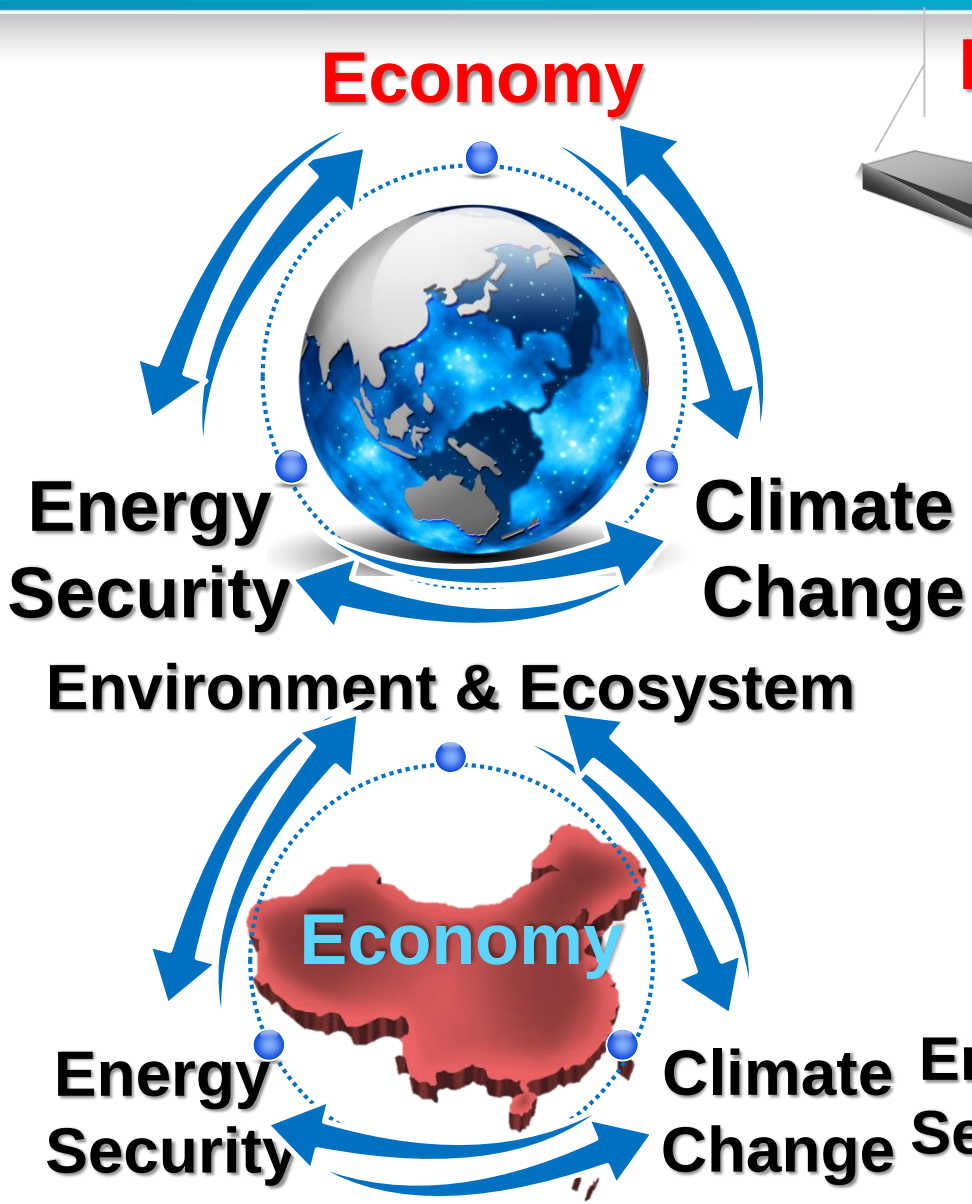
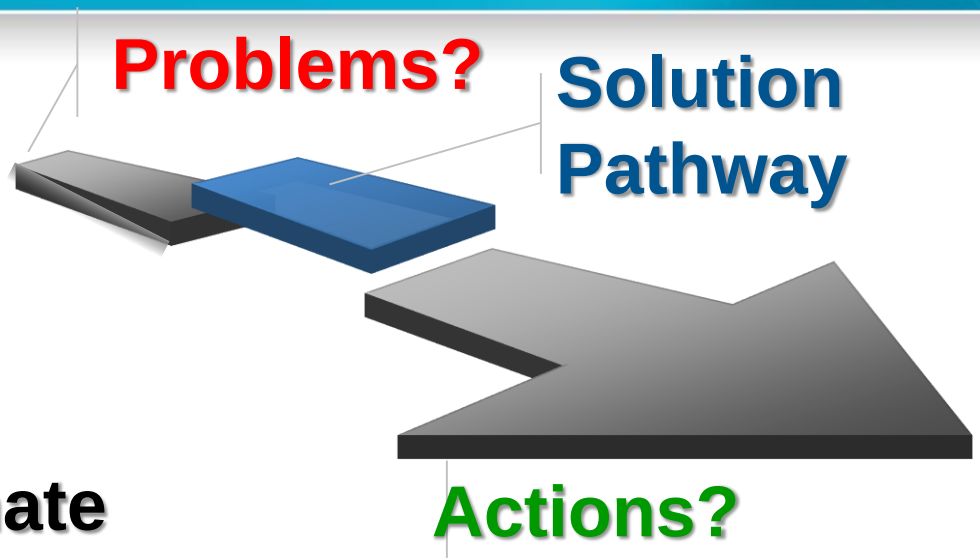
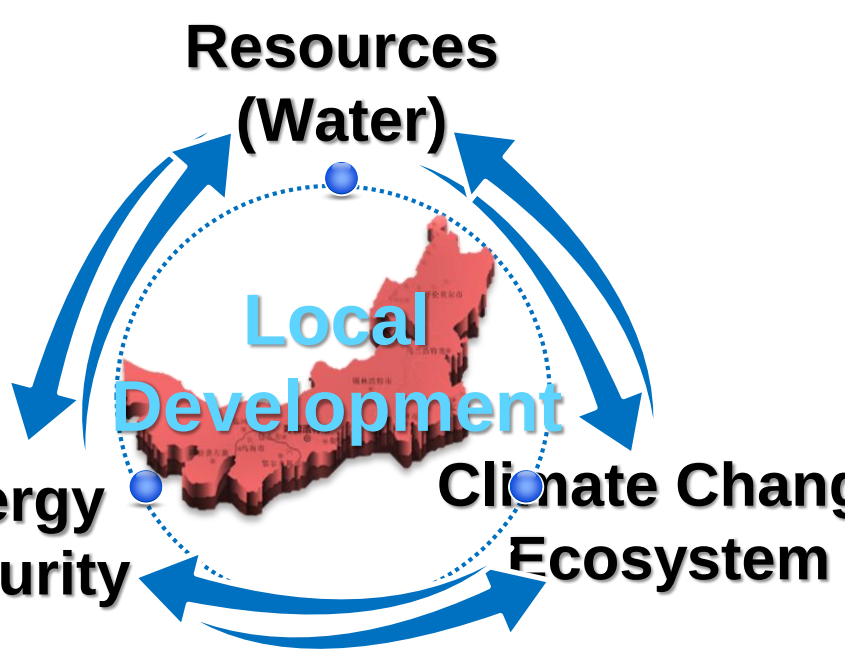
The Core of Arguments ?







Methodology Problems!

Econometrics Model

- time series
- fitting method
- coefficient of elasticity
- Sector analysis method
- I-O analysis
- grey system theory
- etc.

There are two kinds of traditional methods

- econometric method based on trend extrapolation and curve fitting.
- optimal method based on objectives and constraints.

Optimizing Model

- CGE
- MARKAL
- ANSWER-TIMES
- MESSAGE
- EPPA
- AIM -IPAC
- End-Use
- etc.

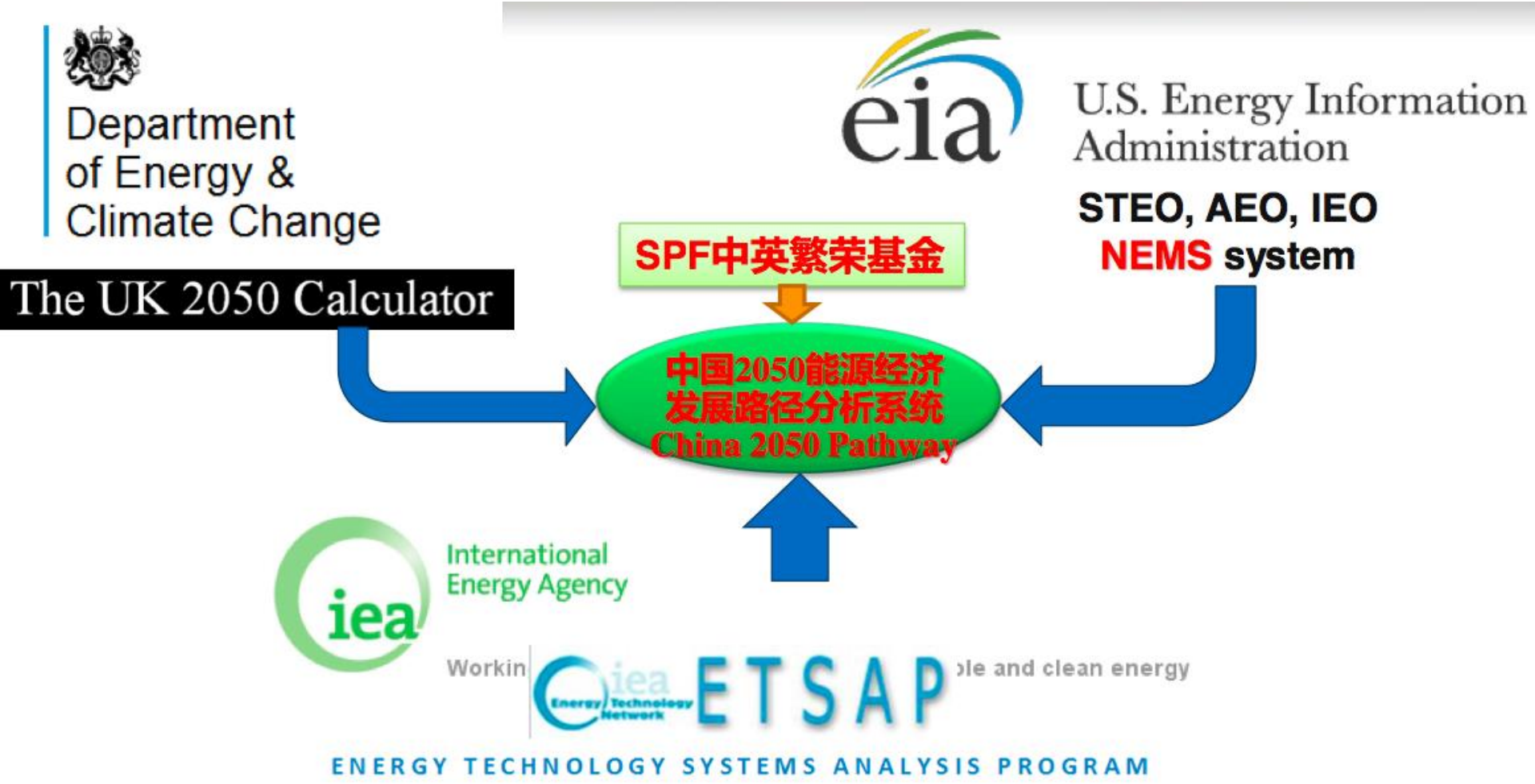
Econometrics Model

- **Advantage :** Suitable for short-term forecast analysis , The precision of projection is easy to be controlled.
- **Disadvantage:** When the configuration is changing, the result of projection will have great deviation , thus the limitations in long-term forecasting is very obvious.

Optimizing Model

- **Advantage :** Suitable for regional planning of energy supply, cost minimum;
- **Disadvantage:** Need too many exogenous variables, such as the rate of economic growth , the coefficient of production, and demand elasticity, that greatly increased the uncertainty of the model , and the model is closed, like "**a black box**". Other staff is very difficult to understand its internal structure but the model builder. The model results is difficult to verify. Therefore the biggest limitation is not open enough.

Methodology of China 2050 Pathway



Methodology of China 2050 Pathway

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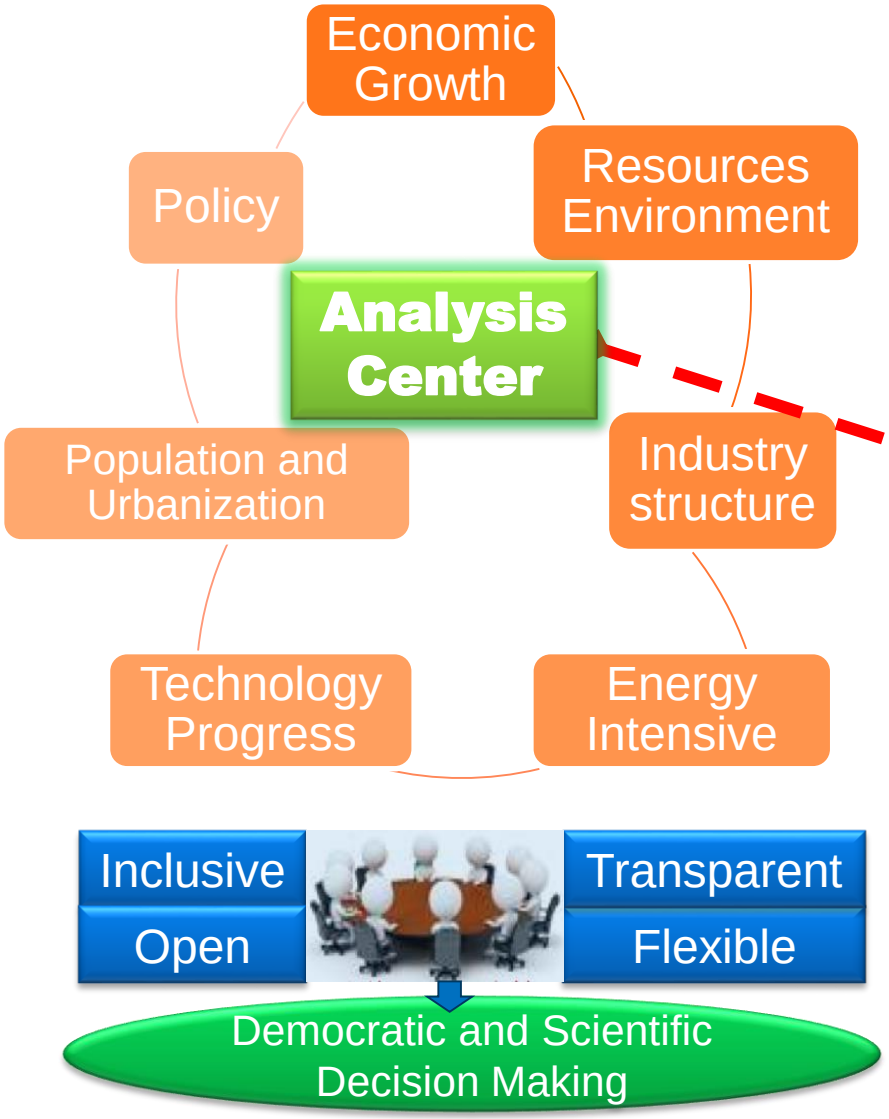
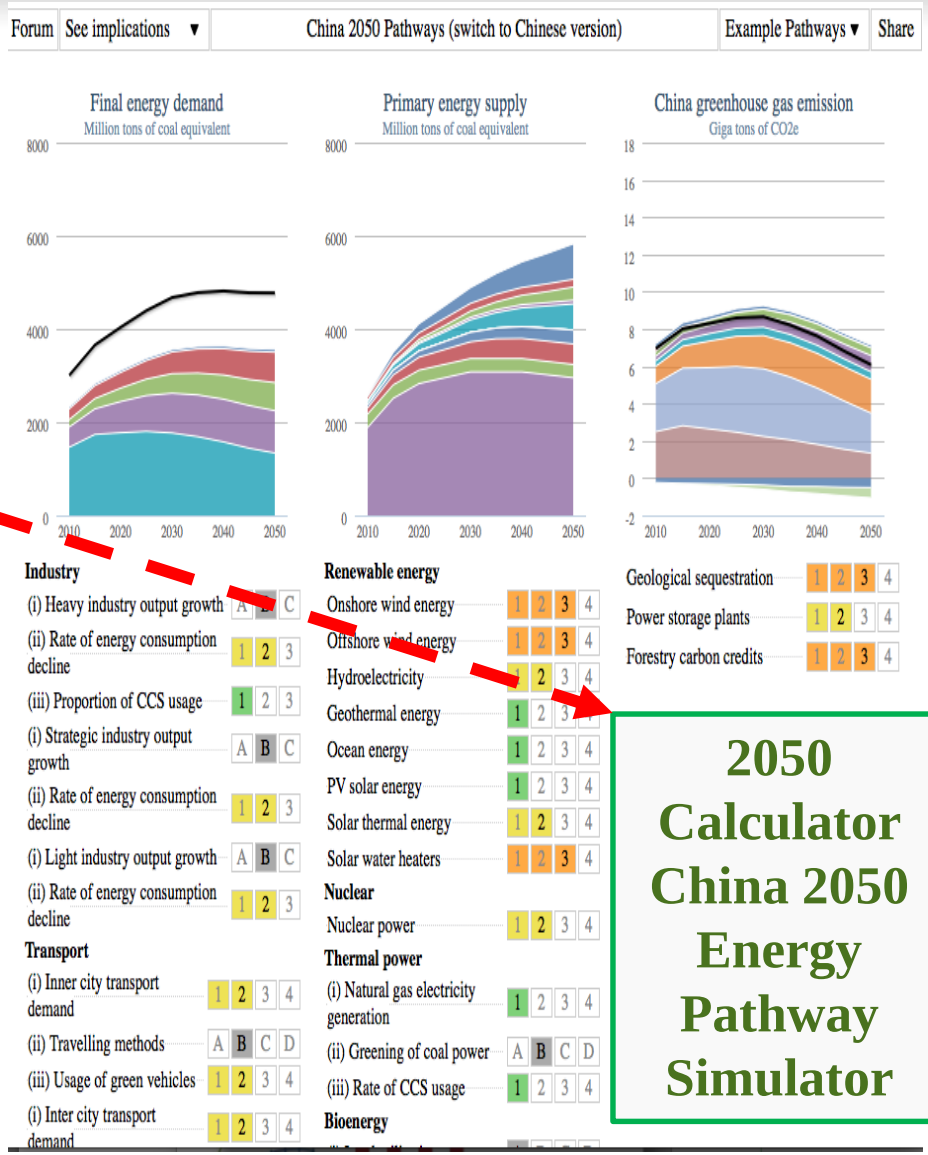




China's economic and political situations are undergoing periodical transition

The demand structure are changing

- Resident：The transition from survival to the pursuit of quality life.(standard)
- Pay attention to environmental protection and public services（Education, medical, pension etc.）
- Pay attention to social fairness and justice and other social order.

Economic Growth Quality

The driving force of economic growth and mechanism of supply is changing

- In the past **30** years: by the cheap environmental resources, "labour force from rural to urban", "agriculture to industry", "domestic to international"
- technology innovation, optimize industrial structure、enhance the vitality of enterprises.

Environment and Ecosystem

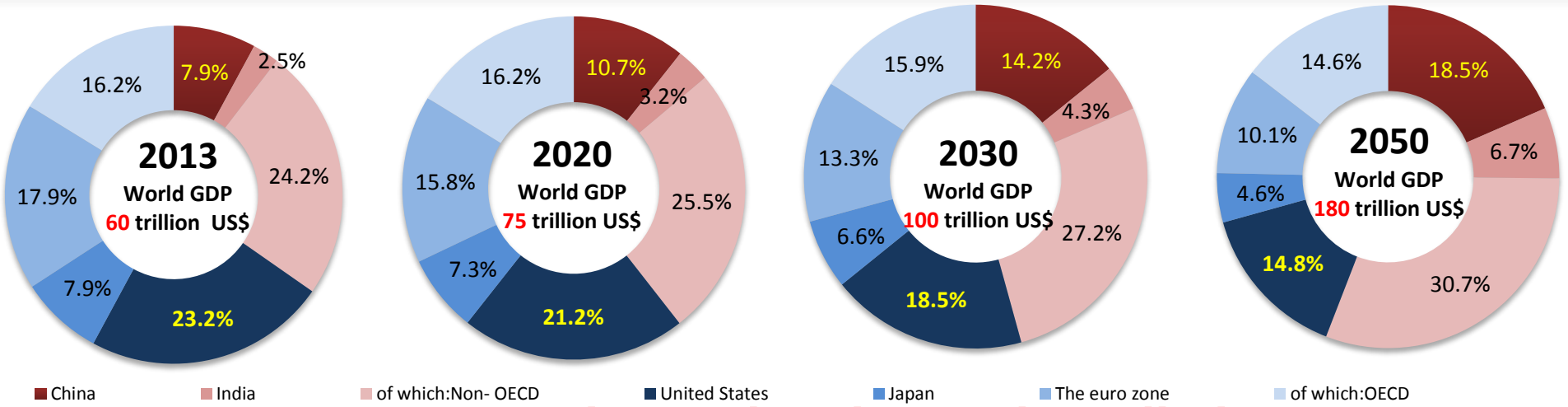
Began to pay more attention to global governance and global energy governance

- From the international market bystander and user become the international market maker.
- Begin to participate in the international affairs more widely and deeply.

New Era

New Normal

The position of China in the world economy



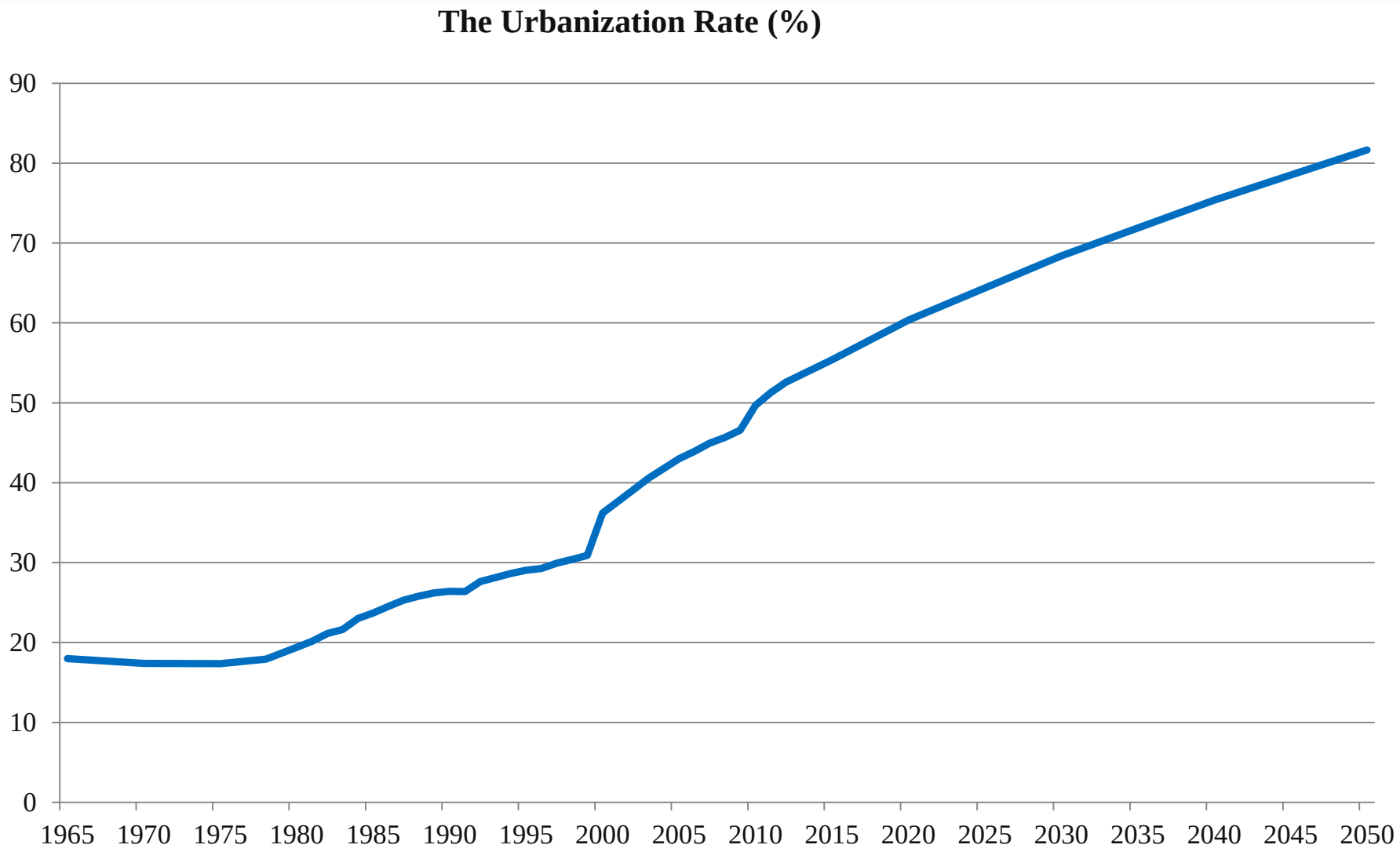
Conservative Estimation and Prediction

The average annual growth rate of GDP	2008-2020	2013-2020	2020-2030	2030-2050	2020-2050
China	8.0%	7.3%	6.0%	4.5%	4.2%
India	7.0%	6.5%	6.1%	5.7%	5.5%
Russia	3.5%	4.0%	4.5%	3.5%	4.0%
Brazil	3.5%	3.5%	3.2%	2.5%	2.8%
Japan	1.2%	1.5%	2.0%	1.0%	1.3%
United States	1.5%	2.0%	2.5%	2.0%	2.5%
The world average	2.6%	3.0%	3.5%	3.5%	3.0%

- In 2020, China GDP will be half of US GDP
- In 2030, China GDP will outstrip the world average;
- In 2040, China GDP will outstrip US GDP ;
- In 2050, per capita GDP will exceed the OECD average level.

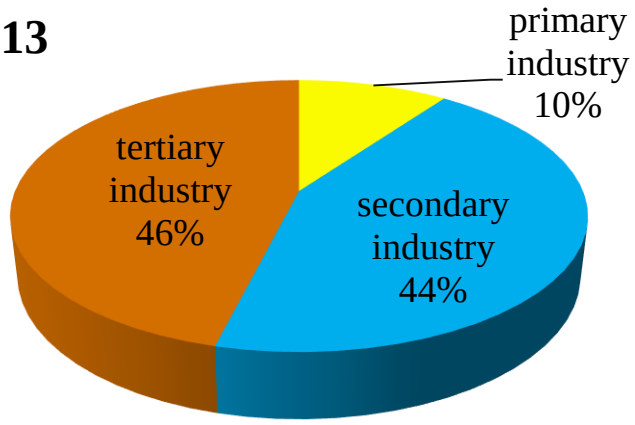
Source: China Energy Outlook 2015(draft)

The national urbanization rate

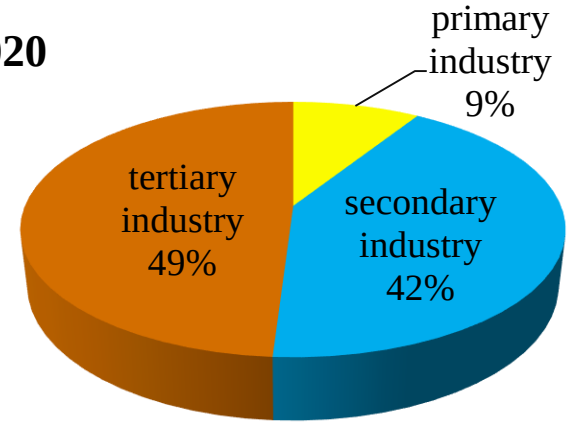


Industrial Structure(Industrialization)

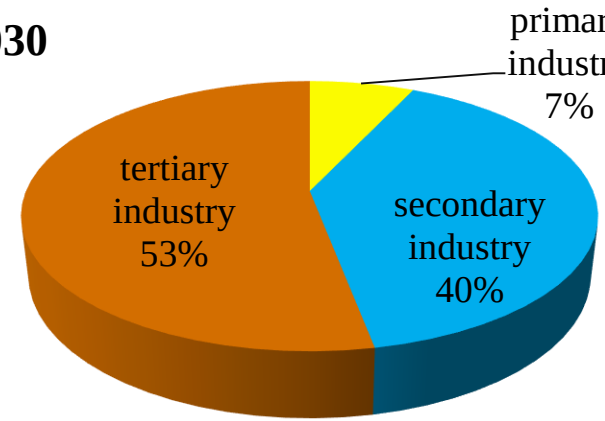
2013



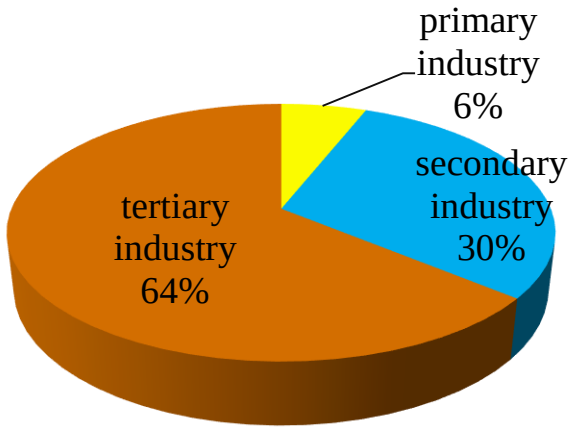
2020



2030



2050



Trends of Global Energy Demand Pattern