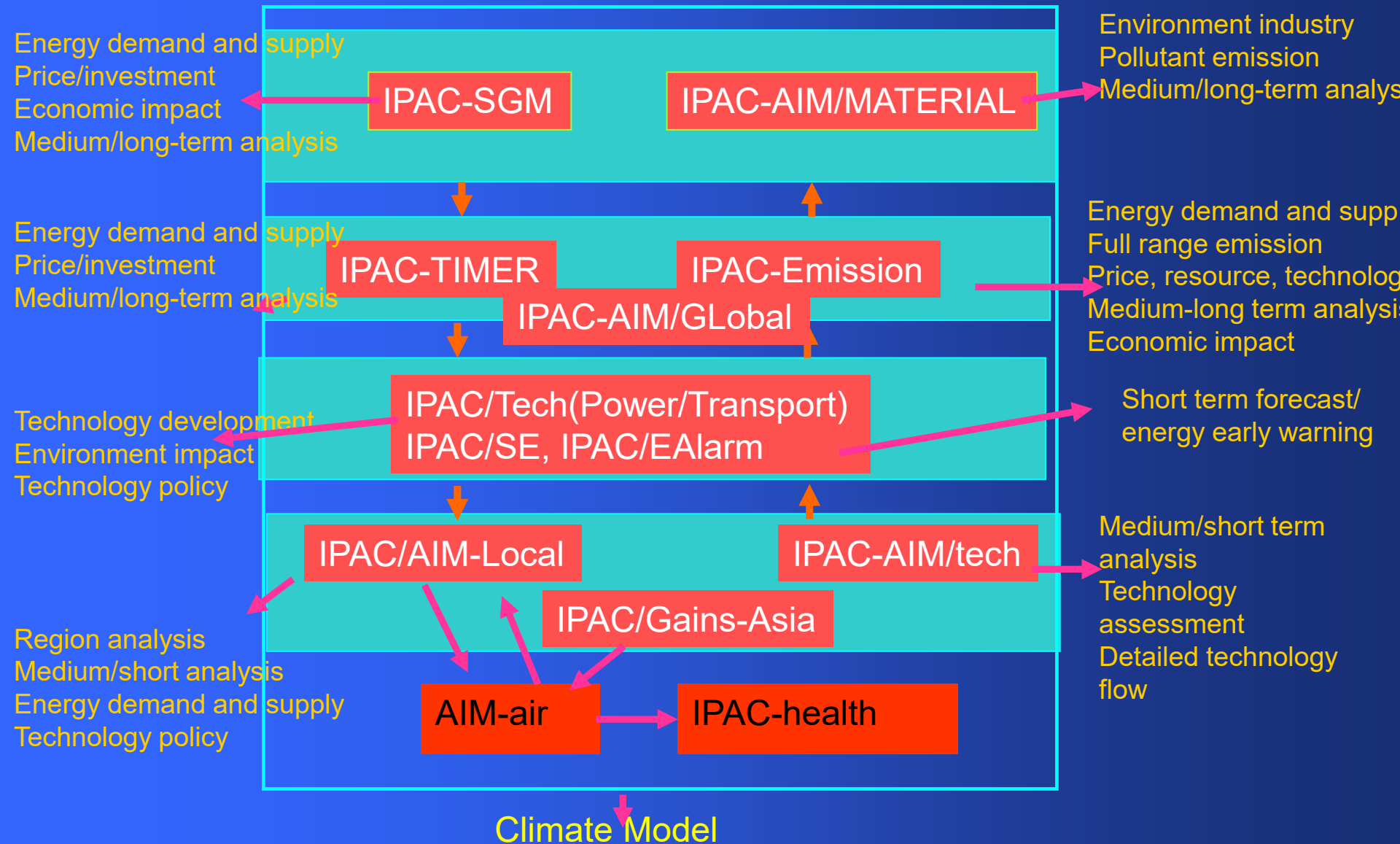


# Energy Transition for Multiple Objectives by IPAC

Jiang Kejun

Energy Research Institute, Chinese Academy of  
Macro-Economics Research

# Framework of Integrated Policy Model for China (IPAC)



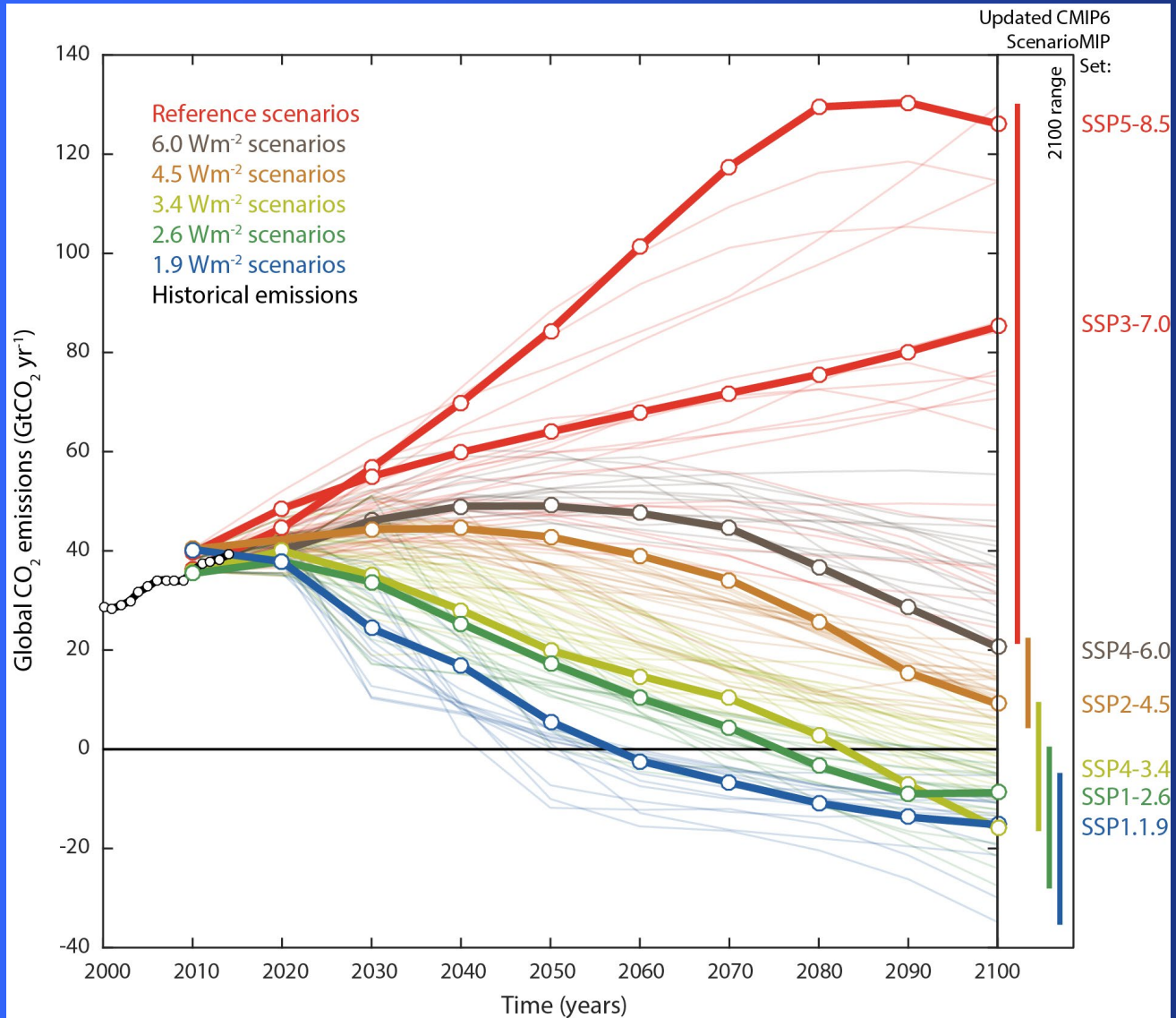
Started from 1993

# Multiple Objectives

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- Carbon neutrality
- WHO standard on air quality
- Water demand reduction
- Less eco-impact new Chemical industry
- Much less mining on earth

# Global CO<sub>2</sub> Emissions, IPCC 1.5C Report

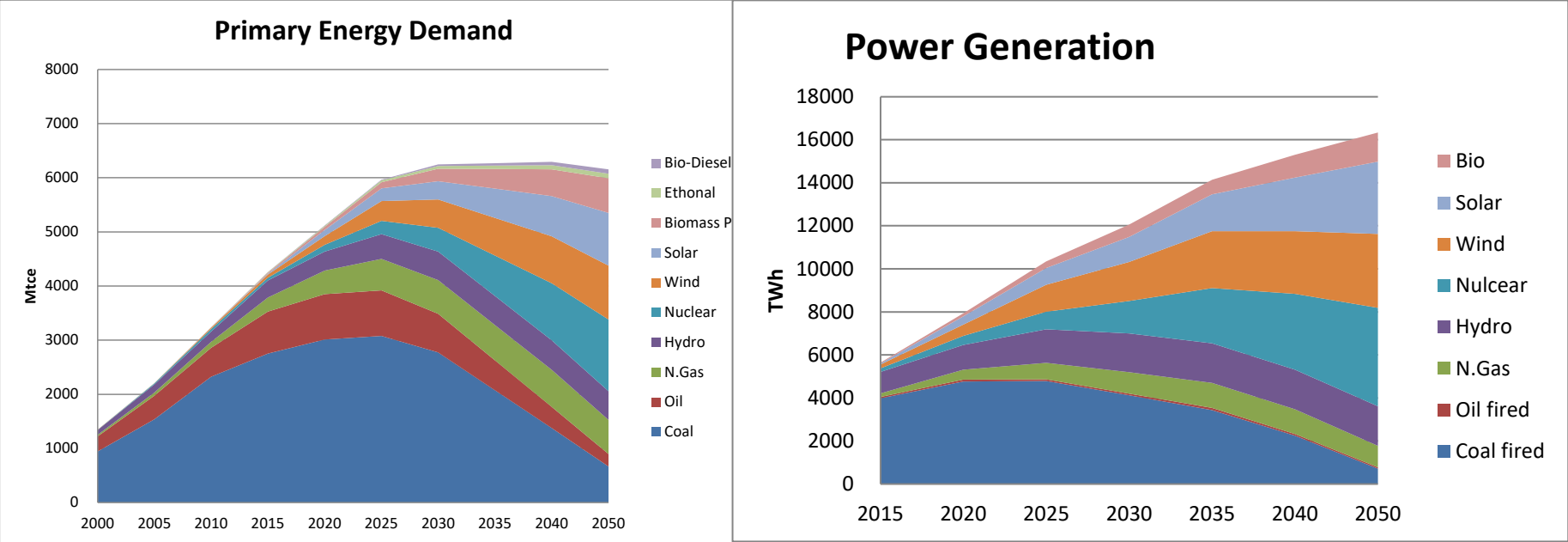


## China's Targets

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**In Sep.22, 2020, President Xi Jinping announced that China's CO2 emission will peak before 2030, and will make effort to be carbon neutrality before 2060 in China**

# Energy Transition in the Carbon Neutrality Target





# SUSTAINABLE DEVELOPMENT GOALS

**1** NO POVERTY

**2** ZERO HUNGER

**3** GOOD HEALTH AND WELL-BEING

**4** QUALITY EDUCATION

**5** GENDER EQUALITY

**6** CLEAN WATER AND SANITATION

**7** AFFORDABLE AND CLEAN ENERGY

**8** DECENT WORK AND ECONOMIC GROWTH

**9** INDUSTRY, INNOVATION AND INFRASTRUCTURE

**10** REDUCED INEQUALITIES

**11** SUSTAINABLE CITIES AND COMMUNITIES

**12** RESPONSIBLE CONSUMPTION AND PRODUCTION

**13** CLIMATE ACTION

**14** LIFE BELOW WATER

**15** LIFE ON LAND

**16** PEACE, JUSTICE AND STRONG INSTITUTIONS

**17** PARTNERSHIPS FOR THE GOALS

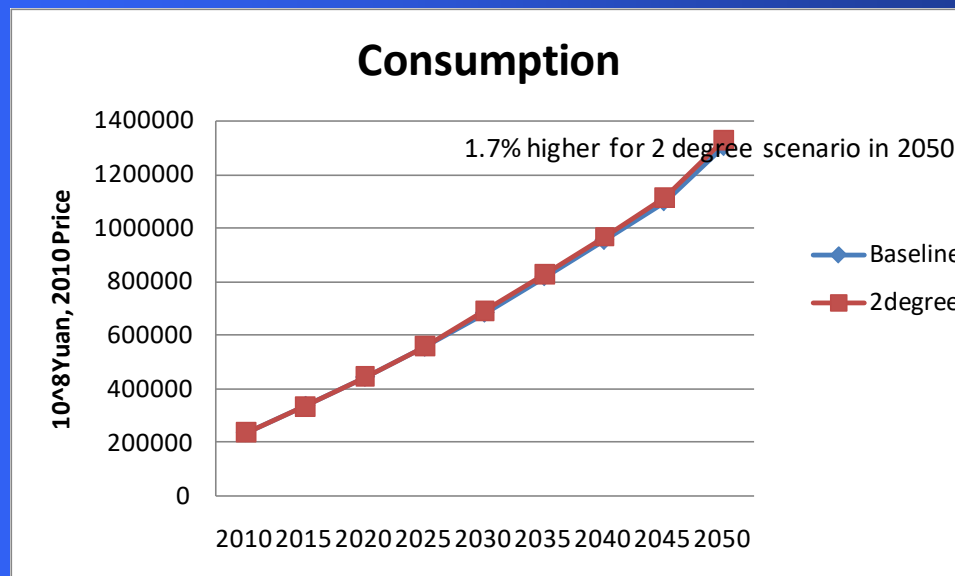
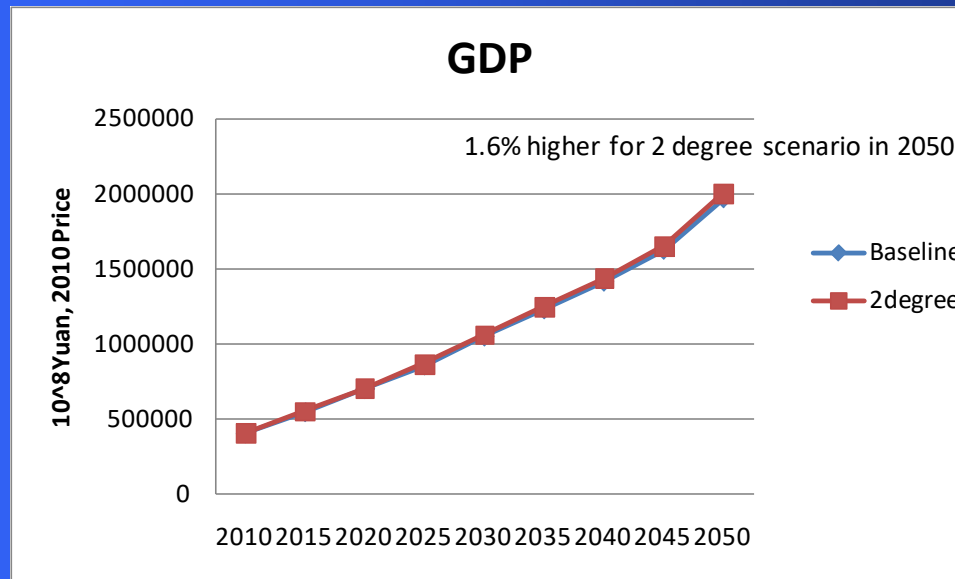
SUSTAINABLE DEVELOPMENT GOALS

**Table 20.1: Selected targets and indicators for human well-being**

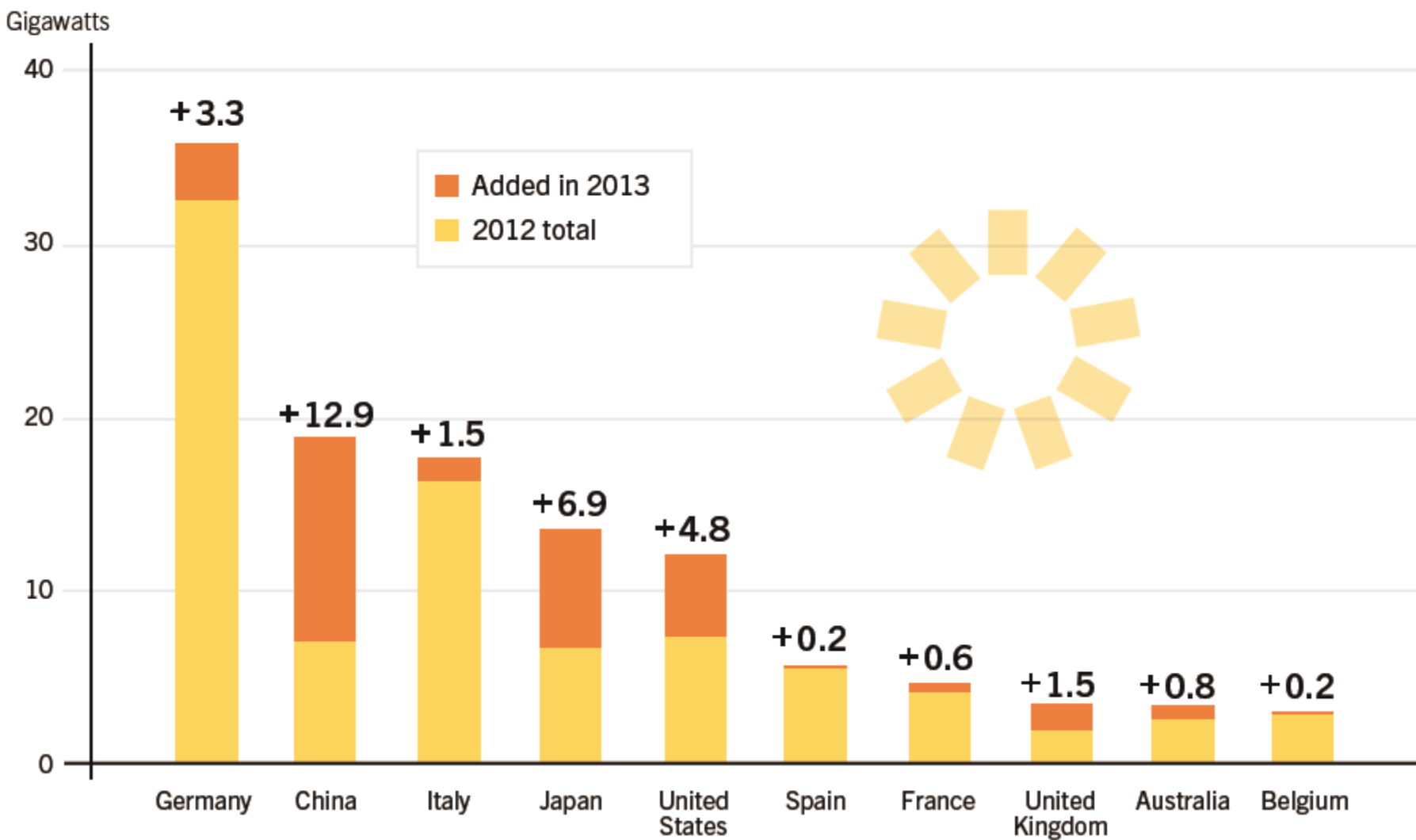
SDG target	Target for GEO-6	Related MEA	Indicator *	Target level	Based on	Cluster in Chapters 21 and 22
<b>2.1 By 2030, end hunger and ensure access by all people, in particular the poor and people in vulnerable situations, including infants, to safe, nutritious and sufficient food all year round</b>	End hunger	–	2.1.1 Prevalence of undernourishment	0 in 2030	SDGs	Agriculture, food, land and biodiversity
<b>3.2 By 2030, end preventable deaths of newborns and children under 5 years of age, with all countries aiming to reduce neonatal mortality to at least as low as 12 per 1,000 live births and under-five mortality to at least as low as 25 per 1,000 live births</b>	End preventable deaths of children under 5	–	3.2.1 Under-five mortality rate	< 25 in 2030	SDGs	Human health
<b>6.1 By 2030, achieve universal and equitable access to safe and affordable drinking water for all</b>	Achieve universal access to safe drinking water and adequate sanitation	–	6.1.1 Proportion of population using safely managed drinking water services	100 per cent in 2030	SDGs	Freshwater
<b>6.2 By 2030, achieve access to adequate and equitable sanitation and hygiene for all and end open defecation, paying special attention to the needs of women and girls and those in vulnerable situations</b>		–	Proportion of population using safely managed sanitation services (6.2.1)	100 per cent in 2030	SDGs	Freshwater
<b>7.1 By 2030, ensure universal access to affordable, reliable and modern energy services</b>	Achieve universal access to modern energy services	–	7.1.1 Proportion of population with access to electricity	100 per cent in 2030	SDGs	Energy, air and climate
		–	7.1.2 Proportion of population with primary reliance on clean fuels and technology	100 per cent in 2030	SDGs	Energy, air and climate



# Mitigation Would Increase GDP!



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





**FIGURE 27.**

**Solar PV Capacity Additions, Top 10 Countries for Capacity Added, 2020**

Gigawatts

300

250

200

150

100

50

0

2022

2021

Rest of World

China

United States

Vietnam

Japan

Germany

India

Australia

Republic of Korea

Brazil

Netherlands

+28.7

+48.2

100

+19.2

+11.1

+8.2

+4.9

+4.4

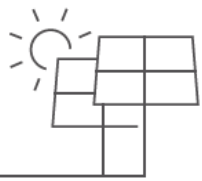
+4.1

+4.1

+3.1

+3.0

Added in 2020  
2019 total







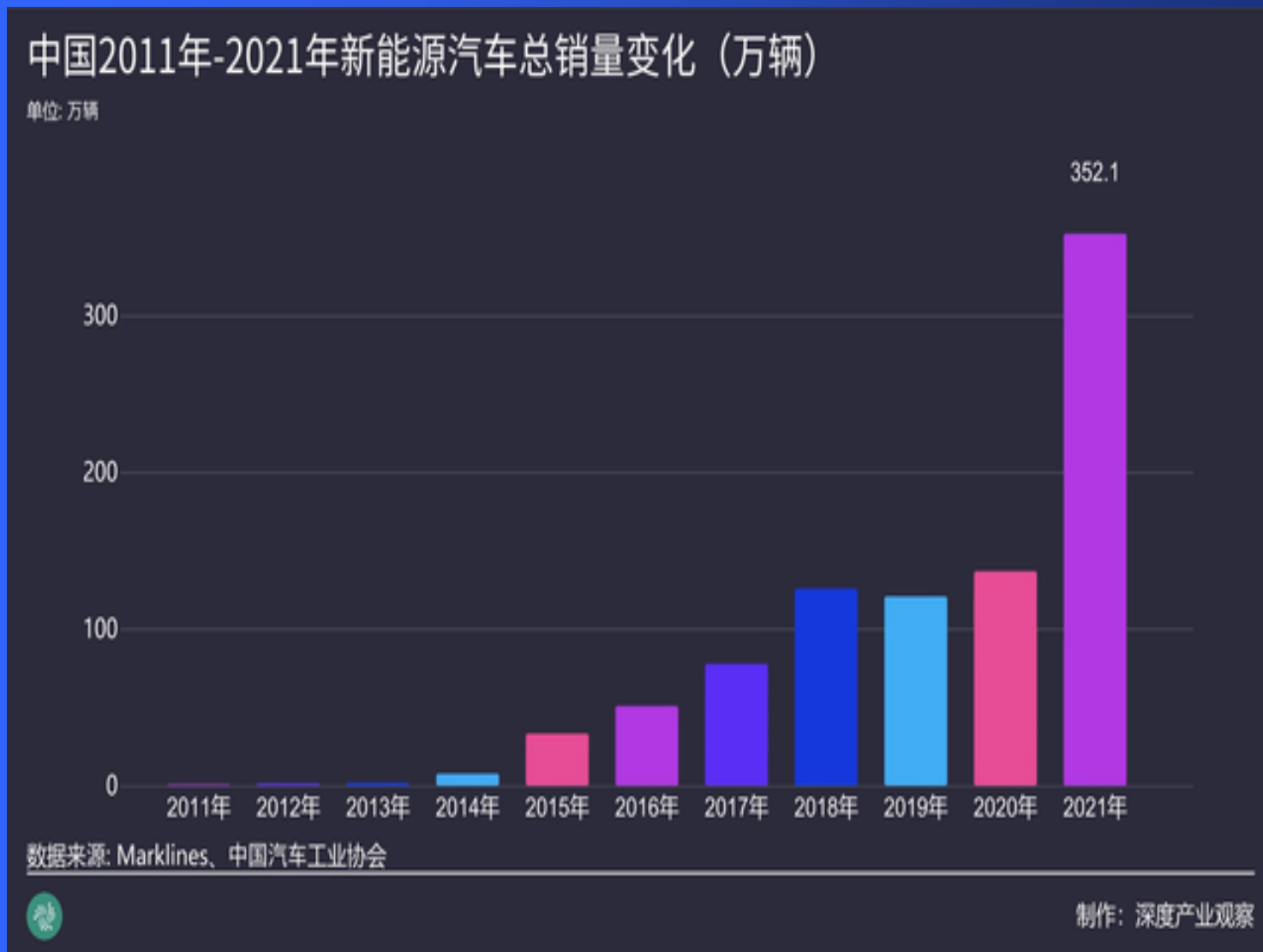
## Agricultural PV

is rapidly emerging as an option for addressing concerns related to land-use as well as for mitigating the potential impacts of climate change on crops and livestock.

- i Glass prices rose sharply due to a combination of stagnating supply and the global year-end rush for solar PV installations, combined with rising interest in larger modules as well as bifacial panels. Stagnating supply resulted from a cap on glass production capacity in China (home to 90% of global production capacity) in response to past overcapacity in the building industry as well as environmental concerns associated with glass production. By one estimate, shortages pushed up global solar glass prices more than 70% between July and November 2020. See endnote 202 for this section.



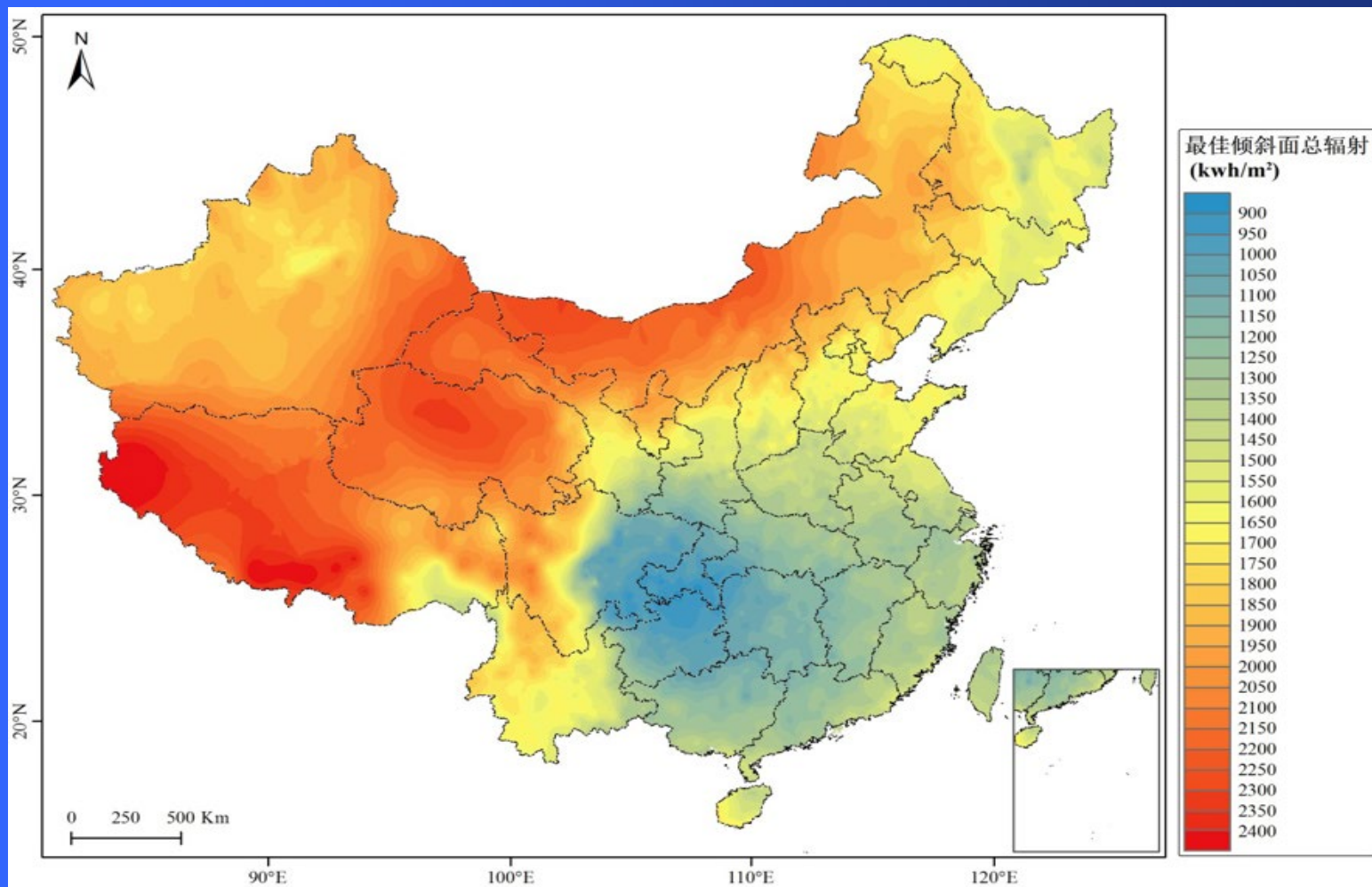
# Sale of new energy car: 6.8million in 2022



## *Electric airplane*

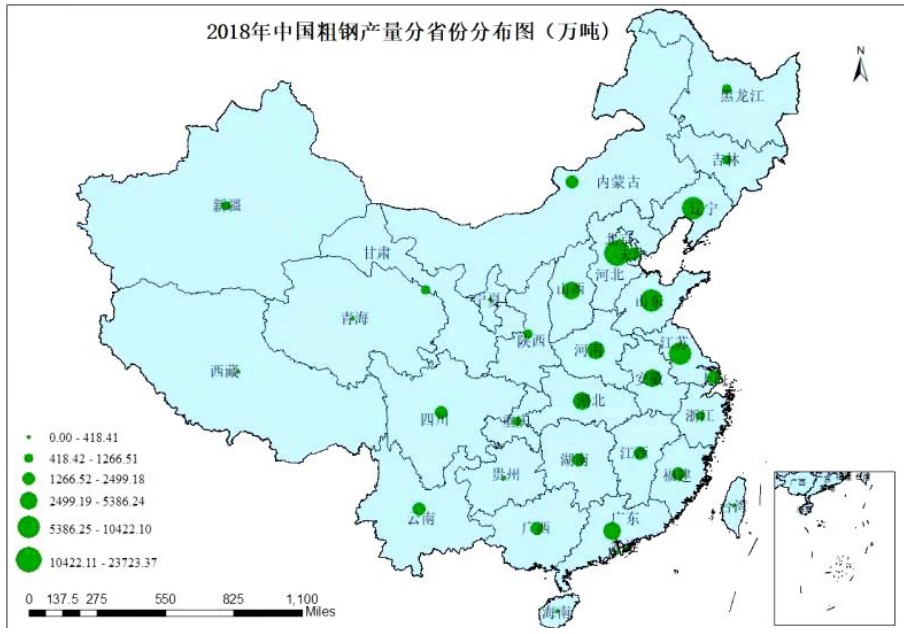


# 光伏资源图 Solar Resource





2018年中国粗钢产量分省份分布图（万吨）



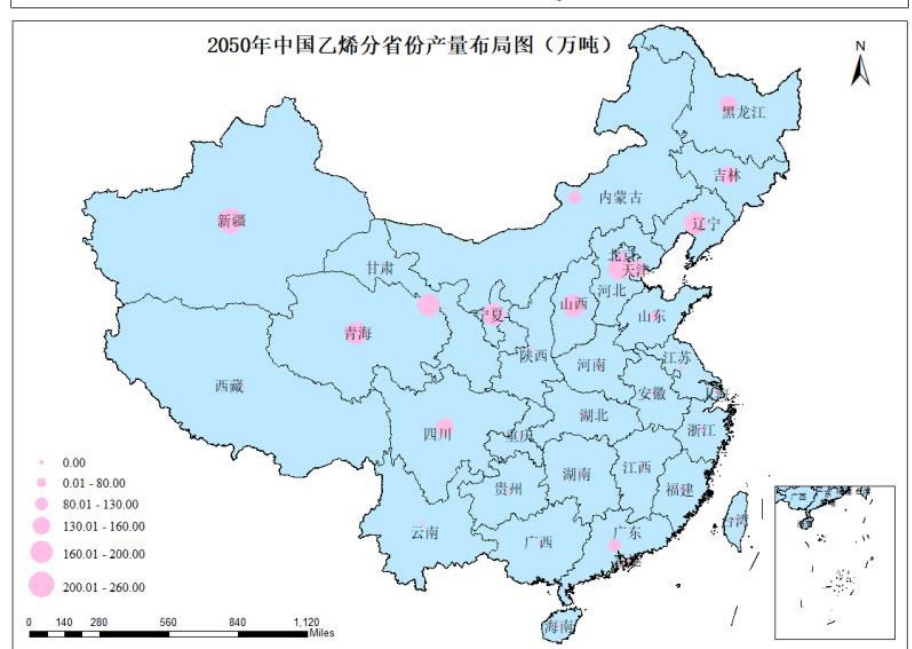
2050年中国粗钢产量分省份分布图（万吨）



2018年中国乙烯分省份产量布局图（万吨）

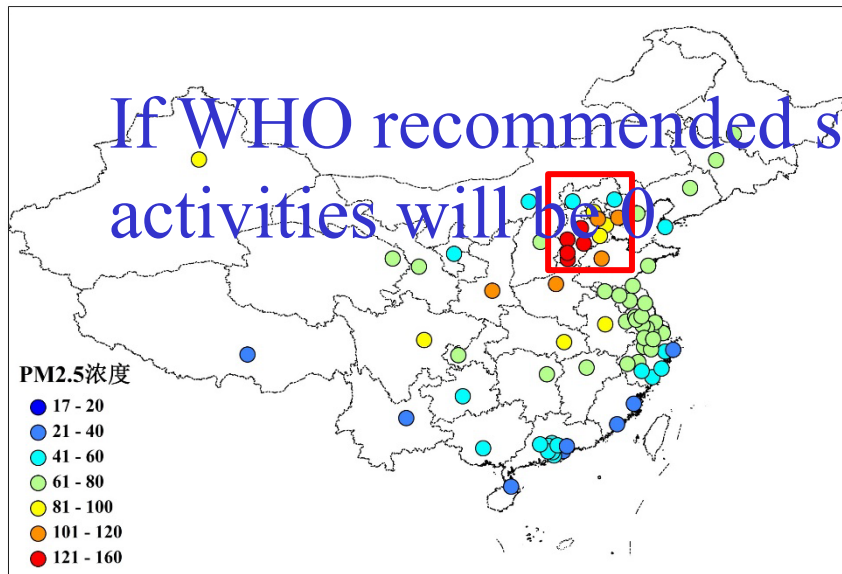


2050年中国乙烯分省份产量布局图（万吨）

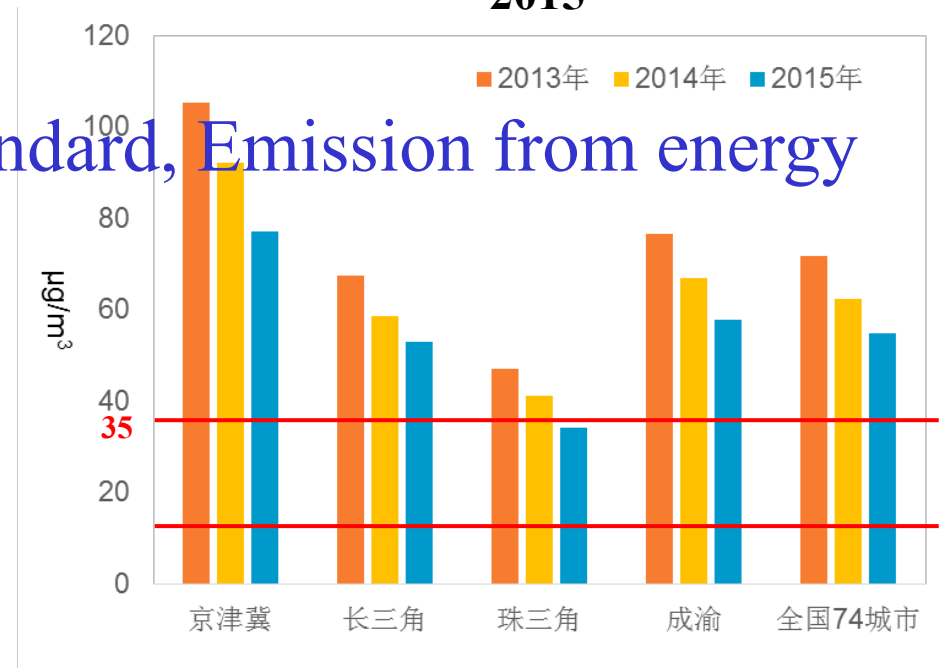


# PM<sub>2.5</sub> Concentration is much higher than standard

PM2.5 concentration of 74 cities in 2013



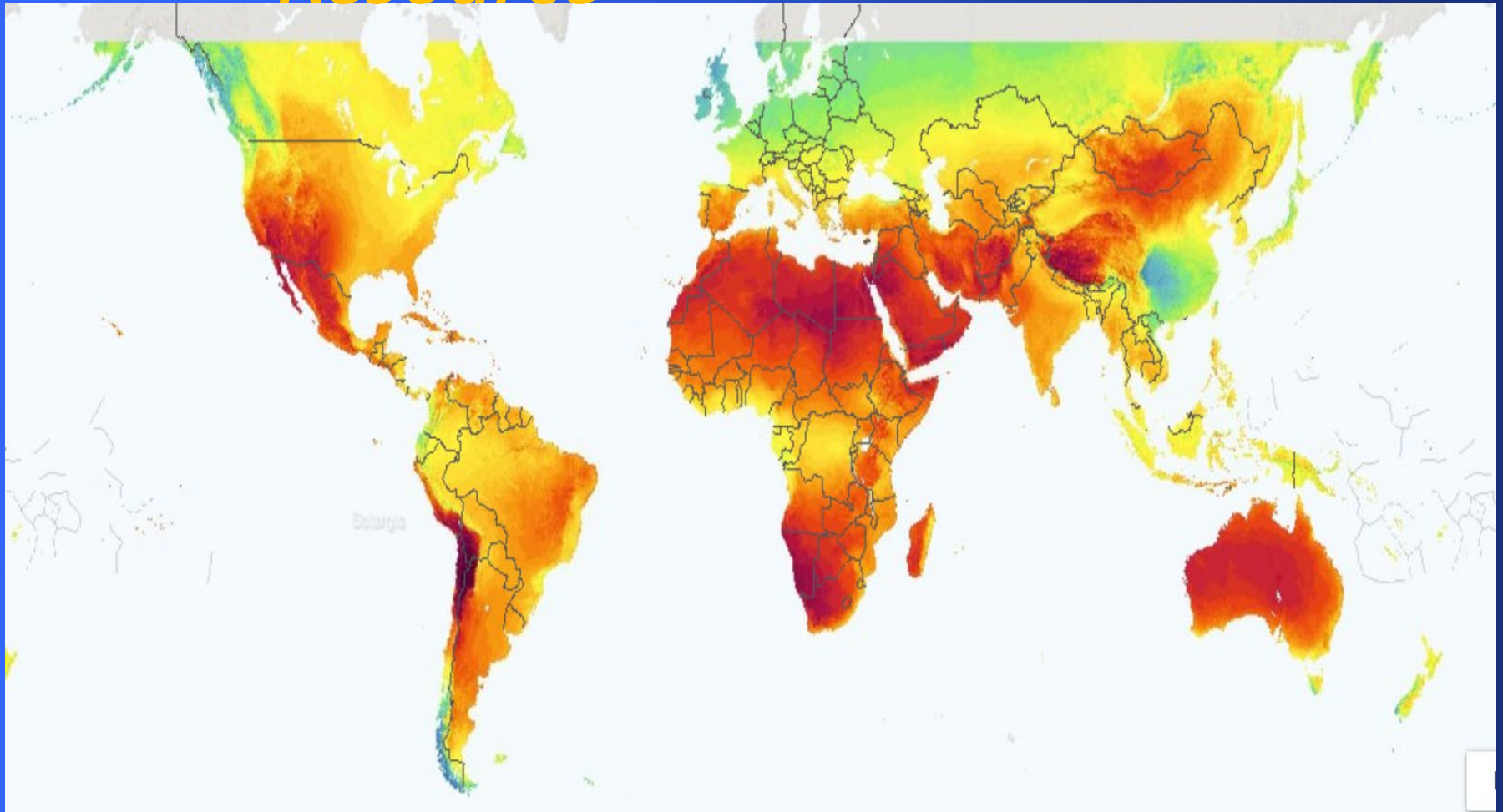
PM2.5 annual concentration from 2013-2015



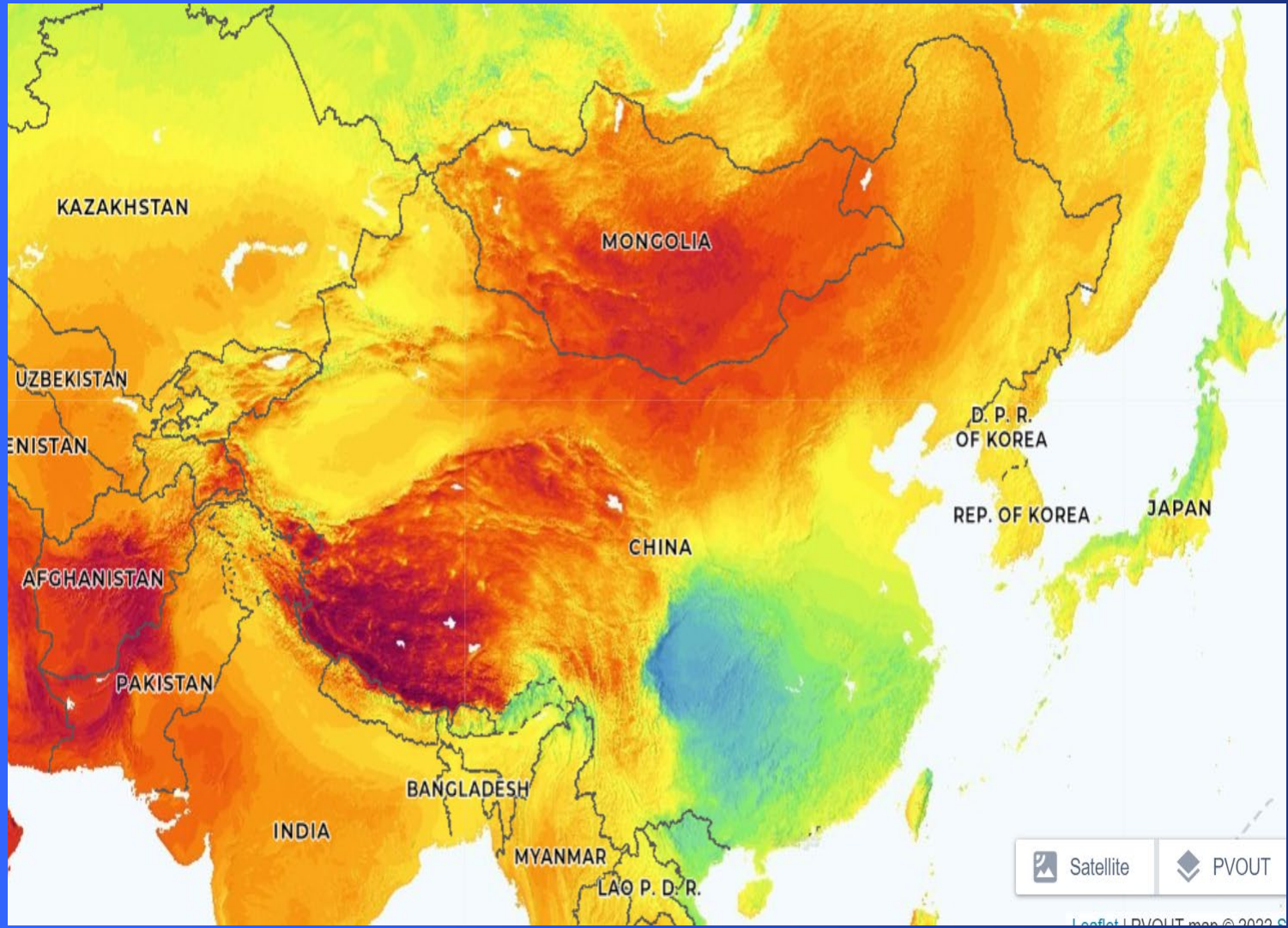
- 2013年京津冀地区所有城市PM<sub>2.5</sub>年均浓度均超标，区域内PM<sub>2.5</sub>年平均浓度达106µg/m<sup>3</sup>，虽2014、2015年空气质量有所改善，但仍大幅超过国家空气质量二级标准。



# *Global Solar Resource*







# A carbon neutrality Asia



## Scenario Analysis

- Japan
- Korea
- China
- India
- Thailand
- Malaysia
- Indonesia
- Nepal
- Vietnam
- Cambodia
- Laos
- Philippine

Thanks!