Energy Policy and Technology in China

Prof. Wang Hongguang

Chinese Academy of Science and Technology for Development

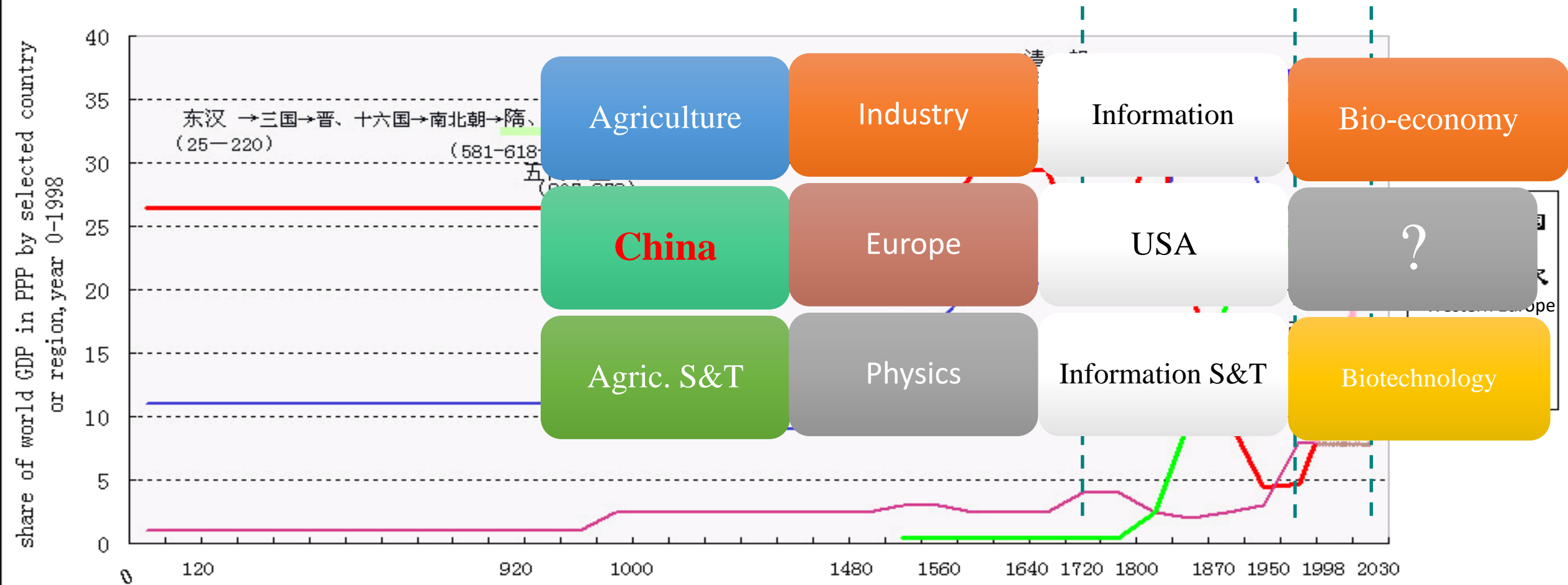**Ministry of Science and Technology, P.R. China**

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CONTENT

- **China's Economy**

- **China's Energy**

- **Energy Technology**

- **Energy Policy**

- **Advice on Cooperation**

1.1 Review of the Recent 2000 Years

China leading, stagnating, recovering

Agriculture	Industry	Information	Bio-economy
China	Europe	USA	?
Agric. S&T	Physics	Information S&T	Biotechnology

东汉 →三国→晋、十六国→南北朝→隋、
（25—220）　　　　　（581-618

source:Angus Maddison,The World Economy :A Millennial Perspective,OECD,Paris,2001

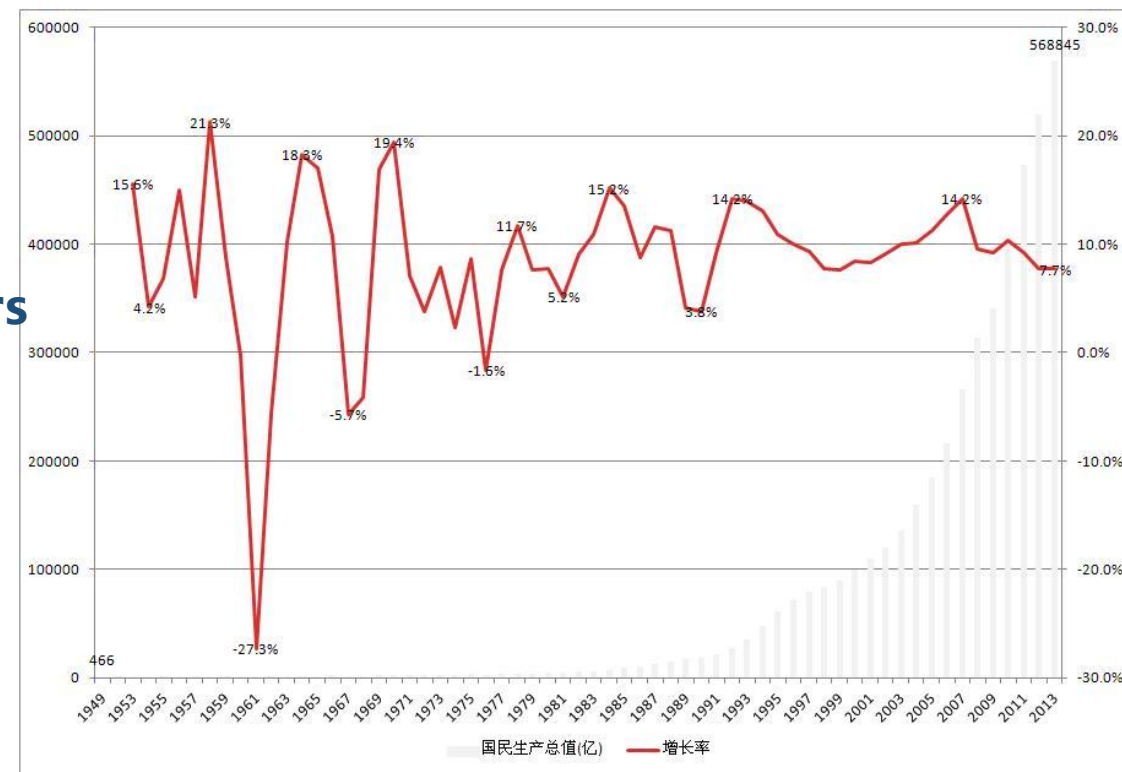# 1.2 Change in China's GDP Share in the Recent 500 Years (%GDP)
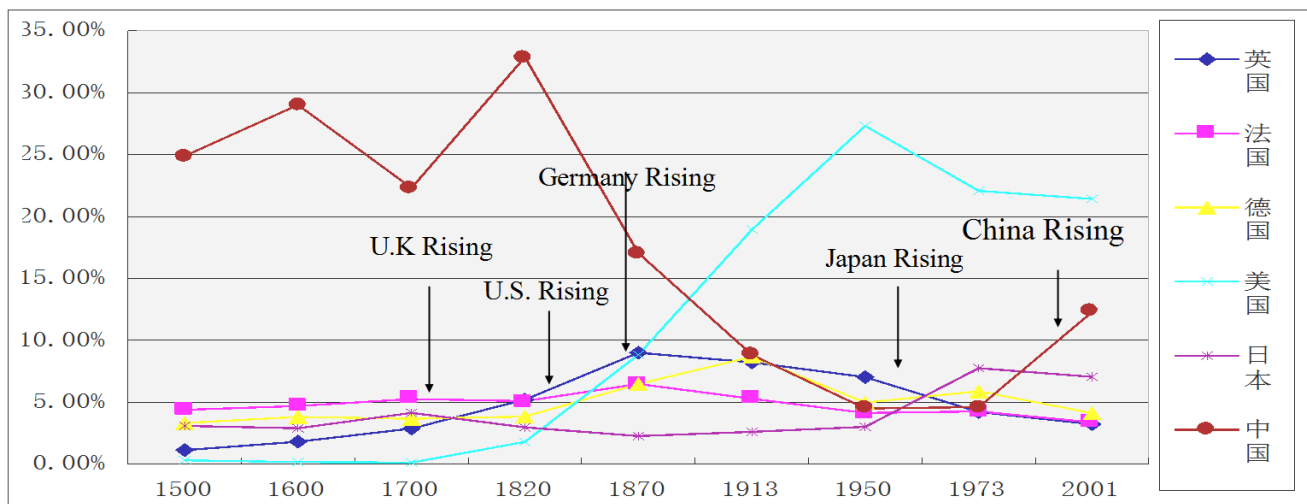
Data source: millennium statistics of world economy, OECD.

Since China's economic growth constantly declined in 1840, American economy surpassed the U.K in 1872, China in 1898, ranking the first in the world, and the U.K surpassed China in 1938.
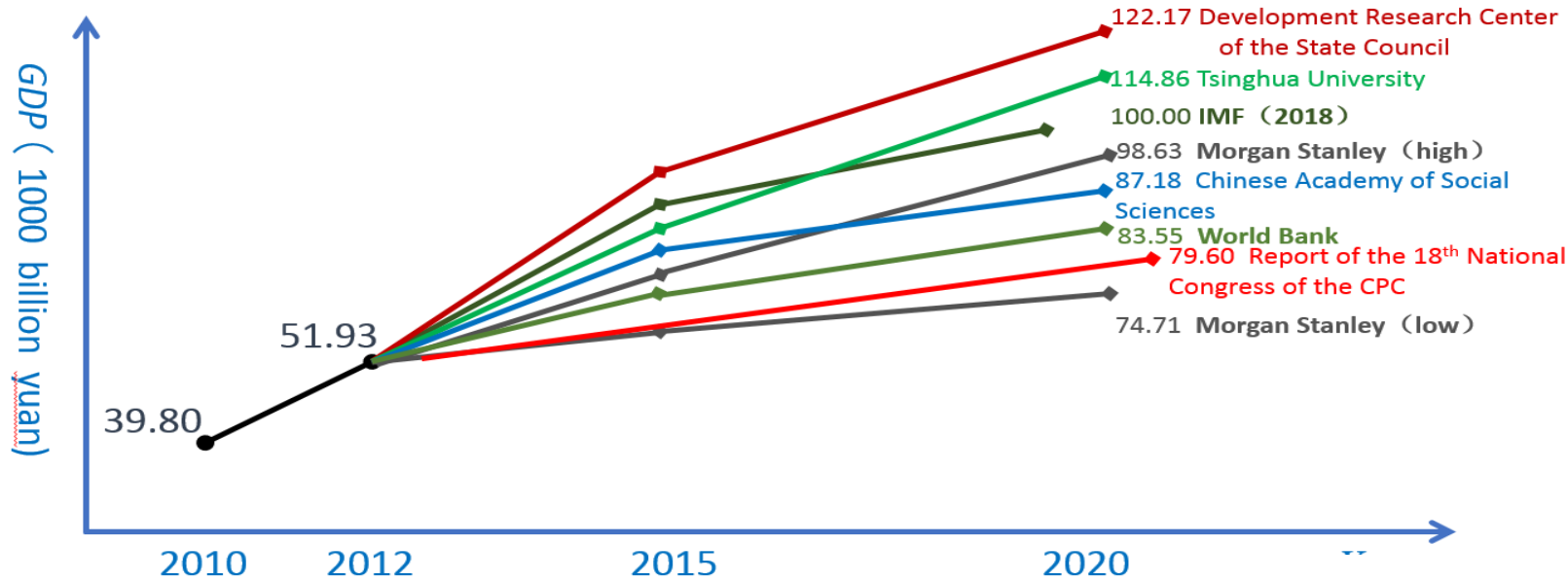
1.3 GDP has been increased 1749 times in past 68 years

Before the foundation of new China, its economy had not increased for more than 120 years. Since the foundation, the economics growth increases more rapidly than that in history and the international. In the first 29 years, it increased by 5.8%, and in the late 35 years, it increased by 9.8%, creating another Chinese wander in human economy history.
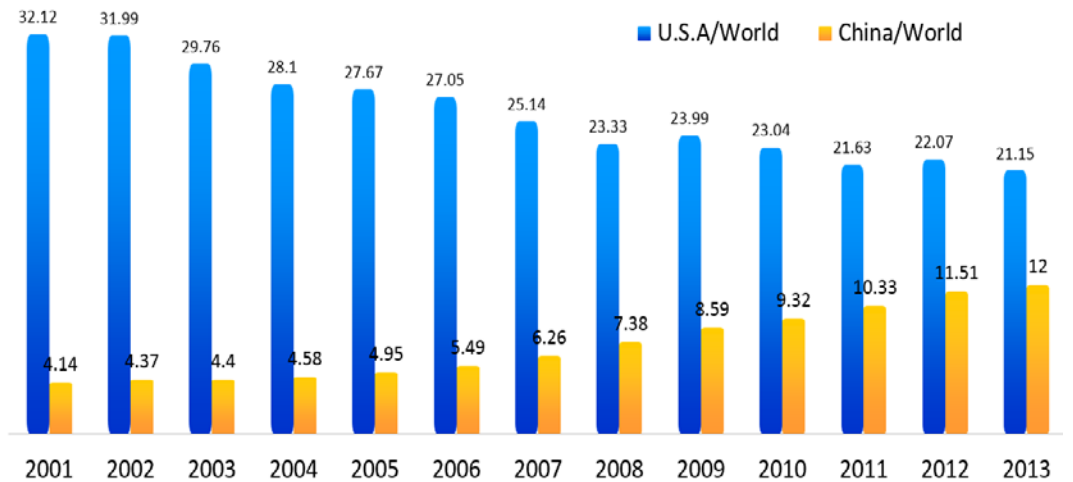
1.4 The Future 20 Years Outlook

GDP (1000 billion yuan)

39.80
51.93

2010 2012 2015 2020

122.17 Development Research Center of the State Council
114.86 Tsinghua University
100.00 IMF (2018)
98.63 Morgan Stanley (high)
87.18 Chinese Academy of Social Sciences
83.55 World Bank
79.60 Report of the 18th National Congress of the CPC
74.71 Morgan Stanley (low)

Proportion of China's Economy to World Economy is increasing

■ U.S.A/World   ■ China/World

Year	U.S.A/World	China/World
2001	32.12	4.14
2002	31.99	4.37
2003	29.76	4.4
2004	28.1	4.58
2005	27.67	4.95
2006	27.05	5.49
2007	25.14	6.26
2008	23.33	7.38
2009	23.99	8.59
2010	23.04	9.32
2011	21.63	10.33
2012	22.07	11.51
2013	21.15	12

2.1 The scale of energy ranks 1st in the world
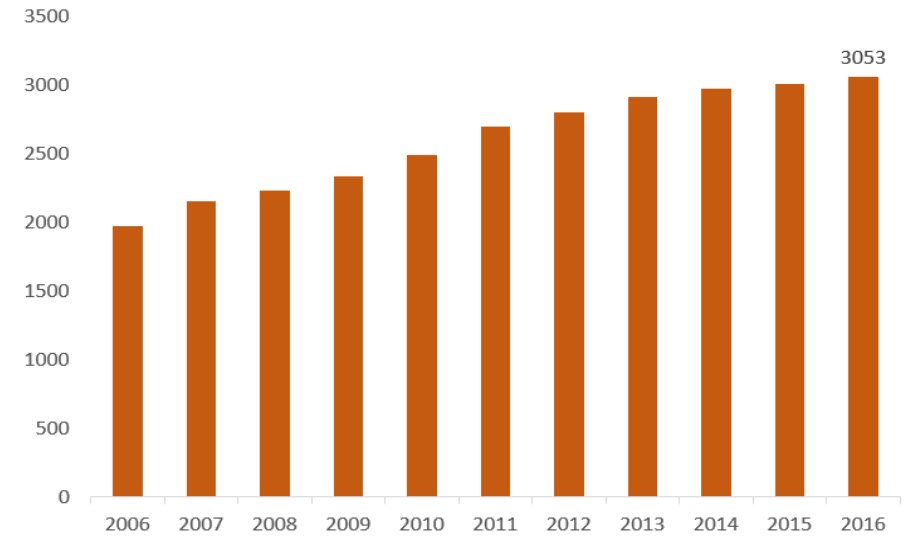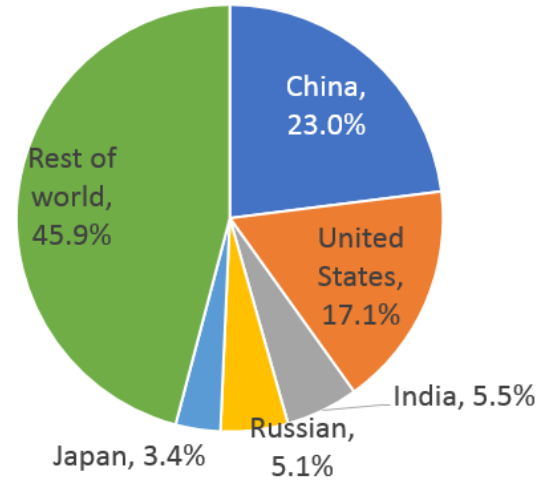
Primary energy consumption (Million tons oil equivalent)
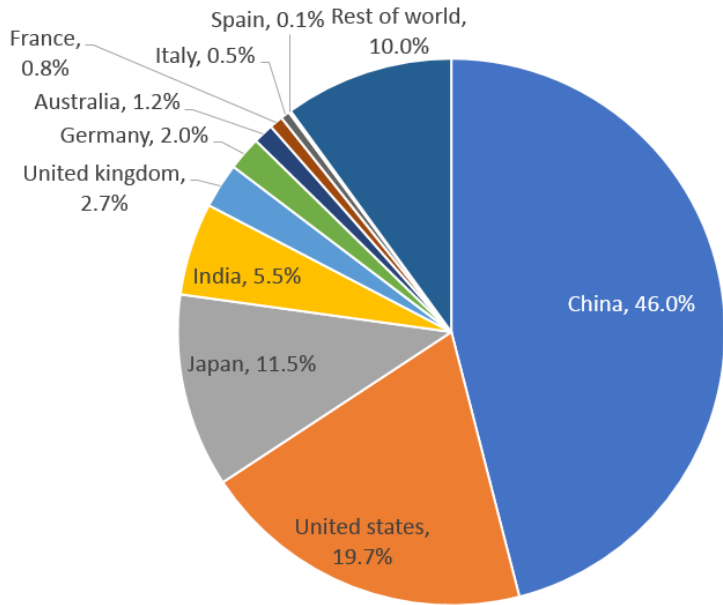Data source: BP Statistical Review of World Energy (2017)

2.2 The scale of clean energy ranks 1st in the world

Power	RANKING			
Renewable power (incl. hydro)	CHINA	UNITED STATES	BRAZIL	GERMANY	CANADA
Renewable power (not incl. hydro)	CHINA	UNITED STATES	GERMANY	JAPAN	INDIA
Bio-power generation	UNITED STATES	CHINA	GERMANY	BRAZIL	JAPAN
Hydropower capacity	CHINA	BRAZIL	UNITED STATES	CANADA	RUSSIAN FEDERAT.
Hydropower generation	CHINA	BTAZIL	CANADA	UNITED STATES	RUSSIAN FEDERAT.
Solar PV capacity	CHINA	JAPAN	GERMANY	UNITED STATES	ITALY
Wind power capacity	CHINA	UNITED STATES	GERMANY	INDIA	SPAIN

HEAT	RANKING			
Solar water heating collector capacity	CHINA	UNITED STATES	TURKEY	GERMANY	BRAZIL
Geothermal heat capacity	CHINA	TURKEY	JAPAN	ICELAND	INDIA

Edited according to RENEWABLES 2017 GLOBAL STATUS REPORT(FEN21)

By the end of 2016, China was home to more than one-quarter of the world's renewable power capacity.

Solar Power
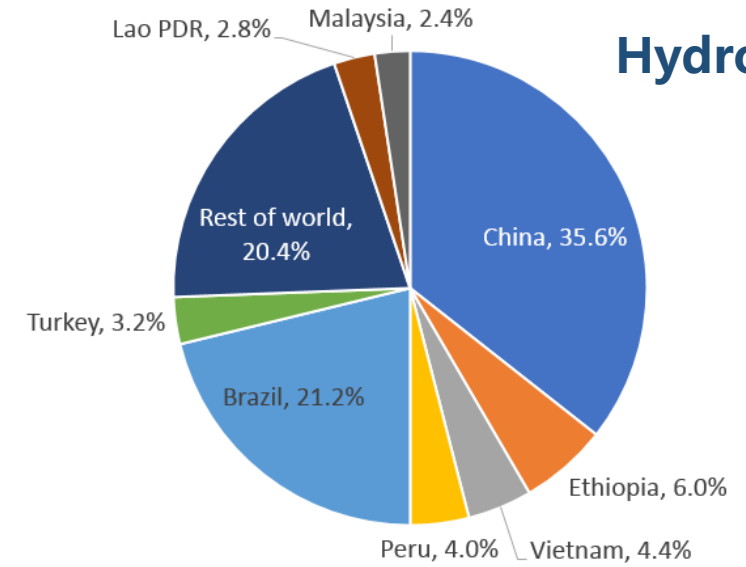**China accounted for 46% of new capacity**

Hydropower

Rest of world, 10.0%
Spain, 0.1%
Italy, 0.5%
France, 0.8%
Australia, 1.2%
Germany, 2.0%
United kingdom, 2.7%
India, 5.5%
Japan, 11.5%
China, 46.0%
United states, 19.7%

Data source: RENEWABLES 2017 GLOBAL STATUS REPORT(FEN21)

Rest of world, 17.0%
Canada, 1.3%
Italy, 0.5%
France, 2.9%
Brazil, 3.6%
Germany, 9.1%
United kingdom, 1.3%
India, 6.6%
United states, 15.0%
China, 42.7%

Data source: RENEWABLES 2017 GLOBAL STATUS REPORT(FEN21)

Lao PDR, 2.8%
Malaysia, 2.4%
Rest of world, 20.4%
China, 35.6%
Turkey, 3.2%
Brazil, 21.2%
Ethiopia, 6.0%
Peru, 4.0%
Vietnam, 4.4%

Hydropower Capacity additions (2016)

Rest of world, 40%
China, 28%
Russian Federation, 4%
Brazil, 9%
Canada, 9%
United states, 9%
India, 4%

Hydropower Global Capacity, shares of top 6 countries and rest of world(2016)

China's newly installed capacity of wind power accounted for 42.7% of the world's total, and cumulative installed capacity accounted for 34.7% of the world's total.
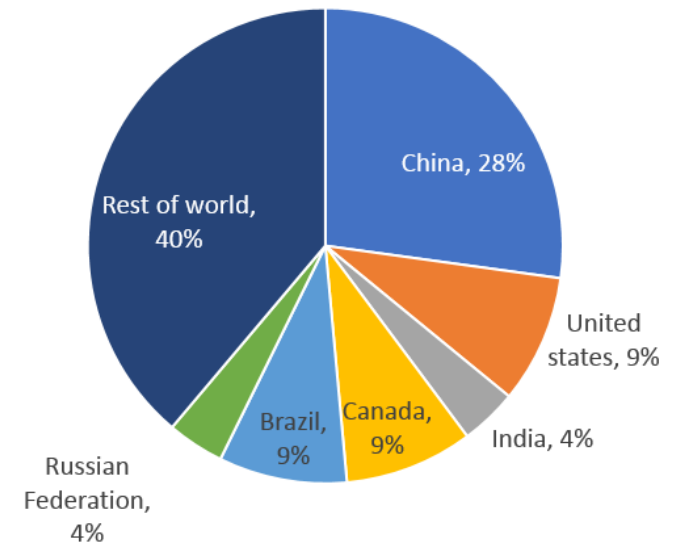
2.3 The scale of clean energy investment ranks 1st in the world

Billion USD

Year	Value
2006	11.1
2007	16.6
2008	25.3
2009	38.1
2010	41.4
2011	46
2012	58.3
2013	63.3
2014	87.3
2015	115.4
2016	78.3

Data source: RENEWABLES 2017 GLOBAL STATUS REPORT(FEN21)

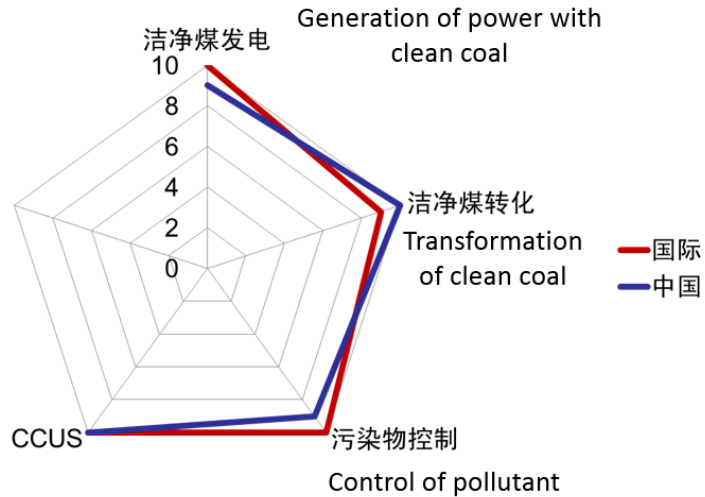others, 4.3%

wind power, 44.7%

solar power, 51.0%
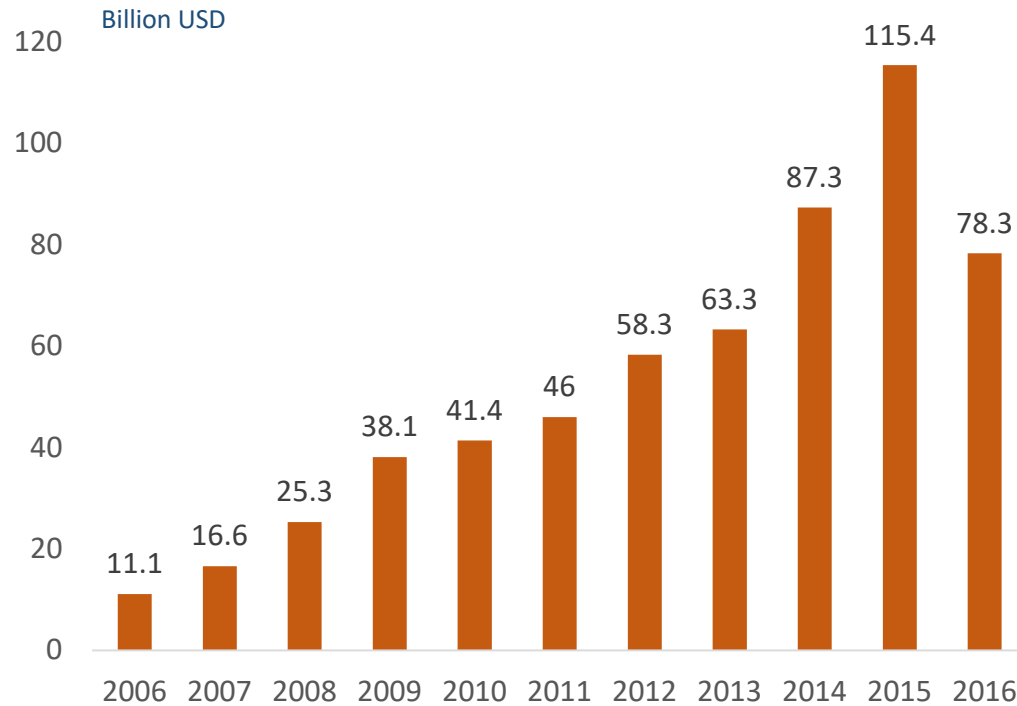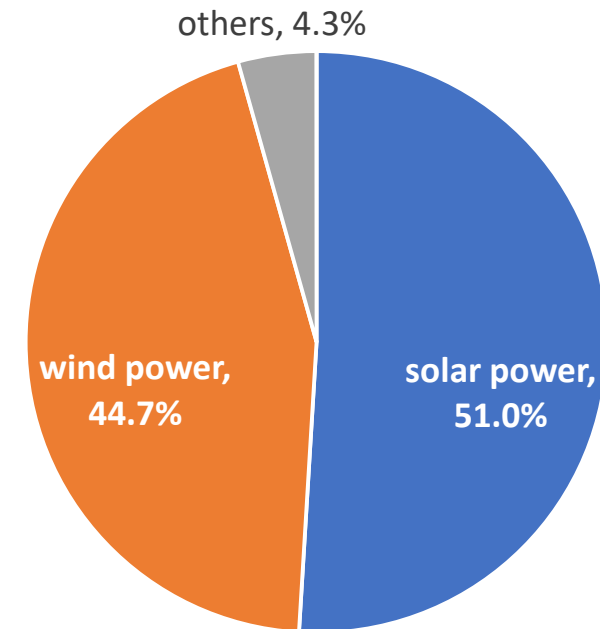
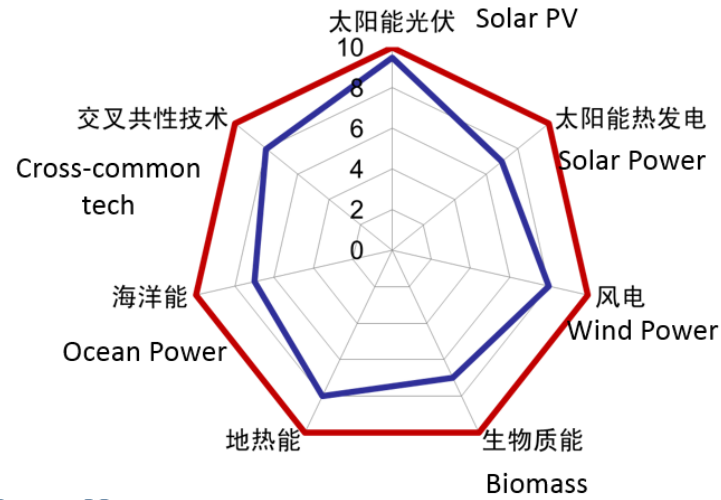The Structure of New Investment in Renewable Energy by technology in China (2016)

3.1 A clear gap between China and developed countries in energy technology
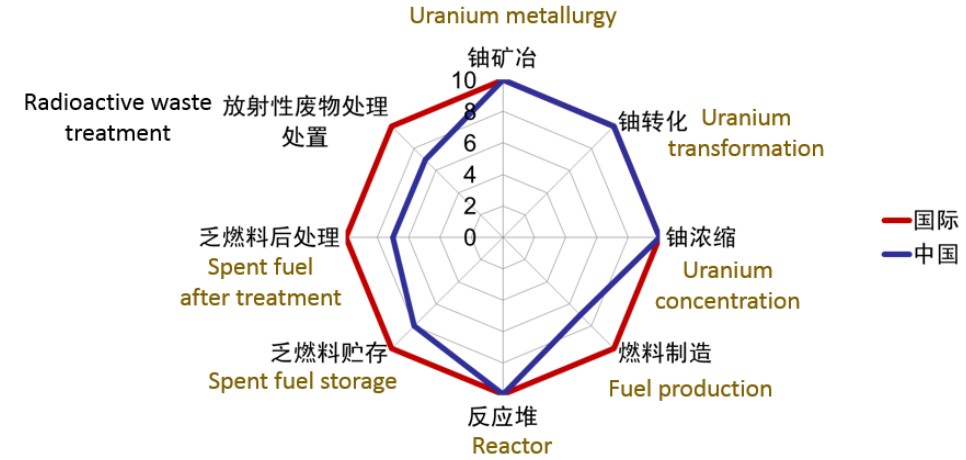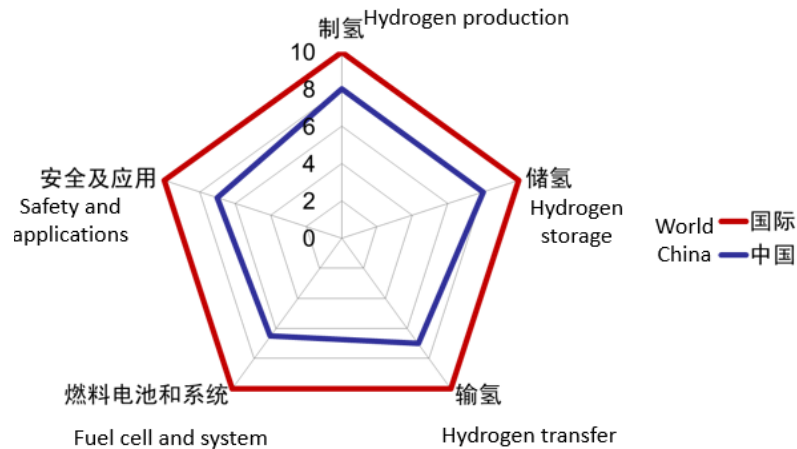
Clean coal tech

洁净煤发电 / Generation of power with clean coal

洁净煤转化 / Transformation of clean coal

污染物控制 / Control of pollutant

CCUS

国际 / 中国

Renewable energy

太阳能光伏 / Solar PV

太阳能热发电 / Solar Power

风电 / Wind Power

生物质能 / Biomass

地热能 / Ocean Power

海洋能 / Ocean Power

交叉共性技术 / Cross-common tech

国际 / 中国

Nuclear tech

铀矿冶 / Uranium metallurgy

铀转化 / Uranium transformation

铀浓缩 / Uranium concentration

燃料制造 / Fuel production

反应堆 / Reactor

乏燃料贮存 / Spent fuel storage

乏燃料后处理 / Spent fuel after treatment

放射性废物处理处置 / Radioactive waste treatment

国际 / 中国

Hydrogen & fuel cell

制氢 / Hydrogen production

储氢 / Hydrogen storage

输氢 / Hydrogen transfer

燃料电池和系统 / Fuel cell and system

安全及应用 / Safety and applications

World 国际 / China 中国

Energy saving, energy storage and distributed supply of energy

工业节能技术 / Energy saving tech for industry

建筑节能技术 / Energy saving tech for Construction

交通运输系统及终端节能技术 / Energy saving tech for transportation systems and terminals

化学储能 / Chemical energy storage

物理储能 / Physical energy storage

分布式供能 / Distributed supply of energy

国际 World / 中国 China
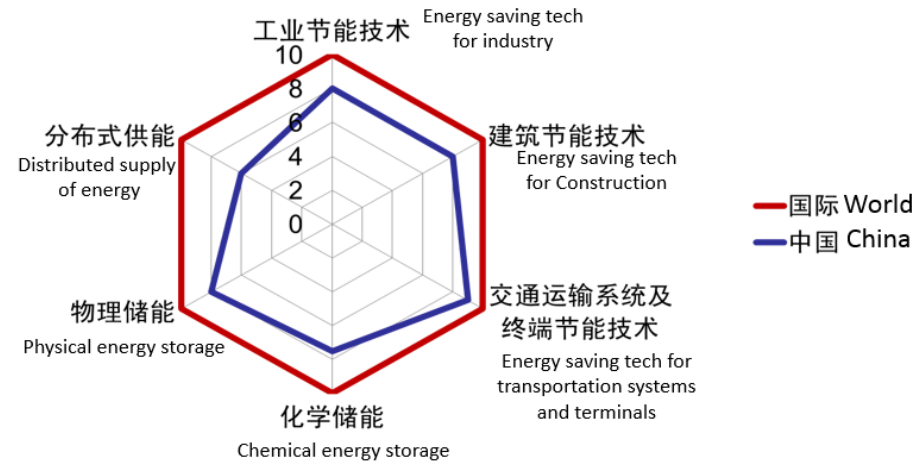
3.2 The Key Technology Direction of Future Energy

- Clean, Efficient Utilization of Coal: Clean Coal, Coal-based Polygeneration Technology
- Nuclear Energy Technology: Fast Reactor Technology, High-Temperature Gas-Cooled Reactor Technology
- High-efficiency battery technology and electric vehicles
- Renewable energy technologies: solar energy, wind energy, bioenergy
- New generation hydropower technology and equipment:
- Large-scale energy storage technology: super capacitors, etc.
- 700°C Ultra-supercritical Power Generation Technology
- Building Energy Saving Technology
- High temperature superconducting force application technology

4 China's energy policy is undergoing transforming

4.1 The problem of insufficient quantity of energy has been basically solved and low quality of energy has become the major challenge.

4.2 Optimized structure. The economy is in a period of transformation, the tertiary sector becomes an engine of economic growth, the energy consumption has decreased.

4.3 Environment optimization. Decreased consumption of coal, increased clean energy.

4.4 Developing electric vehicles. Both the production quantity and sales volume ranks 1st in the world.
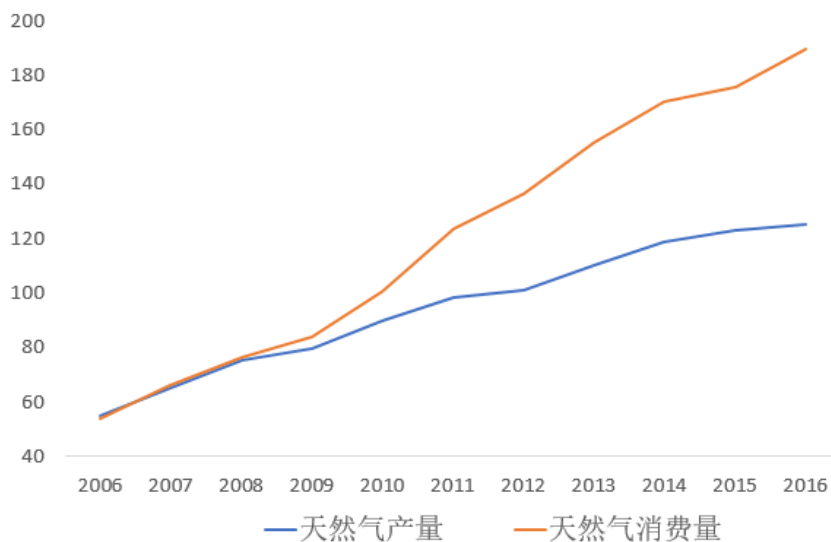
In the "13th Five-Year" plan, China will further adjust the energy structure.

Production and consumption of coal in China show a downward trend(million tons of oil equivalent)
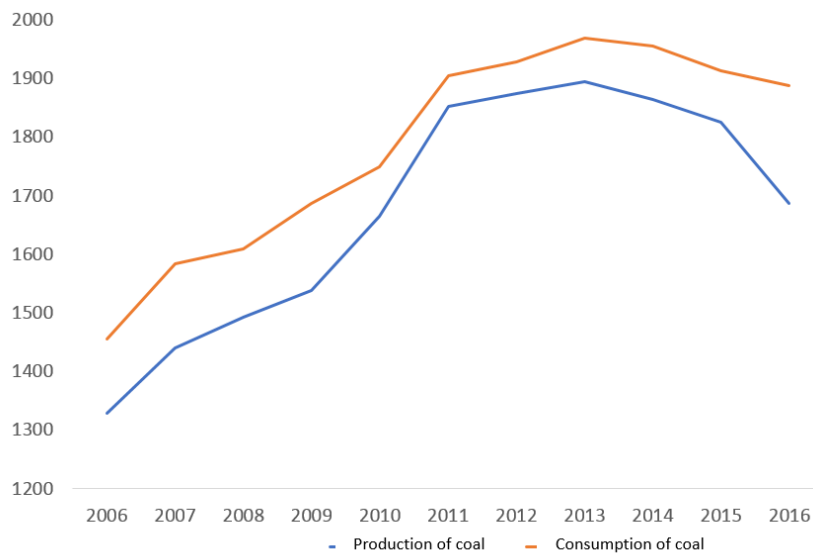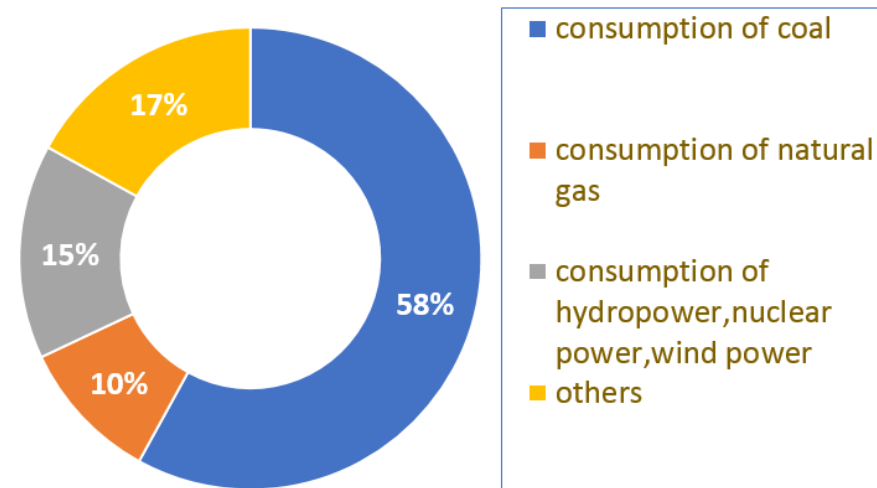
Data source: BP Statistical Review of World Energy (2017)

Production and consumption of natural gas in China show an upward trend(million tons of oil equivalent)

Data source: BP Statistical Review of World Energy (2017)

Production of coal — Consumption of coal

— 天然气产量 — 天然气消费量

- consumption of coal — 58%
- consumption of natural gas — 10%
- consumption of hydropower,nuclear power,wind power — 15%
- others — 17%

In 2020, the proportion of non fossil energy consumption increased to more than 15%, the proportion of natural gas consumption reached 10%, and the proportion of coal consumption decreased to less than 58%.

5 Advice on global energy technology foresight and cooperation

5.1 Research on energy policy

5.2 Energy technology foresight

5.3 Energy industry foresight

5.4 Talents foresight in energy sector

5.5 Battery technology foresight

Thank You!