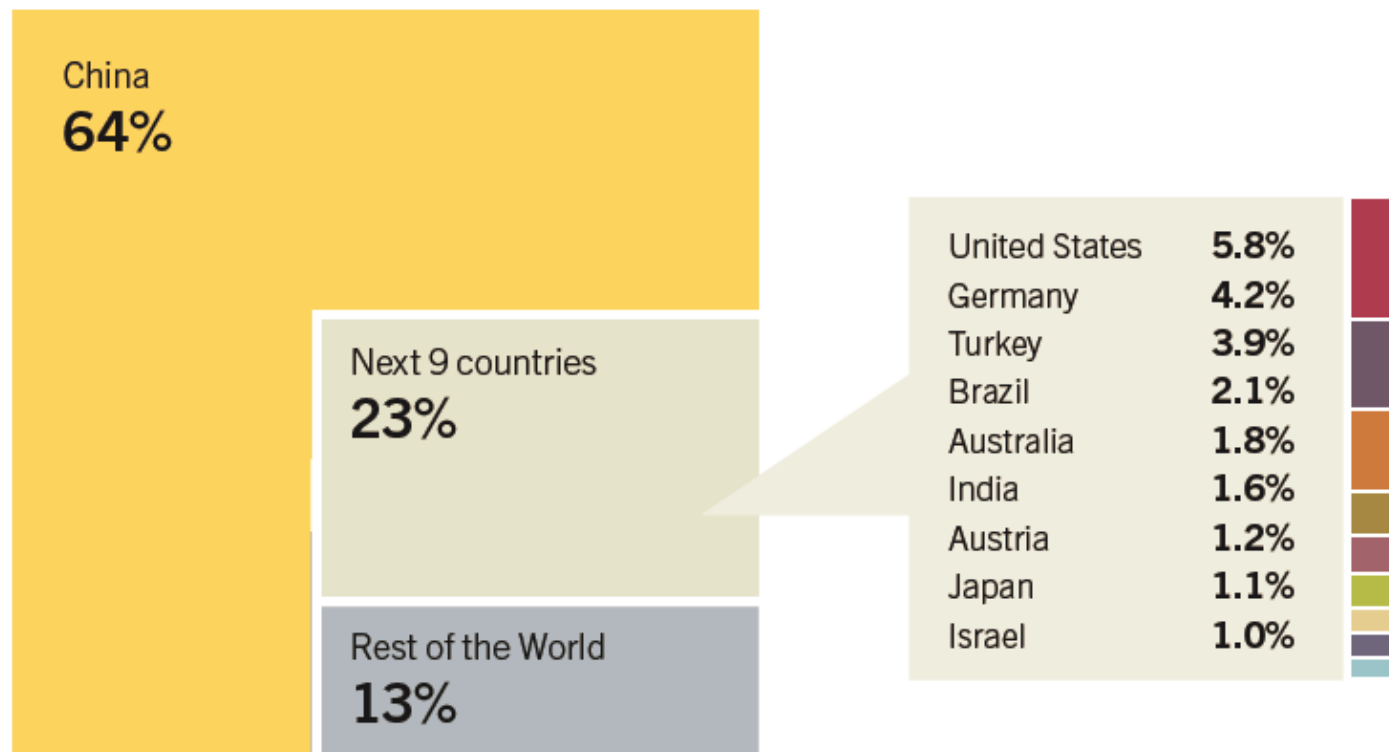


**Figure 13.** Solar PV Capacity and Additions, Top 10 Countries, 2013

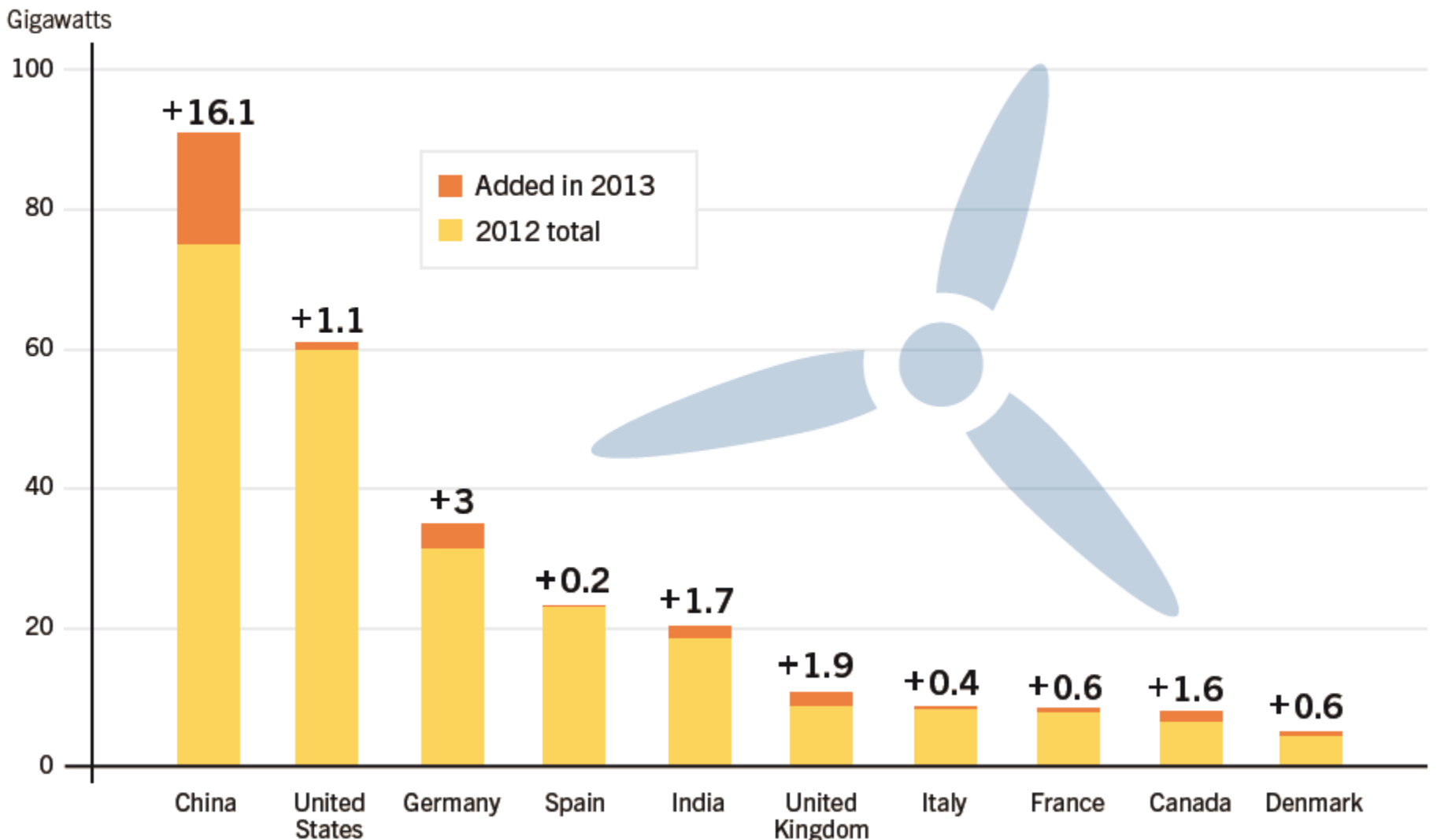




**Figure 16.** Solar Water Heating Collectors Global Capacity, Shares of Top 10 Countries, 2012



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



Additions are net of repowering

## 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 13<sup>th</sup> 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