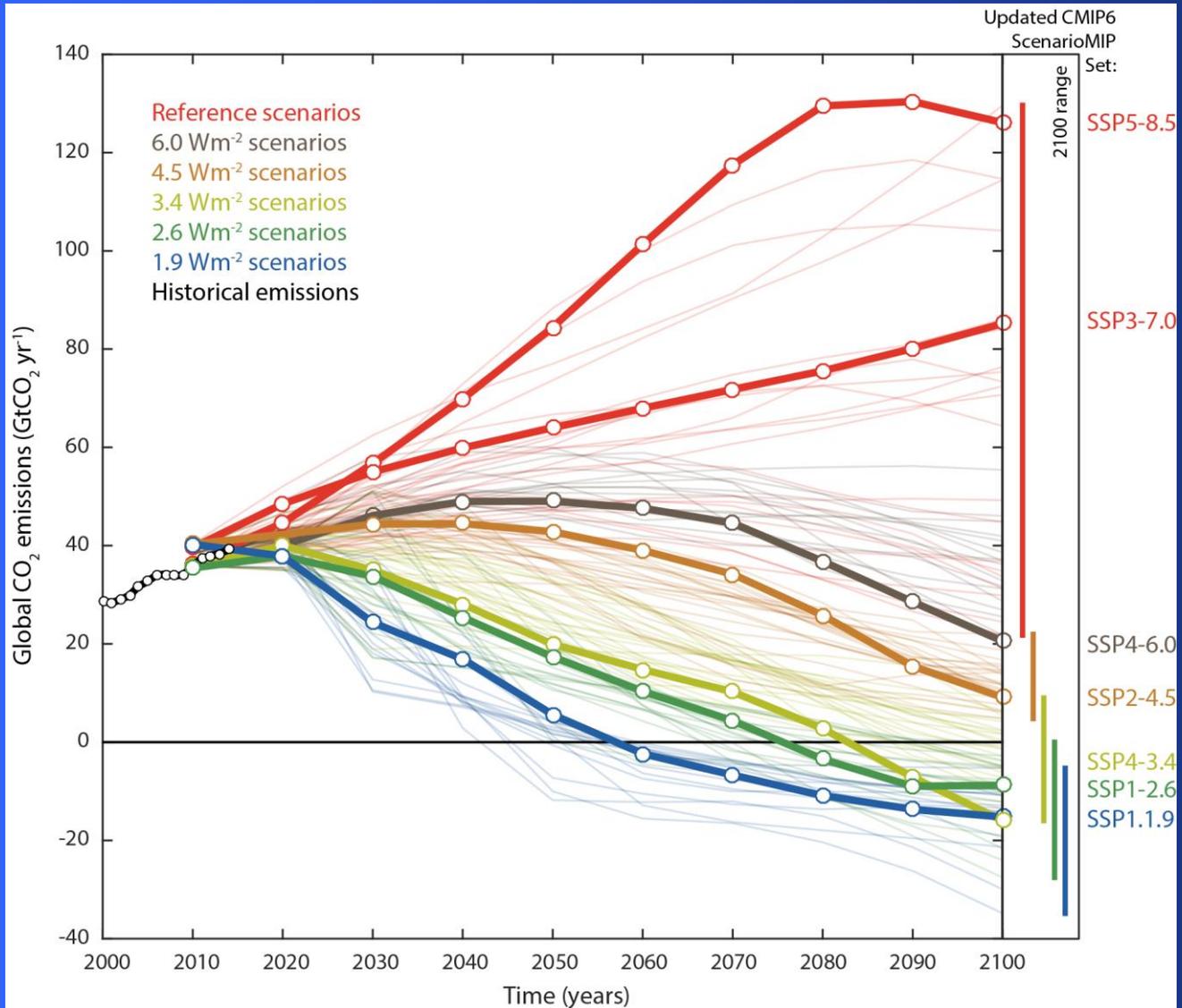


China's Energy and Economy Transition with the Multiple Objectives

Hu Xiulian, Jiang Kejun

Energy Research Institute

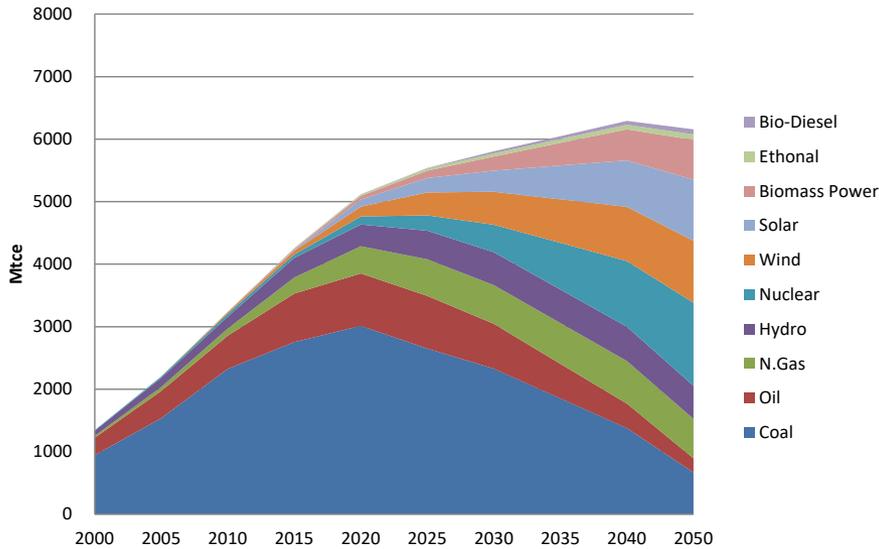
Global CO₂ Emissions, IPCC 1.5C Report



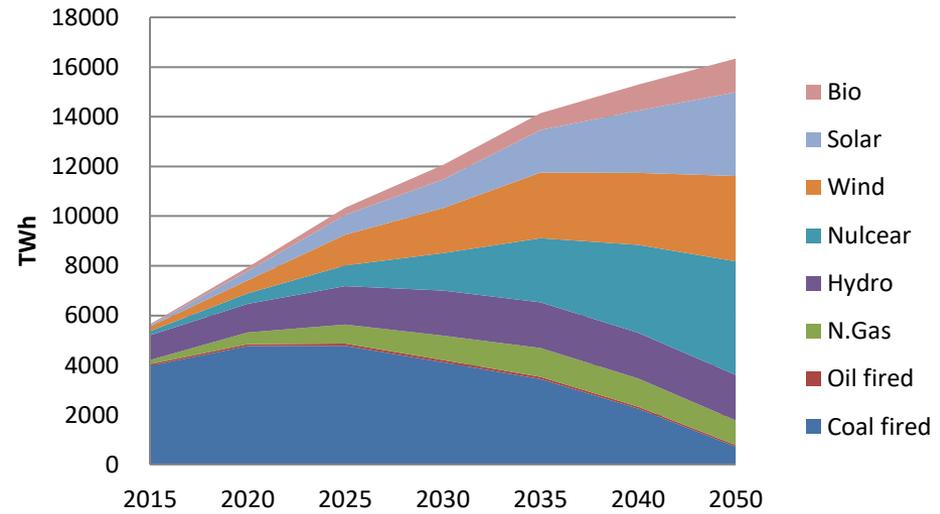
Multiple Objectives

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

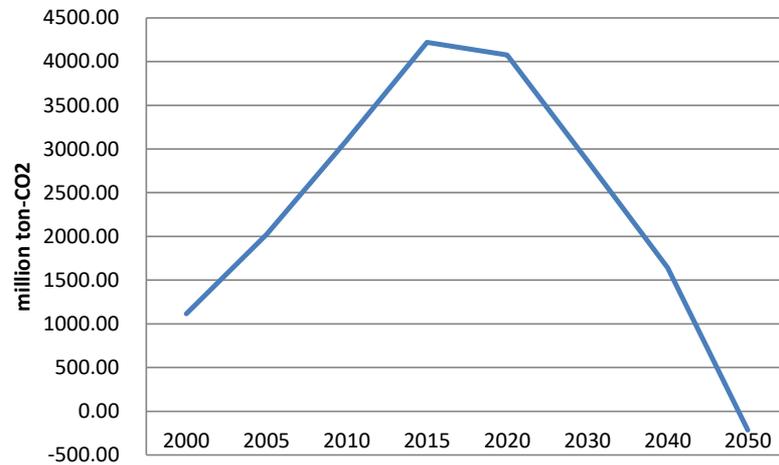
Primary Energy Demand



Power Generation



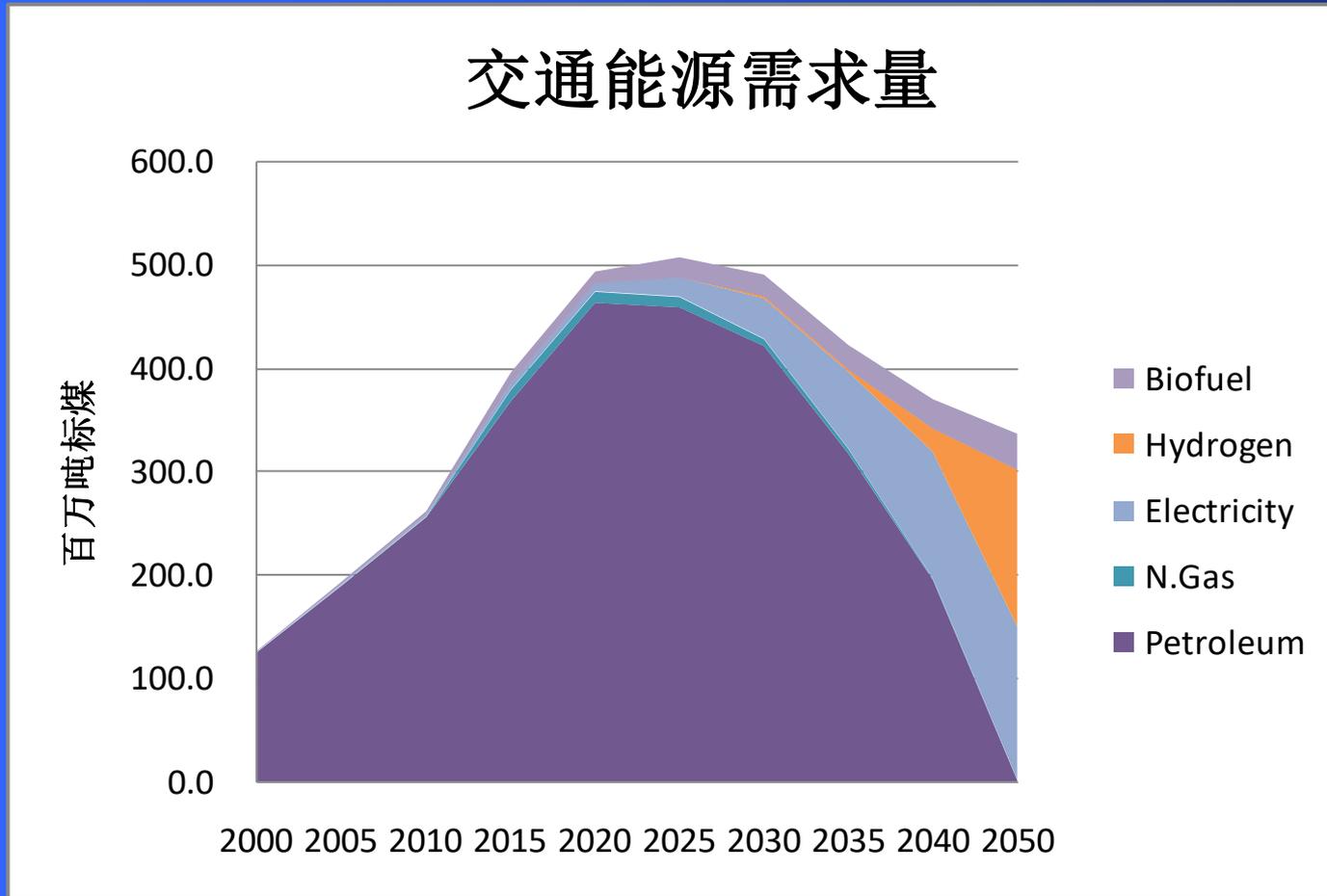
CO2 emission in power sector



Ways from deep cut of GHGs on impacting economy development

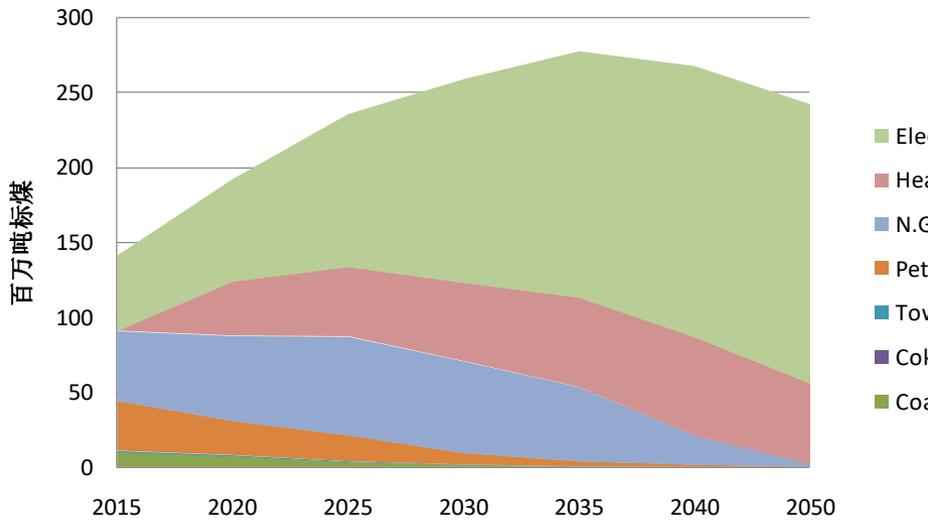
- Overall impact in economic development pattern
- Energy supply industry will have strong transition
- Transition in end use sector
- New manufactures process in some sectors
- Mitigation of GHGs may increase GDP in China
- China's oversea investment are increasing rapidly

Energy Demand in transport in China

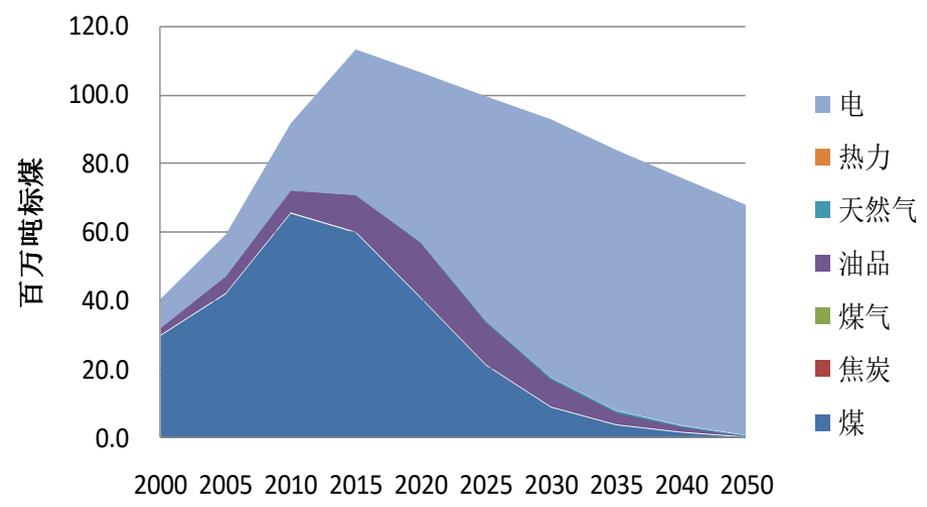


Final energy demand in urban household, rural household, and tertiary sector

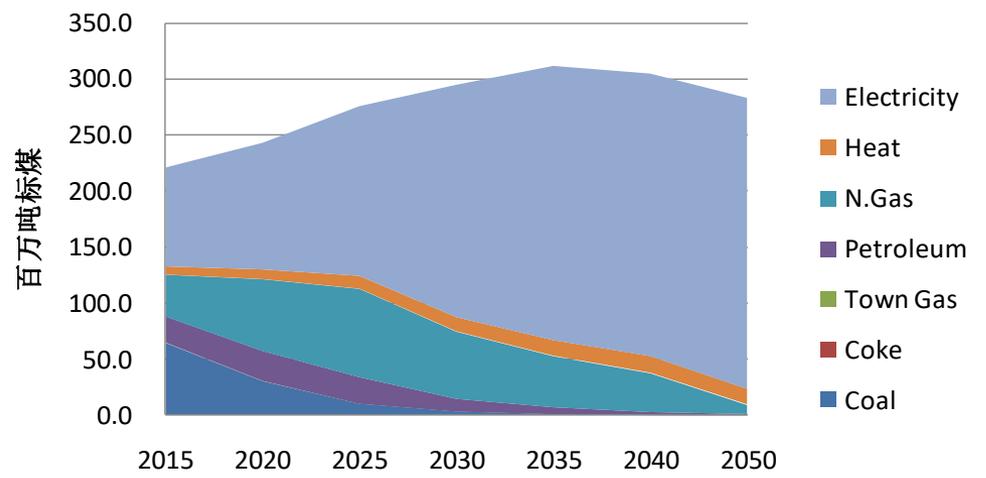
城市居民能源需求量



农村居民能源需求



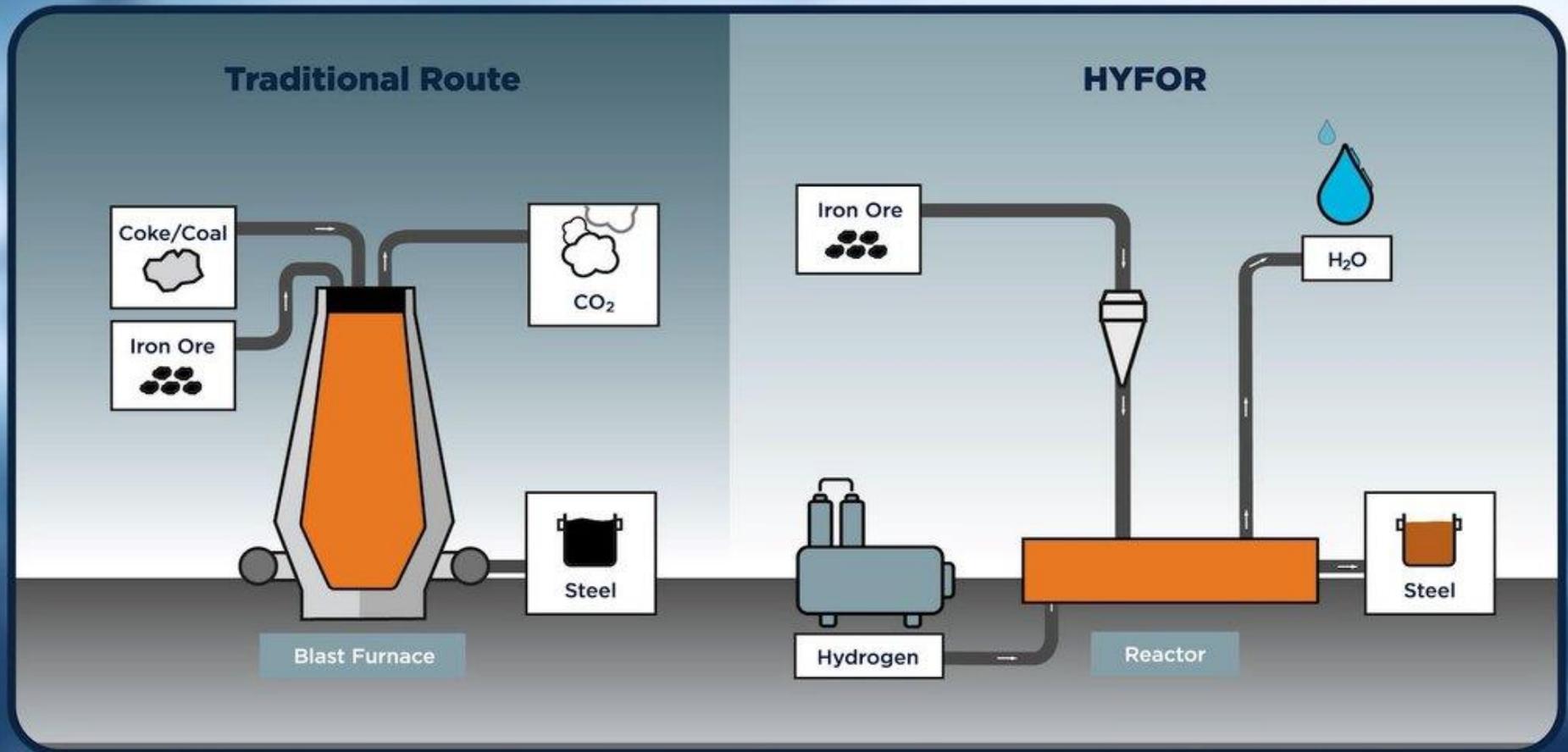
服务业终端能源需求量



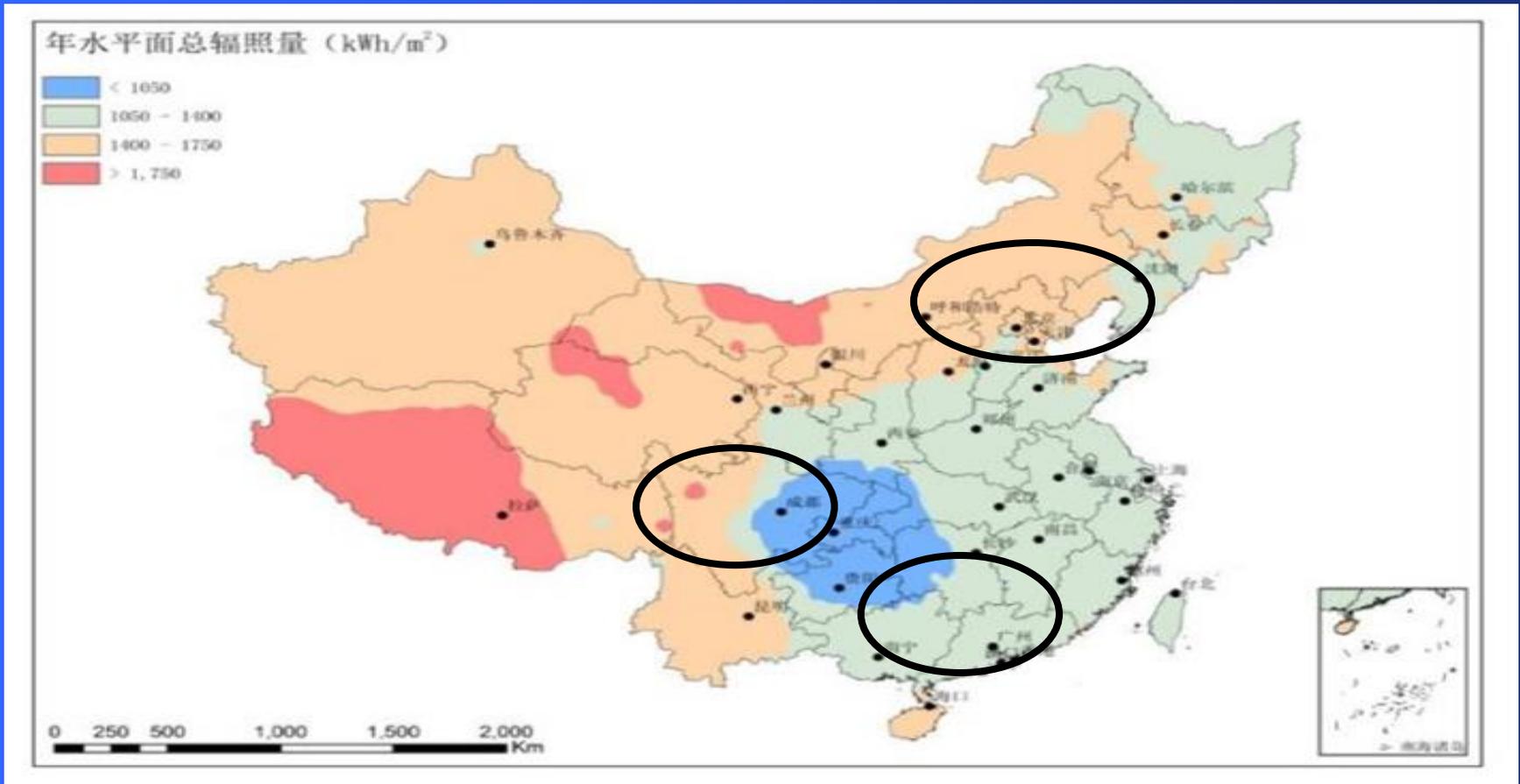
Significant Transition in Industry Sectors and Transport: Hydrogen Based Process

- **Steel making**
- **Ammonia**
- **Benzene**
- **Ethylene**
- **Methanol**
- **Clinker**
- **Heavy Duty transport and air plane**

Steel making transition



The Economy development map will be changed by location of very cheap renewable energy or nuclear



2018年中国粗钢产量分省份分布图 (万吨)

Steel

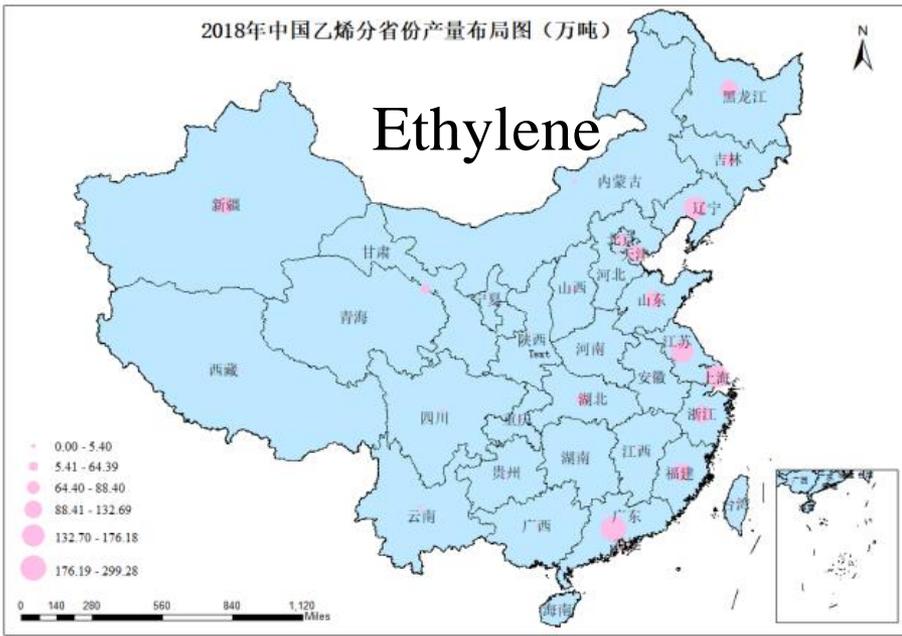


2050年中国粗钢产量分省份分布图 (万吨)

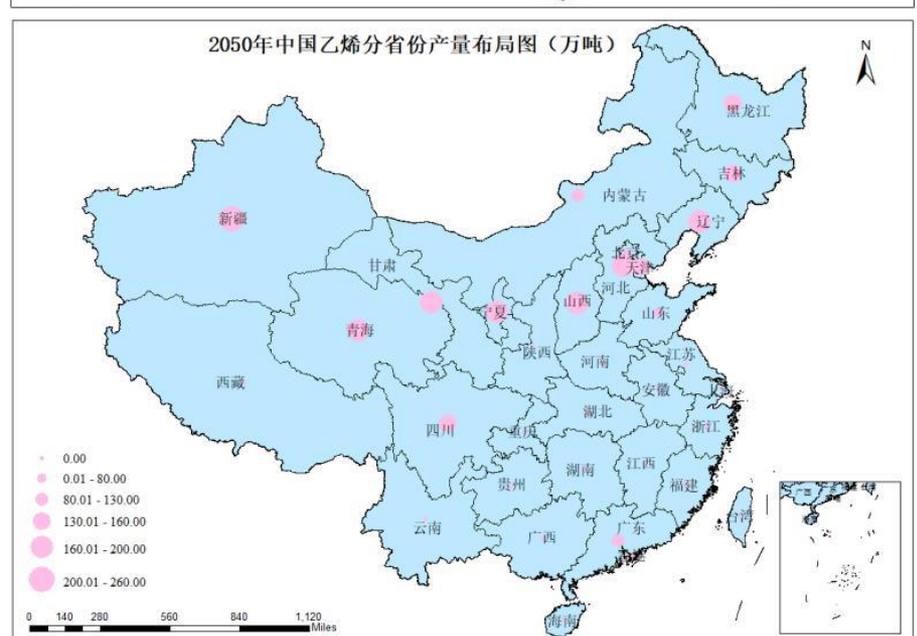


2018年中国乙烯分省份产量布局图 (万吨)

Ethylene



2050年中国乙烯分省份产量布局图 (万吨)

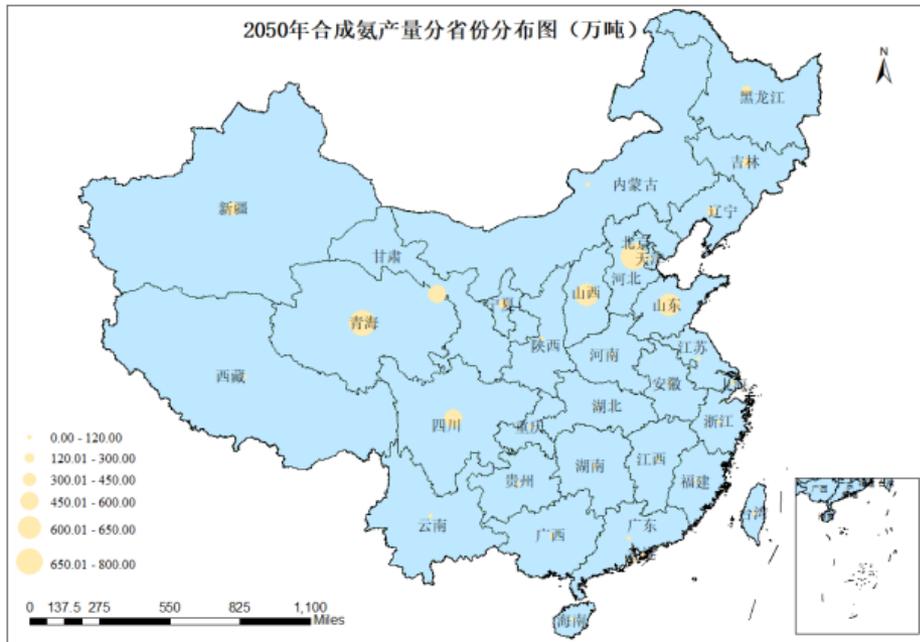


2018年合成氨产量分省份分布图 (万吨)

Ammonia

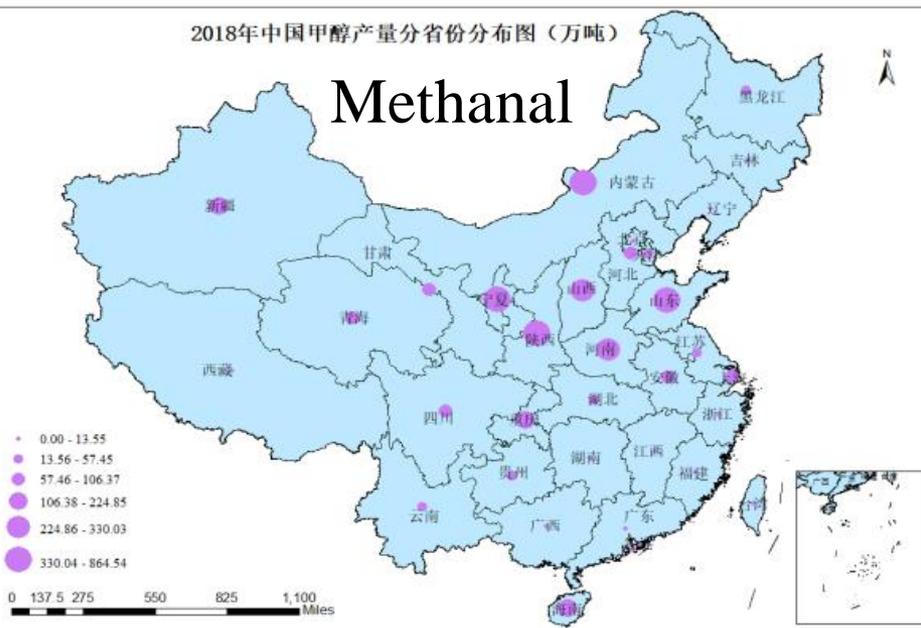


2050年合成氨产量分省份分布图 (万吨)

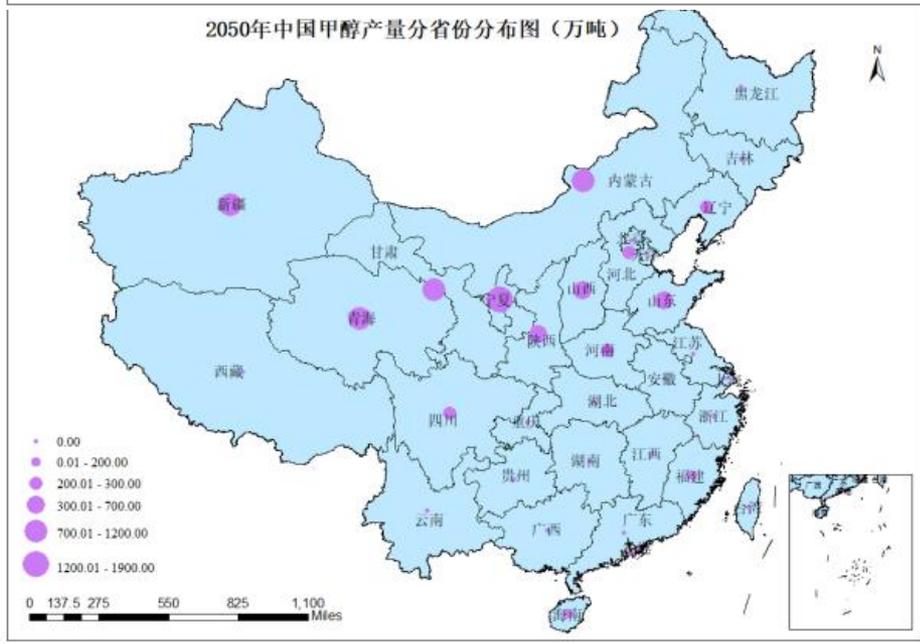


2018年中国甲醇产量分省份分布图 (万吨)

Methanal

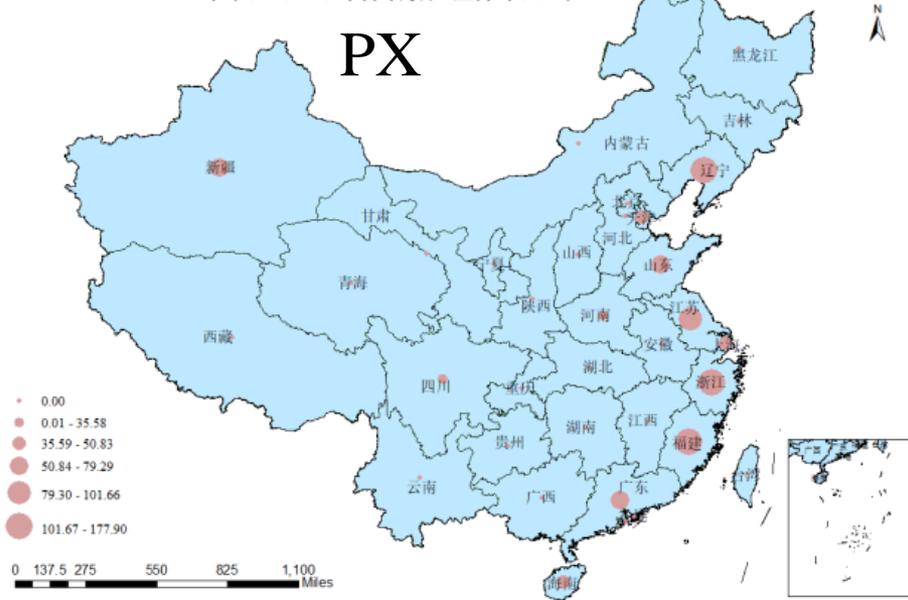


2050年中国甲醇产量分省份分布图 (万吨)

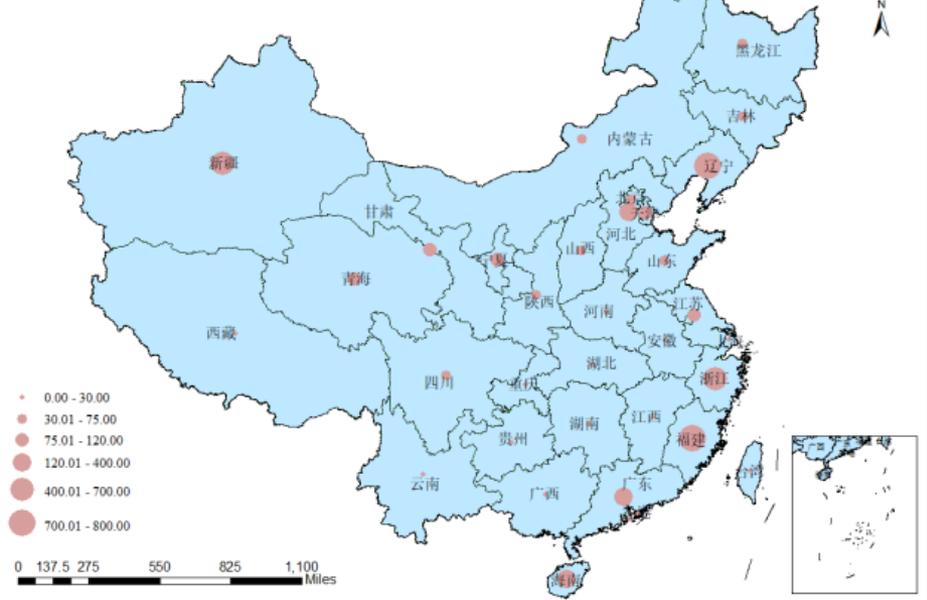


2018年中国对二甲苯分省份产量分布图 (万吨)

PX

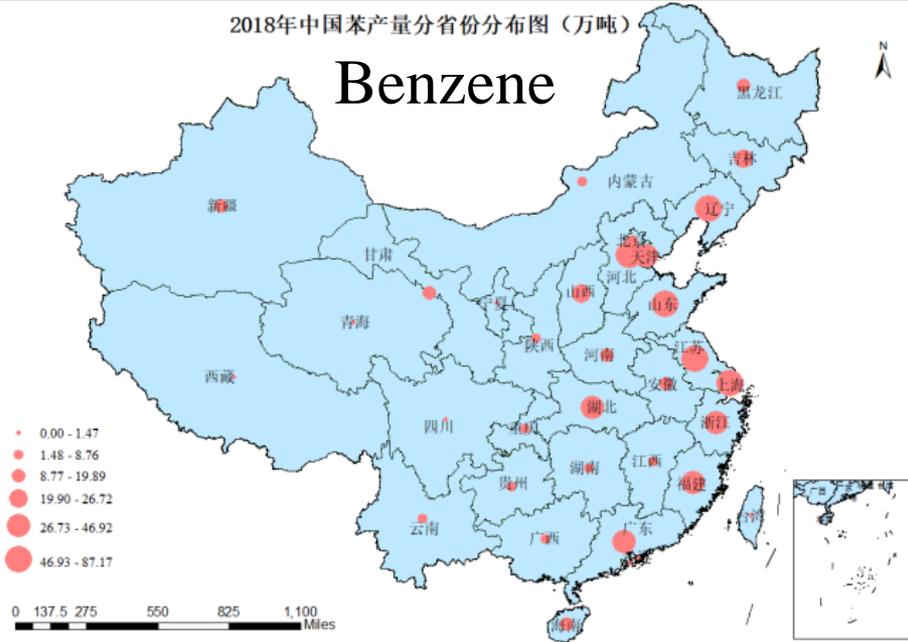


2050年中国对二甲苯分省份产量分布图 (万吨)

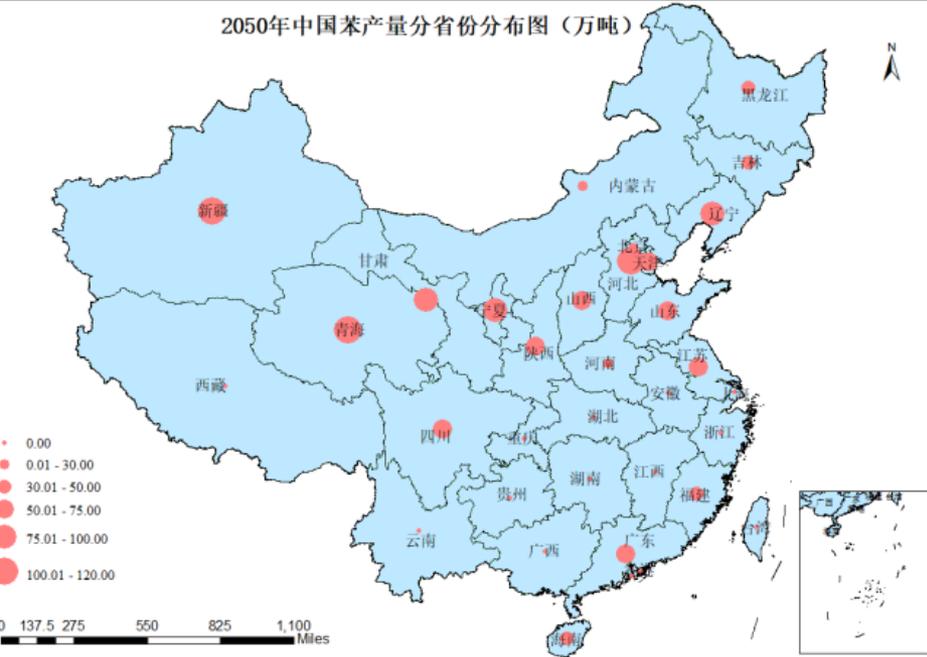


2018年中国苯产量分省份分布图 (万吨)

Benzene



2050年中国苯产量分省份分布图 (万吨)



Hydrogen

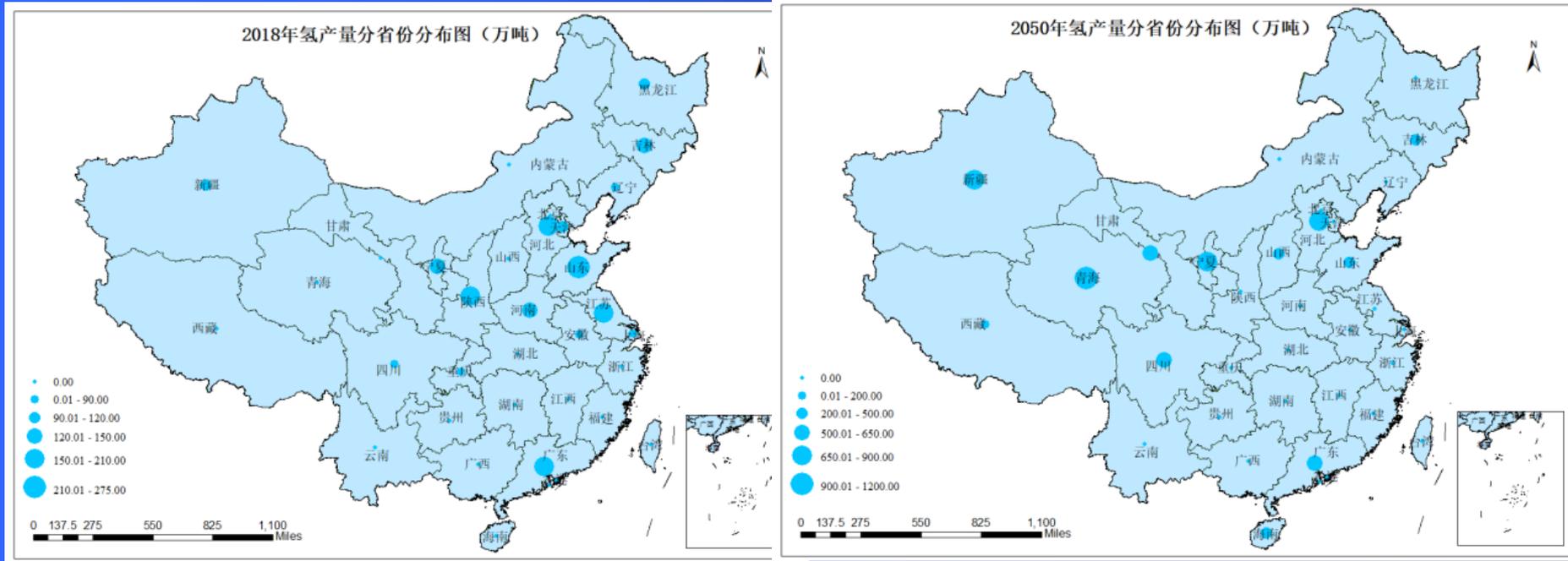
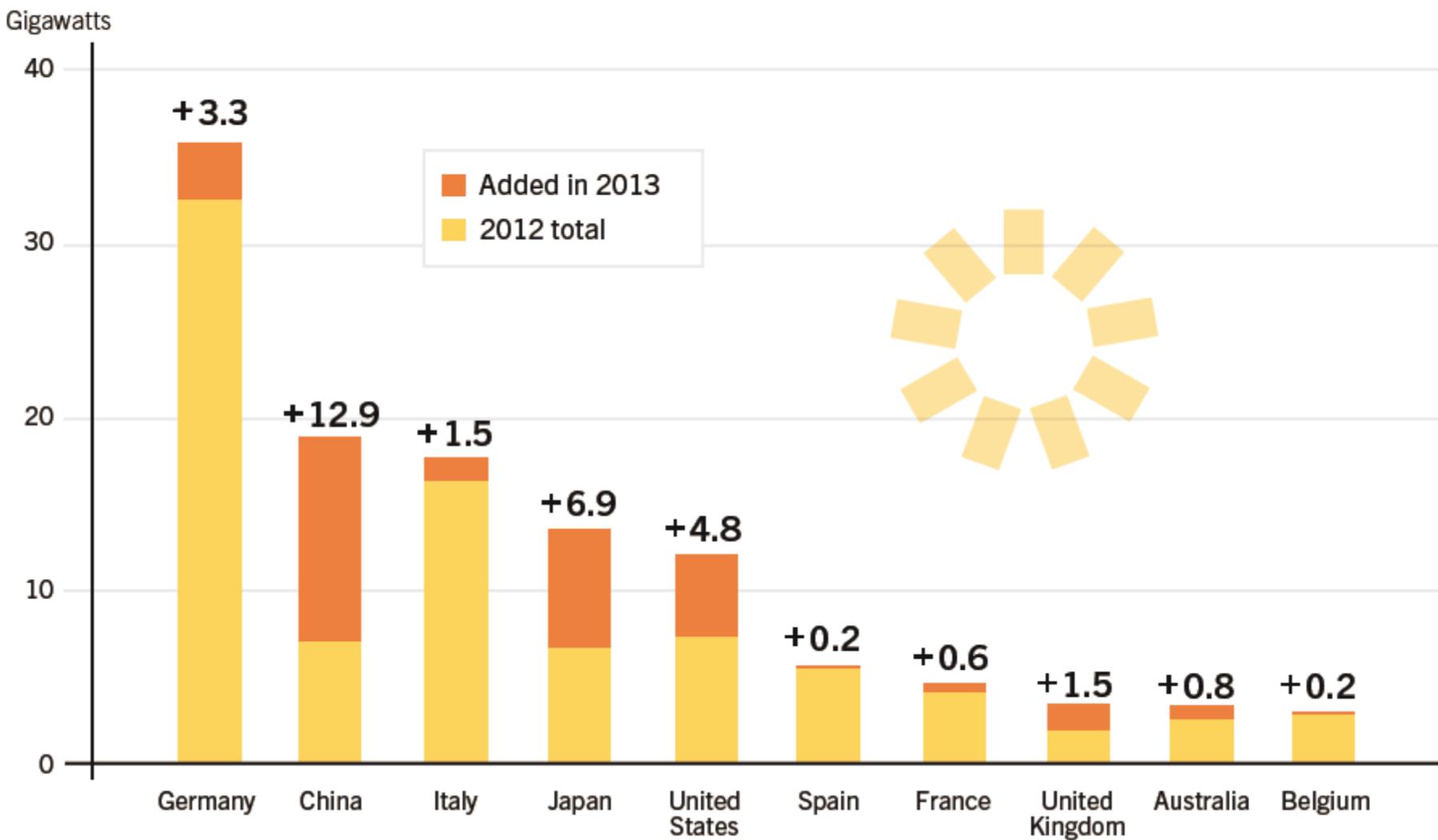
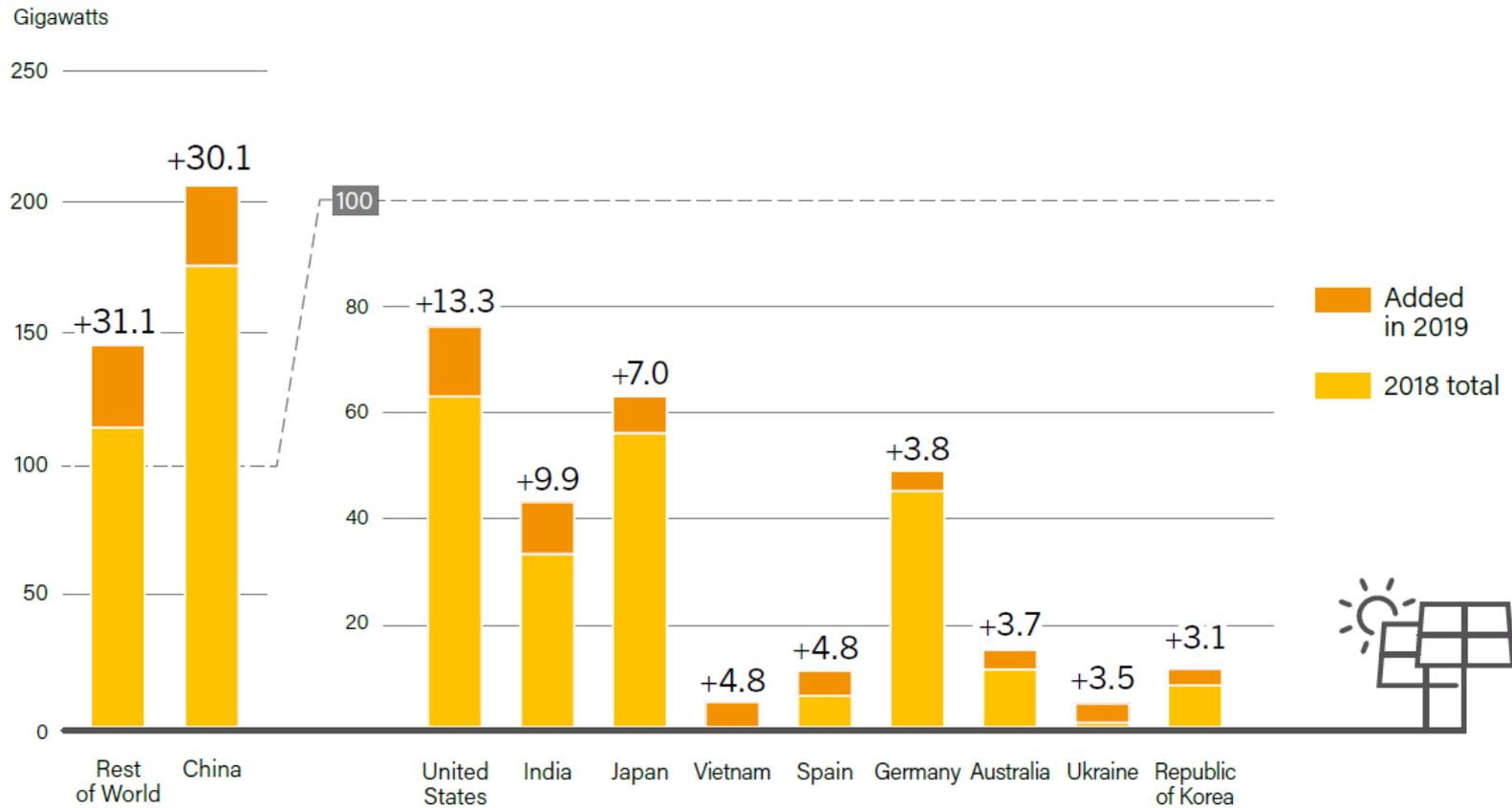


Figure 13. Solar PV Capacity and Additions, Top 10 Countries, 2013



By 2022, it is possible to be over 450GW solar PV

FIGURE 30. Solar PV Capacity and Additions, Top 10 Countries for Capacity Added, 2019



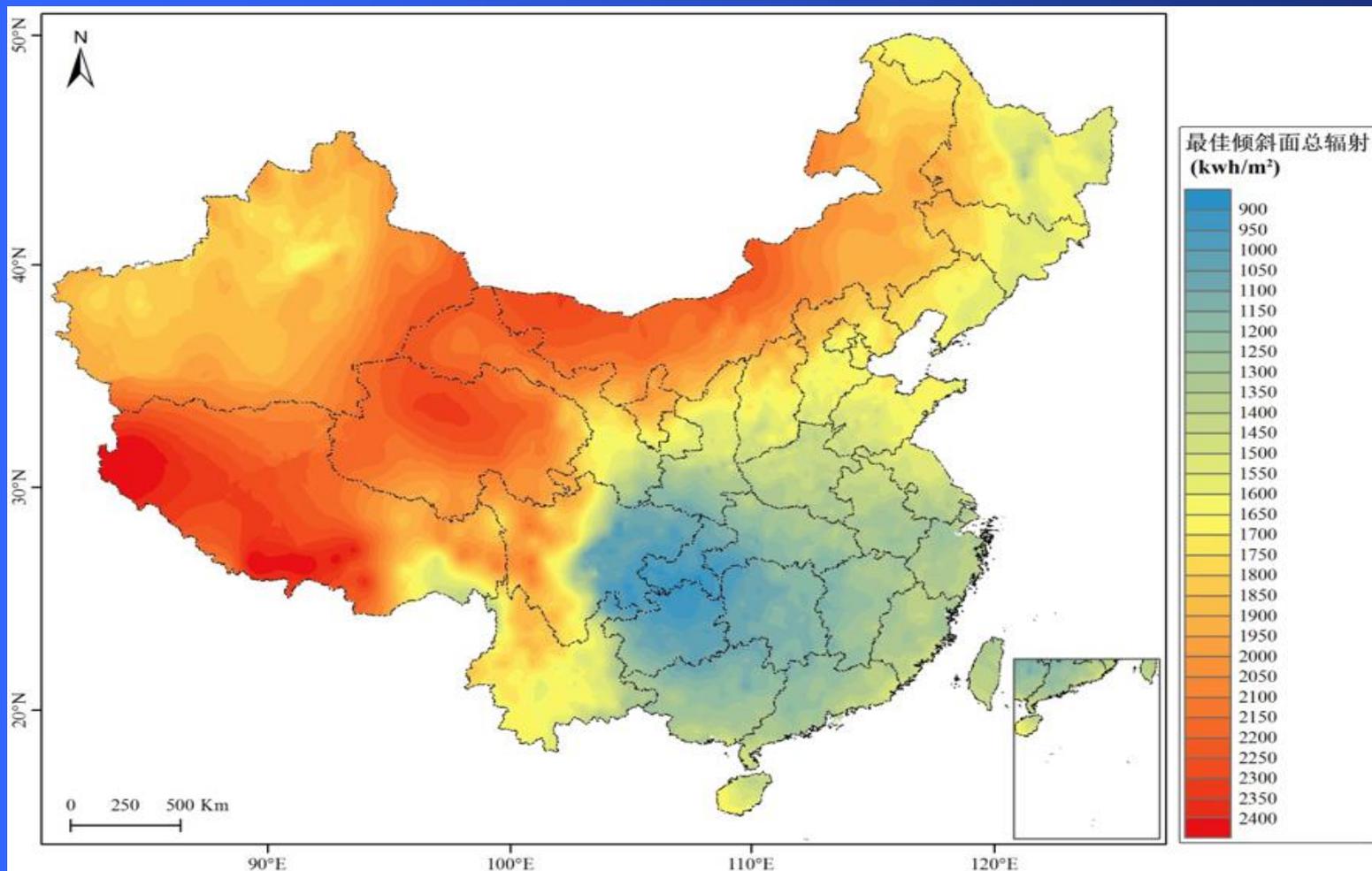
Note: Data are provided in direct current (DC).

Source: See endnote 27 for this section.

- Nuclear power, with cost lower than 0.25yuan/kWh by 2035



光伏资源图 Solar resource map

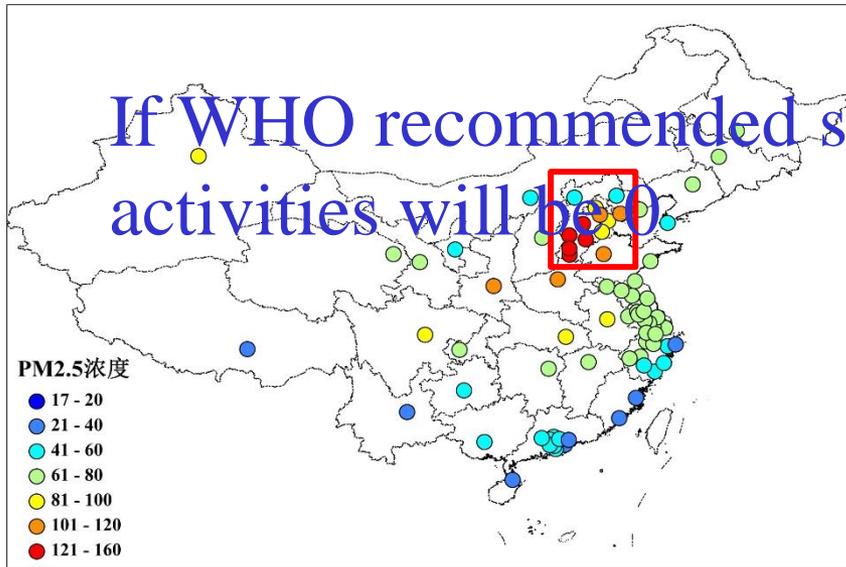


Future Agriculture

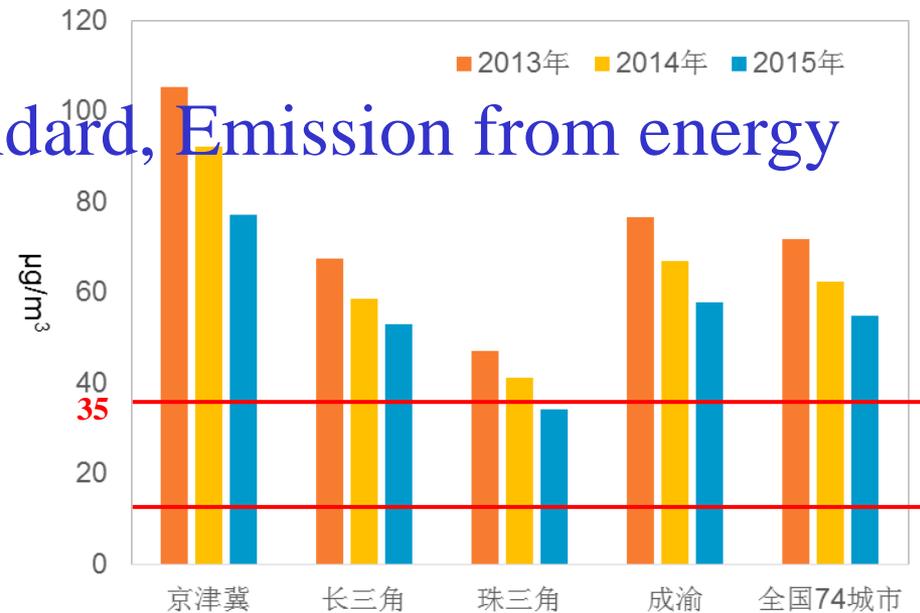
- Manmade protein
- Agriculture without soil
- No cotton future
- Well fit food
- Agriculture revolution?

PM_{2.5} Concentration is much higher than standard

PM_{2.5} concentration of 74 cities in 2013



PM_{2.5} annual concentration from 2013-2015



- 2013年京津冀地区所有城市PM_{2.5}年均浓度均超标，区域内PM_{2.5}年平均浓度达106µg/m³，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。



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

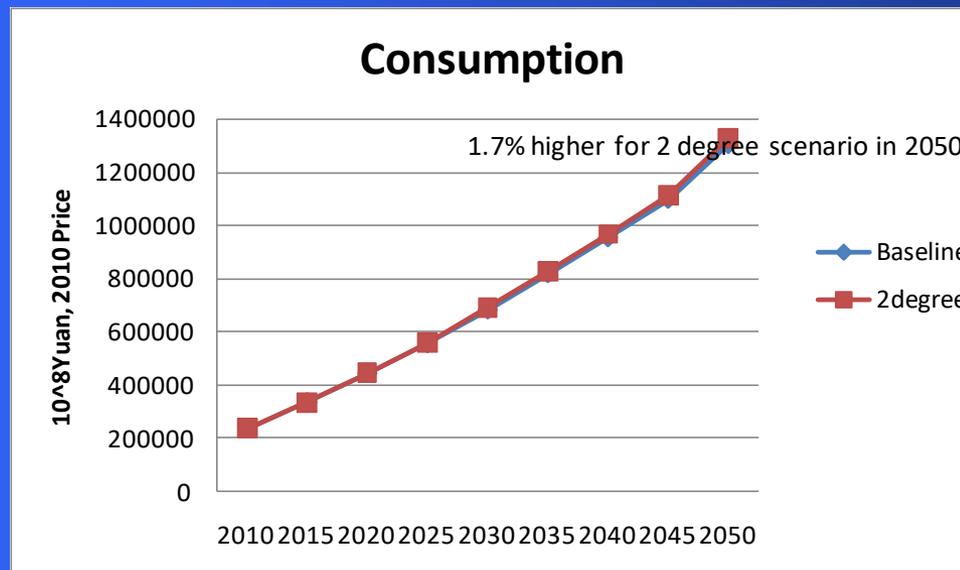
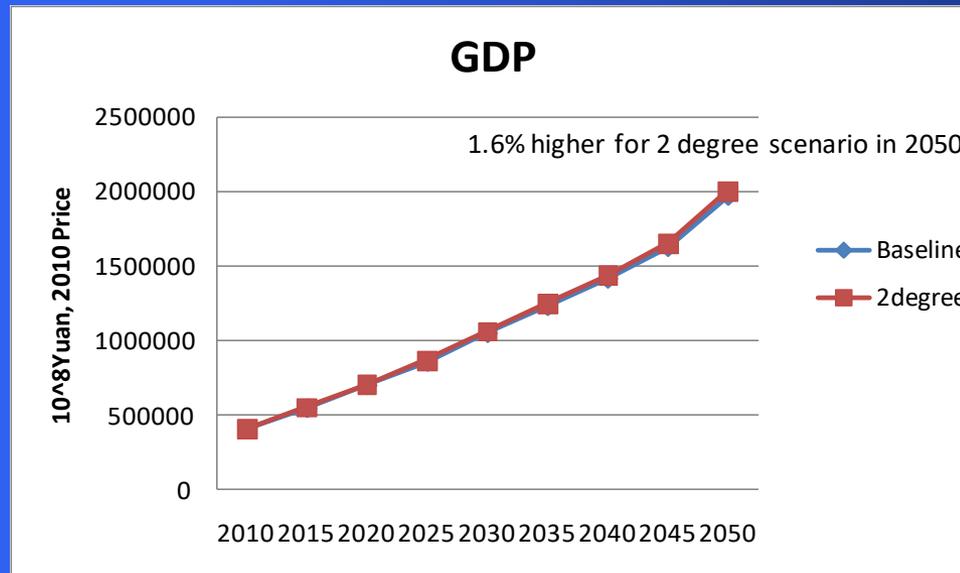
15 LIFE ON LAND

16 PEACE, JUSTICE AND STRONG INSTITUTIONS

17 PARTNERSHIPS FOR THE GOALS


SUSTAINABLE DEVELOPMENT GOALS

Mitigation Would Increase GDP!



Policy Progress After Carbon Neutrality Target Setting

- **After Sep. 22, 2020, more than 10 times meetings in top leading committee on carbon peaking and neutrality**
- **Jan. 24, 2022, study session of the Political Bureau of the CPC, solid implementation of decisions, arrangements on carbon peaking, neutrality**
- **Oct. 27, 2021, The State Council realized Action Plan for Carbon Dioxide Peaking Before 2030**
- **1+N policy package: National action plan, and 7 sectoral action plan on carbon peaking**

Key energy policies

- **Green electricity market established in May 2021**
- **Pricing regulation for peak/off-peak load power generation: 4 fold for peak load power generation**
- **Additional renewable energy outside the mandated amount for provinces could be outside the dual-control on energy use**

Thanks !