

Co-benefits of GHG Emission Reduction Policy in China: Opportunities and Challenges

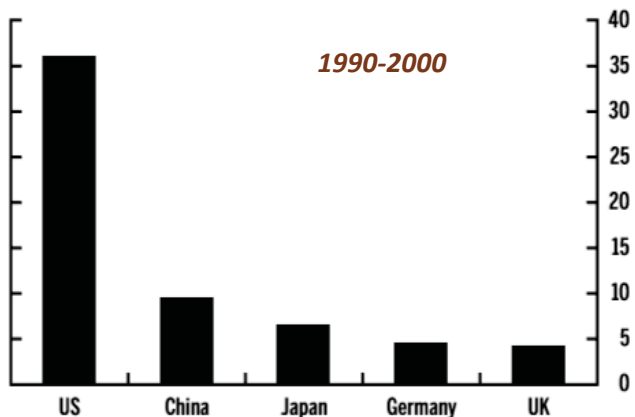
Alun Gu

Institute of Energy, Environment and Economy
Tsinghua University

Marrakech 2016

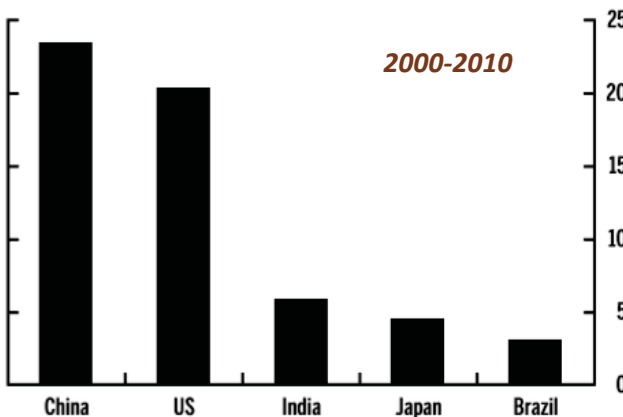
中国已经成为世界增长的引擎 China as the engine of global growth

贡献增长的前五大经济体



数据来源: WDI, Lin 2011

Top five contributors to growth



Source: WDI, Lin 2011

中国对世界经济增长的贡献约为25%，

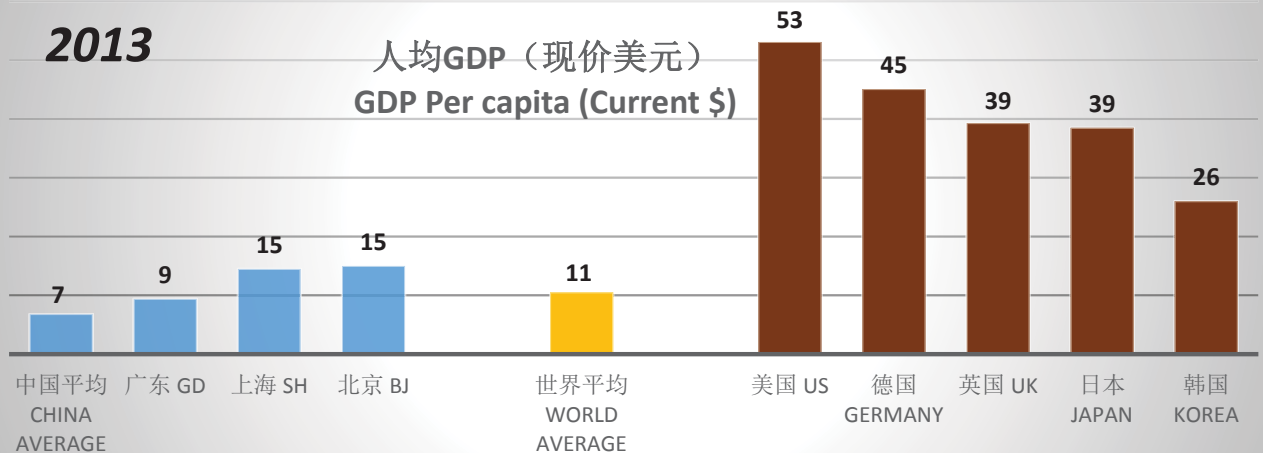
China contribute 25% of global growth

未来仍有进一步增长的空间与潜力;

Potential for further growth still remains

2013

人均GDP (现价美元)
GDP Per capita (Current \$)



有机会在2030年前跻身高收入国家、成为世界第一大经济体

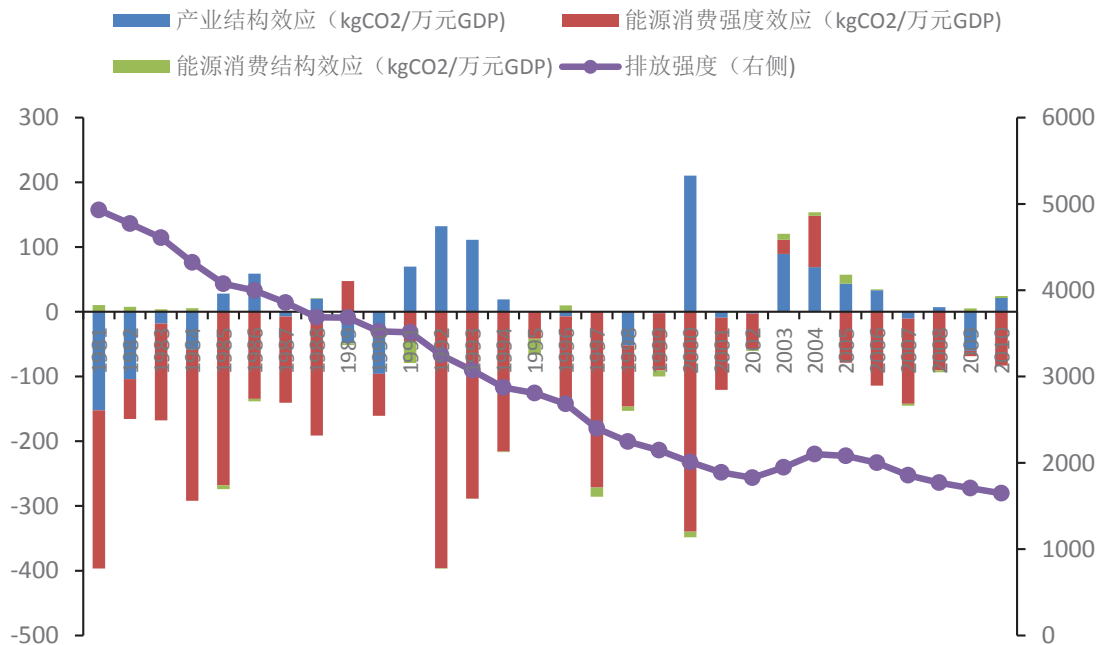
Have chance to become high income country and top one economy before 2030

数据来源: WDI, 报告计算

Source: WDI, staff calculation

中国的能效提高取得显著成绩

China's efficiency improvement break record



过去30年，中国GDP碳排放强度年均下降3.7%；2013年我国碳强度比2005年下降28.5%，年均下降4%

China's carbon intensity per unit of GDP decreased by 28.5% in year 2013 from 2005 level, 4% on annual average during that period, and 3.7% on annual average for last 3 decades

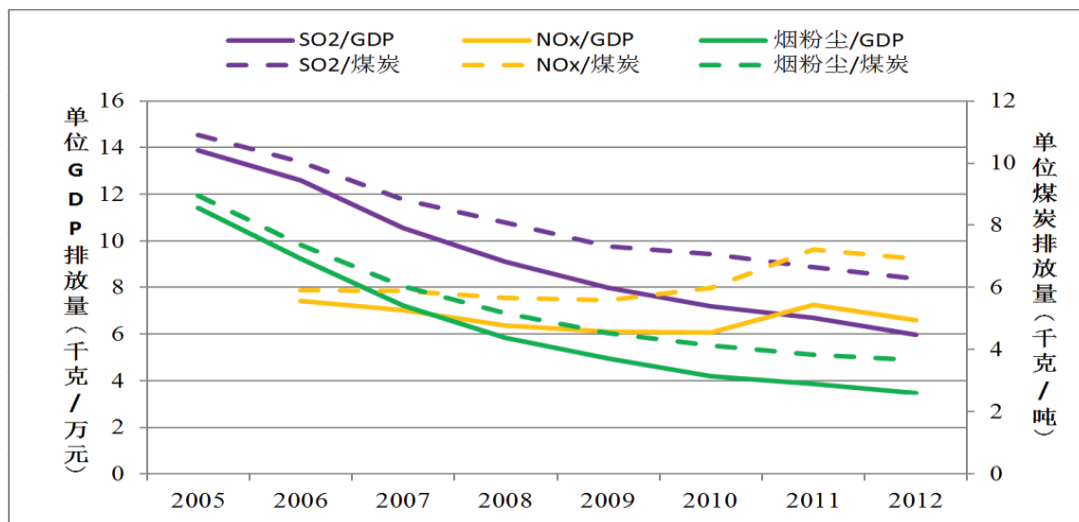
国家 Country	碳排放强度下降最快的10年 The best ten years	碳排放强度下降最快10年的 年均降幅 (%) Best 10 years efficiency improvement rate (%)
英国 UK	1916-1926	4.20
美国 US	1934-1944	3.58
德国 Germany	1990-2000	3.37
日本 Japan	1977-1987	3.20

下降强度和持续时间均超过主要发达国家历史最好记录

The annual improvement rate has break all record of major developed economy, in duration and intensity.

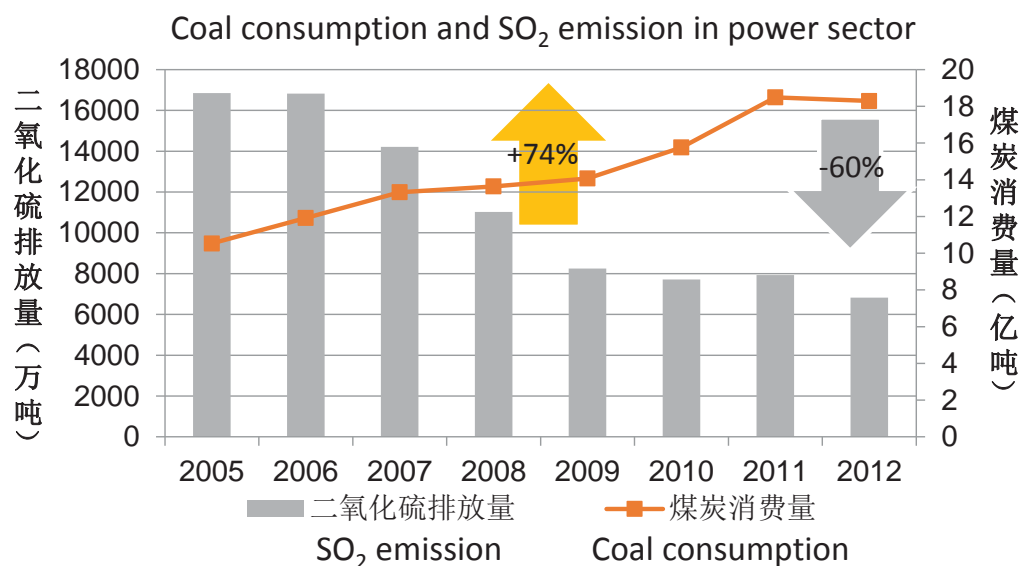
污染物总量控制取得成效

Total air pollutants control made progress



实施大气污染物总量控制，取得了显著的成效。二氧化硫和烟粉尘总量出现下降，氮氧化物排放总量得到控制，全国单位GDP大气污染物排放强度呈持续下降的趋势

Total air pollutants control made remarkable progress, result in a continuous decline of SO₂ and dust emission, and air pollutant intensity, while NO_x under control

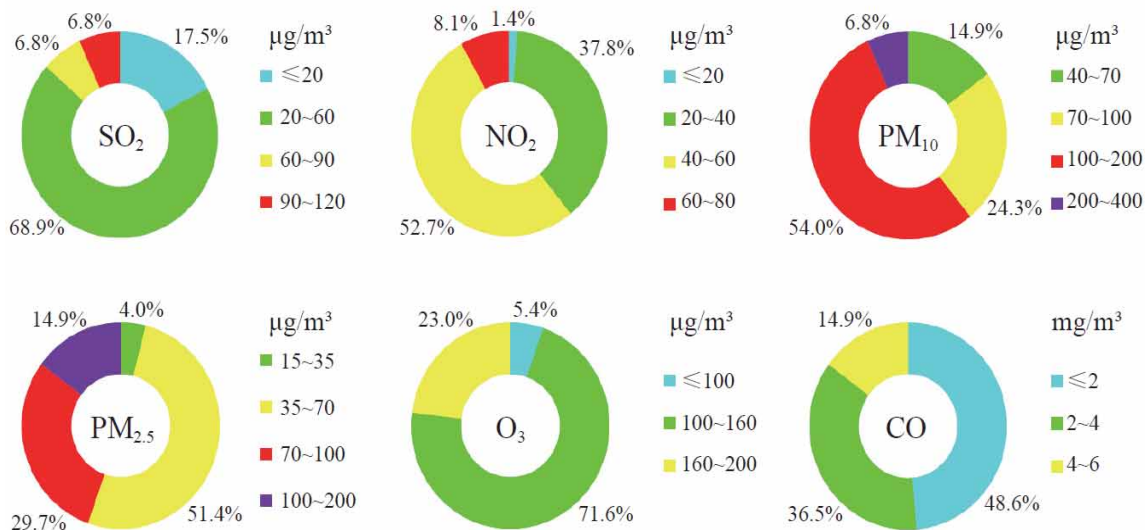


在电力、钢铁、水泥、机动车等重点行业采取了一系列措施和行动，主要大气污染物排放控制成效显著；

Policies and measures taken in key sectors achieved marked effect, including power, iron and steel, cement and transportation;

但是雾霾频发，空气质量不容乐观

But, haze bring air quality down

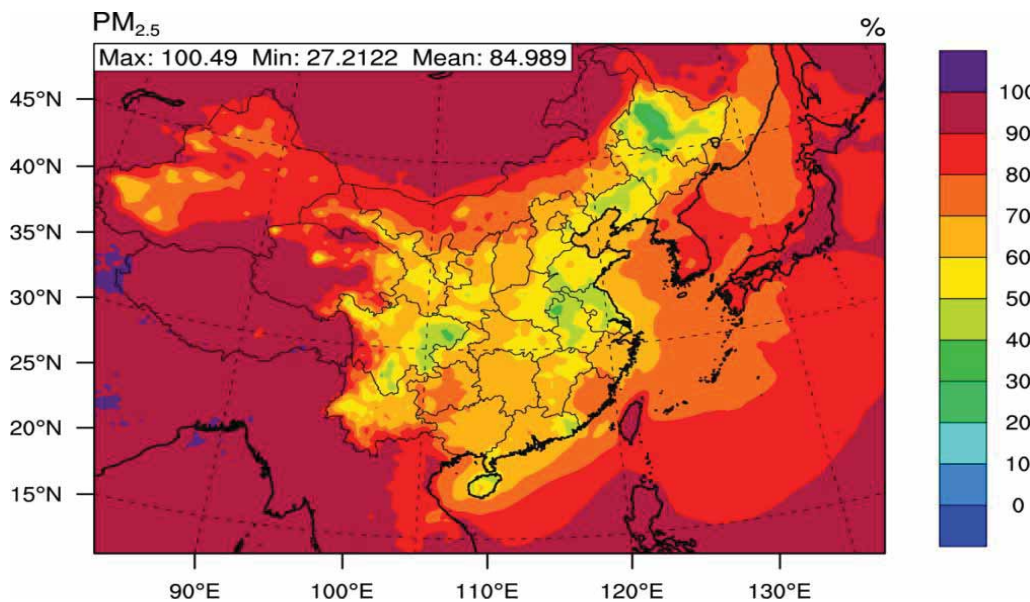


我国大气污染形势依然严峻，以可吸入颗粒物（PM₁₀）、细颗粒物（PM_{2.5}）为特征污染物的区域性大气环境问题日益突出。

Air pollution is severe. The major characteristic is the high concentrations of particulate matter, leading to frequent smog in many regions.

煤炭燃烧是PM_{2.5}的重要排放源，在京津冀、长三角、珠三角等重点区域，贡献在50%-70%之间；

Coal burning is the major source of PM_{2.5}. In Jing-Jin-Ji region, Yangtze River Delta and Pearl River Delta, coal burning is responsible for between 50% and 70% of PM_{2.5} pollution.



应对挑战需要经济、能源和环境的协同治理

Call for synergy economy, energy and environmental goals



经济 Economy

- 经济增长放缓，需要寻找新的增长动力，避免“中等收入陷阱”；
- The slowing down growth of economy needs new drivers to avoid middle income trap



能源 Energy

- 能源消费将全面超出供应能力，能源安全亟待提升；
- Energy consumption will surpass supply capacity, requires for improved energy security



环境 Environment

- 空气质量问题突出，2030年需全面达到空气质量的 国家二级标准
- The Grade II standard of air quality needs to be achieved in year 2030

通过经济、能源与环境目标的协同治理，中国可以在保证良性经济发展的同时减少空气污染、提高能源安全以及降低气候风险；

Through synergy governance on economy, energy and environment, China can a triple win to ensure healthy economic development, improve energy security and reduce climate risks

协同治理需要额外的减排努力

Synergy governance require additional efforts

变量	2010	持续减排情景		加速减排情景	
		CERS	2020	2030	AERS
能源消费总量 (亿tce)	32.5	49.2	62.5	47.5	59.0
Total energy consumption (10 ⁸ tce)					
GDP能源强度 (2010年为100)	100	73.4	54.6	70.6	51.6
Energy intensity of GDP (2010 as 100)					
CO ₂ 排放量 (亿吨CO ₂)	72.5	104	127	96.8	106
CO ₂ emission (10 ⁸ t)					
GDP的CO ₂ 强度 (2010年为100)	100	69.6	51.1	64.8	41.5
Carbon intensity of GDP (2010 as 100)					
非化石能源比重 (%)	8.6%	14.5%	20%	15%	23%
Share of non-fossil fuel (%)					

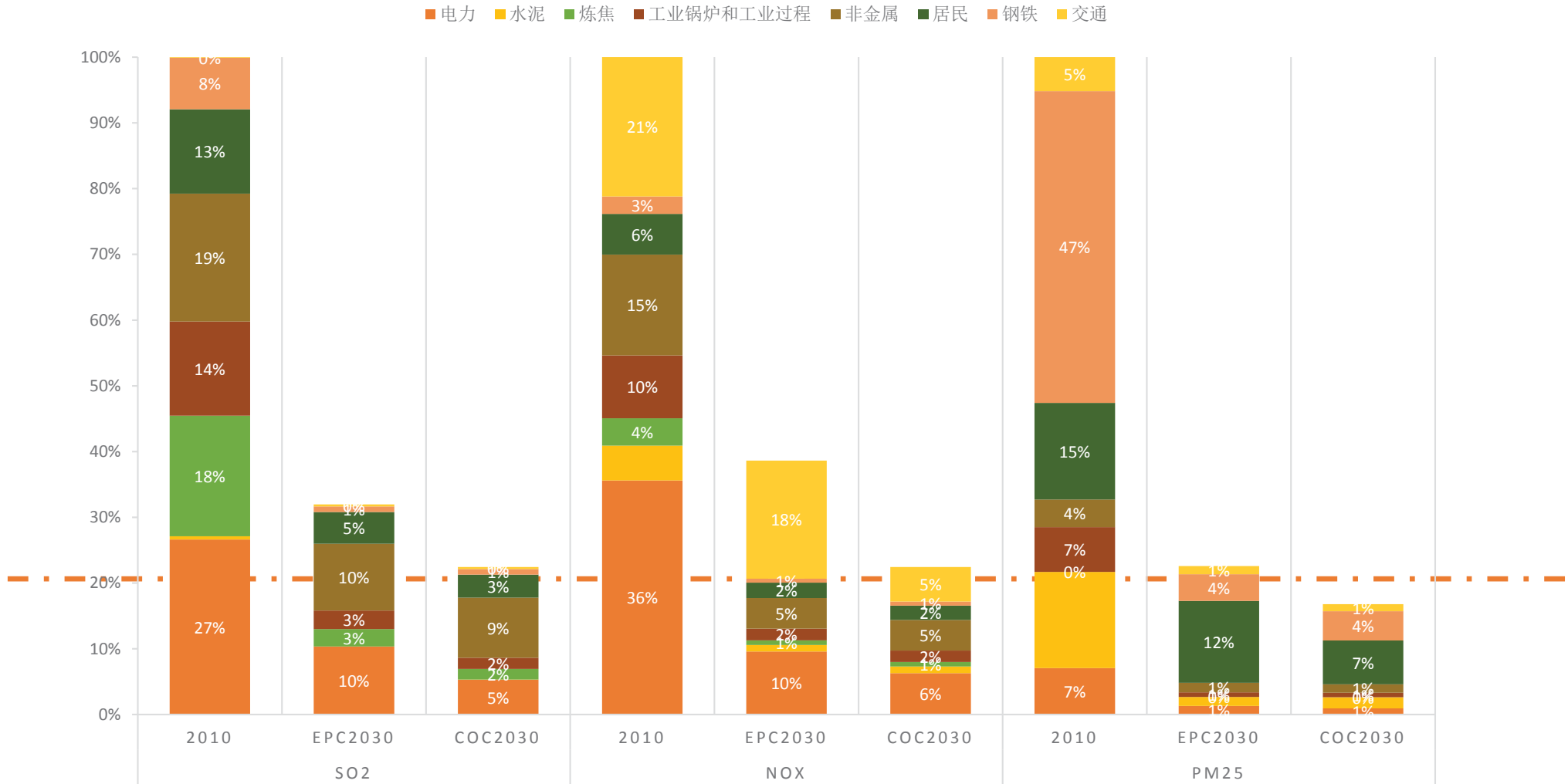
为达到2030年左右CO₂排放不在增长的目标，中国需要在节能及能源结构调整上做出额外的努力，并需要控制煤炭消费总量，在2020年左右停止增长；

To stabilize emission around 2030, China need additional efforts on energy conservation, economic and energy structure adjustment with a view to stabilize coal consumption around 2020;

为实现这一目标，2013-2030年平均碳强度下降率需要从持续减排情景的年均3.3%进一步提高到4.3%，将4%左右的碳强强度下降率再延续20年；

The rate of carbon intensity reduction needs to be improved from 3.3% (under CERS) to 4.3%, expand the 4% reduction trends for another two decades;

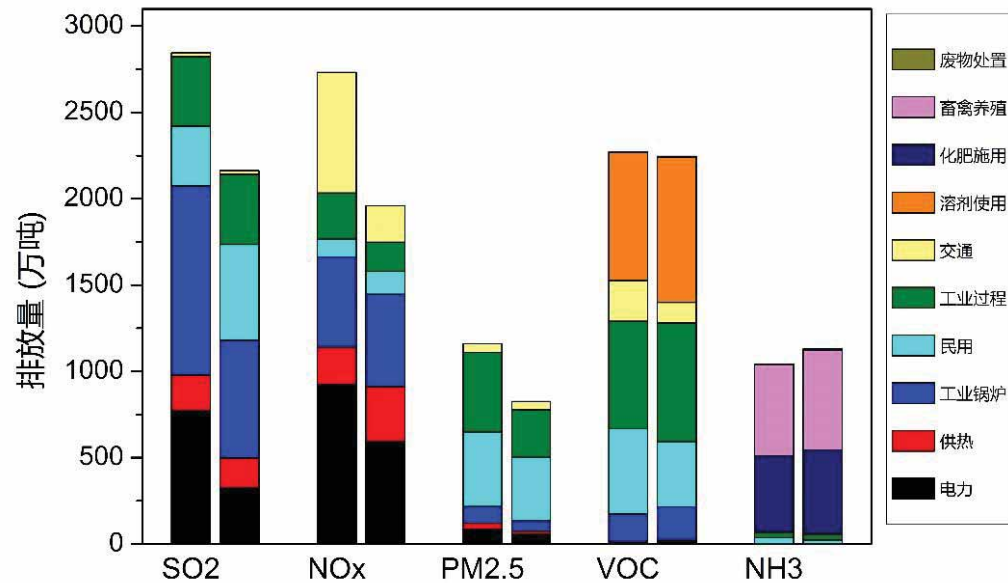
Pollutants control achievements of synergy control scenario



- 2030年协同控制情景下SO₂，Nox和PM_{2.5}分别为2010年的：**21.15%、22.44%和16.68%**。和全面实现空气质量达标的20%、20%、20%基本持平，有望实现空气质量达标。
- 末端控制对于实现2030目标的贡献率在69%~76%之间，基于源头控制的排放对于减排的贡献率24%~31%之间。
- 不同部门的减排率：可以解释能源结构优化带来的LP减排的部门空间分布。（例：电力部门）

向污染宣战可以取得胜利

The battle to air pollution can be won, but require additional efforts

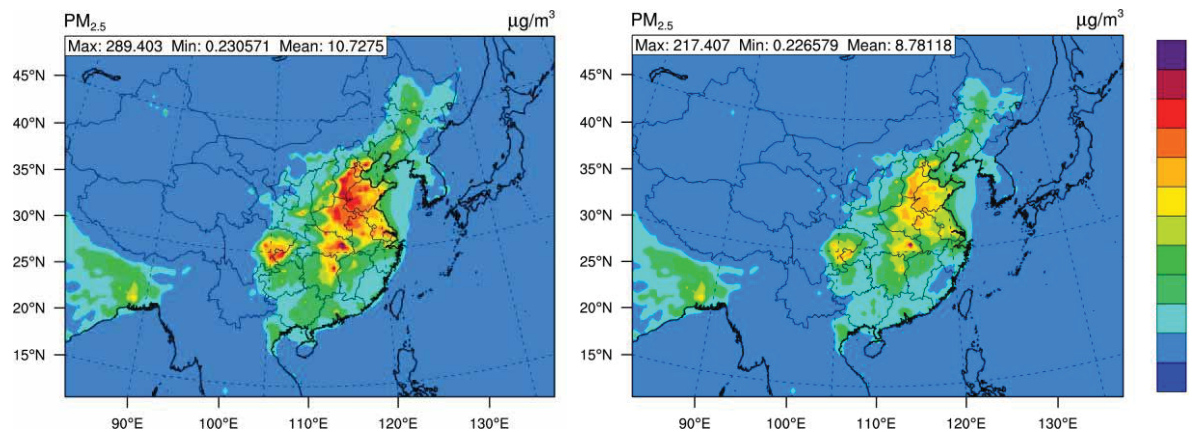


在现有节能减排政策下，2030年全国PM_{2.5}浓度显著下降，但在2030年无法全面达到细颗粒物浓度35 $\mu\text{g}/\text{m}^3$ 的国家二级标准；

Maintaining the intensity of current policy, the PM concentration will be substantially reduced, but still sufficient to achieve the air quality standard;

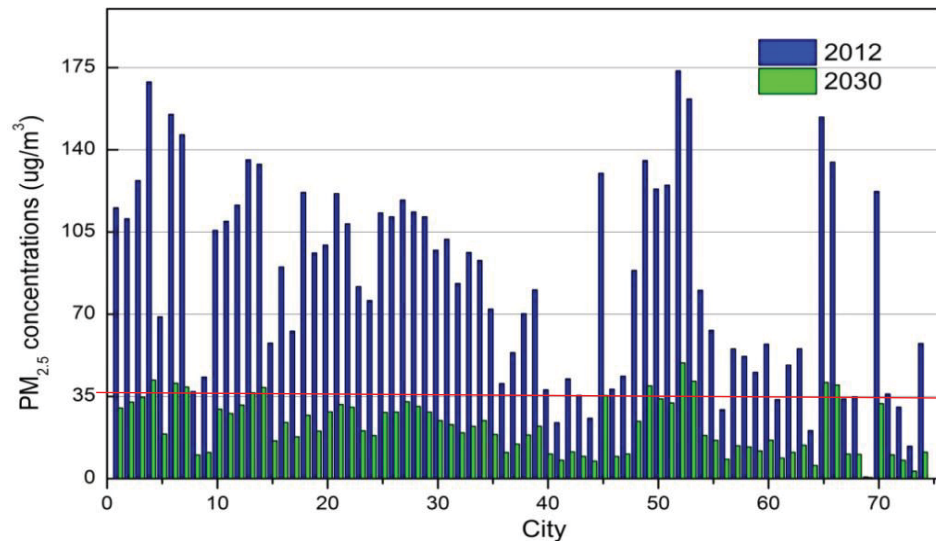
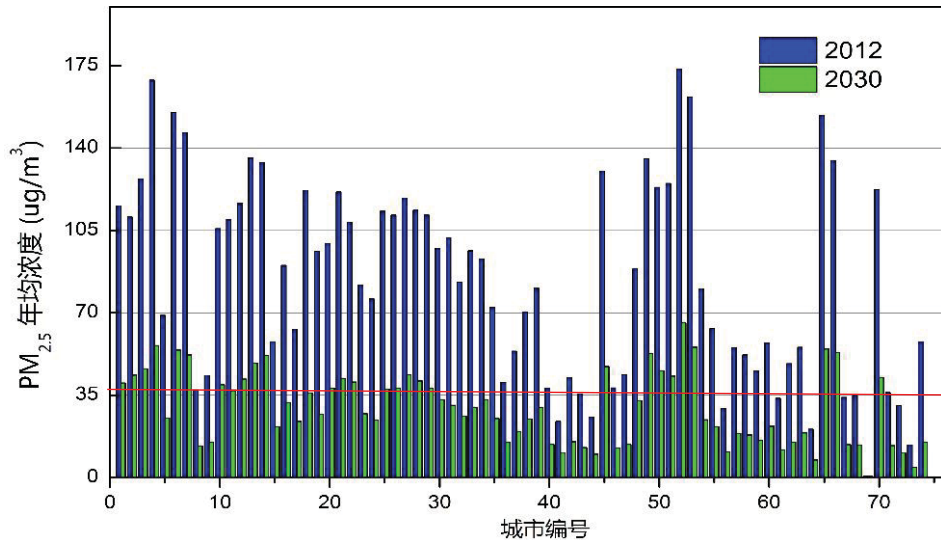
在几个重点区域，珠三角基本能够实现全面达标，但长三角和京津冀地区的主要城市依然难以达标；

Even with the strictest end-of-pipe treatment measures, almost half of Chinese cities risk failing to meet air quality standards in 2030.



向污染宣战可以取得胜利

The battle to air pollution can be won



在加速减排情景下，综合结构调整与严格的末端处理措施可以使全国主要城市的空气质量达到二级标准；

With those additional efforts, combined with most stringent environmental policy, most major cities can achieve air quality targets;

空气质量全面达标需要中国采取进一步的减排努力，改变经济发展模式、改变消费方式、调整能源结构、强化技术进步以实现进一步节能减排；

Targets for air quality are only achievable through a combination of accelerated economic restructuring, energy conservation, fuel switching and environmental policy.

GDP成本可控，部分可被效益抵消 **GDP cost can be managed and can be offset**

在税收中性的假设下，总的GDP损失可以控制在1%之内；

Under the assumption of “tax neutral”, the GDP loss can be managed within 1%;

加速减排对高耗能行业的冲击较大，对煤炭行业的冲击在2020年在6%以上；

The impact on energy intensive industry is remarkable, the impact on coal industry is higher than 6% in year 2020

考虑到加速减排产生的环境和健康效益，相当一部分的GDP成本可以被抵消；

While considering the environmental and health benefit of accelerate efforts, a large portion of GDP cost can be offset

在不增加能源成本的前提下改善能源结构，增强经济对能源价格变动的韧性；

Improve energy structure without increasing energy cost and enhanced economic resilience to energy price risk

战略与政策

Strategy and Policies

在产能过剩的高耗能行业和经济发达的东部地区首先引入碳排放的总量控制，并逐步扩展至所有行业和地区；

Introducing a total emission reduction target first for energy intensive industries and for developed economies of Eastern China, gradually expanded to all industries and all regions.

通过税费体制改革在能源价格中体现环境成本，建立有利于能源低碳化的市场环境；

Reform energy pricing system to reflect the hidden cost of environmental externalities to promote a conducive market for clean energy.

控制煤炭消费总量并在2020年左右停止增长

Limiting total coal consumption with a view to be stabilized around 2020.

通过渐进、逐步提高的碳价格促进产业结构转型；

A gradual increasing carbon price to promote structure adjustment.

实施城市低碳规划和城市角度的碳管理；

Implement low carbon planning and carbon management at city level.

Key Messages

通过经济、能源与环境目标的协同治理，中国可以在保证良性经济发展的同时减少空气污染、提高能源安全以及降低气候风险；

Through synergy governance on economy, energy and environment, China can a triple win to ensure healthy economic development, improve energy security and reduce climate risks

中国可以证明提升人民生活水平、改善生态环境质量和降低气候变化风险的目标可以同步实现，为世界提供典范

it is possible for China to achieve the goals of increasing people's standard of living, improving ecological and environmental quality and reducing the risks of climate change at the same time, providing a positive example to the rest of the world.

Thank you very much!

gal@Tsinghua.edu.cn