With the publication of *Conditions for Survival* Chinese version

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能源产业视角下的中国绿色发展战略

CHINA'S GREEN DEVELOPMENT STRATEGY : FROM A ENERGY INDUSTRY VIEW

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Ⅰ. a strategic peculiarity of China's energy-environment issue

- Presumably no country's energy-environment issue has so closer strategic relations with its national security as that in China. The rapid growth of energy consumption is one of the chief reasons for deterioration of China's environment. Chinese government has to be facing domestic environmental political pressure. At the same time, the rapid growth of energy demand, deterioration of environment and China's becoming the biggest CO2 emission country in the world, all of that make an increasingly large diplomatic and international political pressure to Chinese government.

The Structural Character of Chinese Energy

China's energy structure takes on five characteristics:

1st, the energy structure is dominated by coal and China is unable to transport the coal efficiently. Moreover, the coal-dominating structure gives rise to environmental deterioration ;

2nd, the resource of the gas and oil is very scarce and the oil and gas is mainly located in the northeast, north and the southwest region, the domestic production growth of the gas and oil is slow and the dependence degree will further increase for the international market;

3rd, 80 % of the water power is in the southwest and northwest. the large and far power transmission has not been completely break the bottlenecks technologically;

4th,in China, the nuclear power, natural gas electricity and new energy resources starts late and the development prospect is still unclear;

5th, the energy consumption and supply takes on regional imbalances pattern.

Global Energy Structure (BM 1.91%)

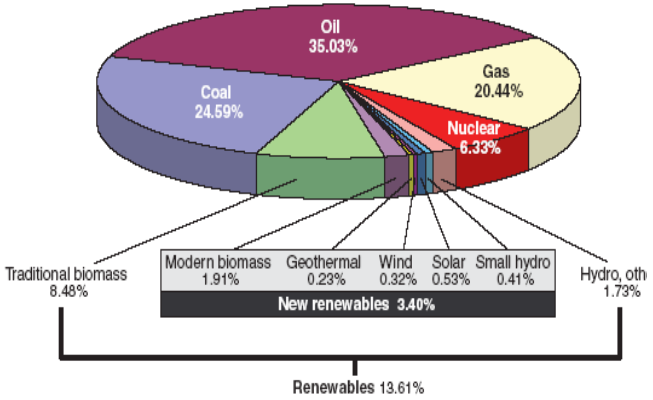
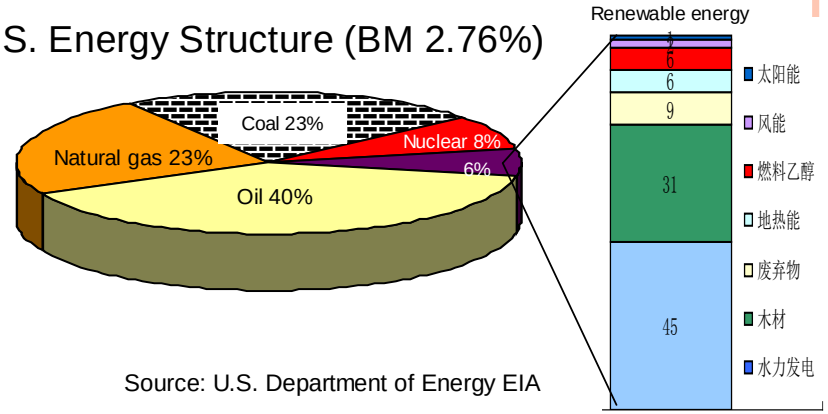


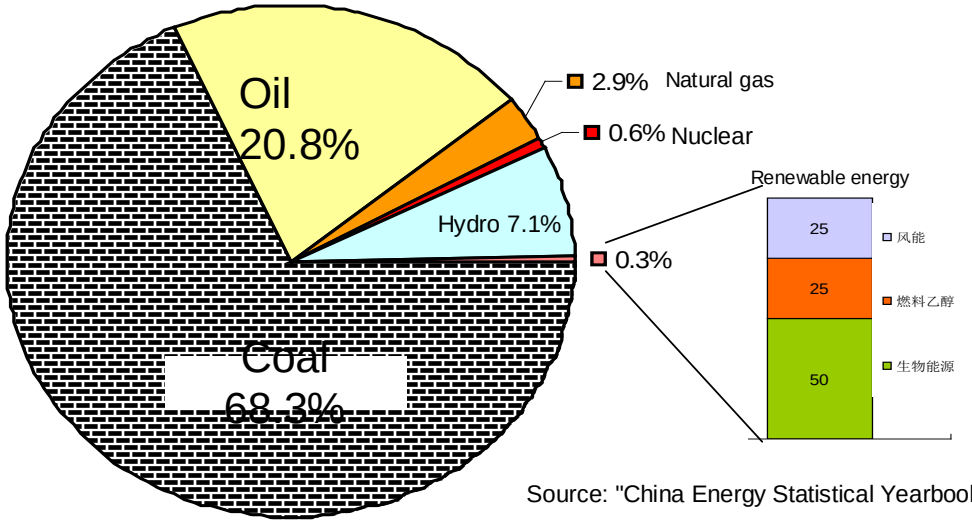
Fig. 1. World total primary energy supply 2004, shares of 11.2 billion tons of oil equivalent, or 470 EJ (*15*, *16*).

U.S. Energy Structure (BM 2.76%)



Source: U.S. Department of Energy EIA

China's energy structure (BM 0.20%)



Source: "China Energy Statistical Yearbook, 2006"

Table of Comparison of the energy structure

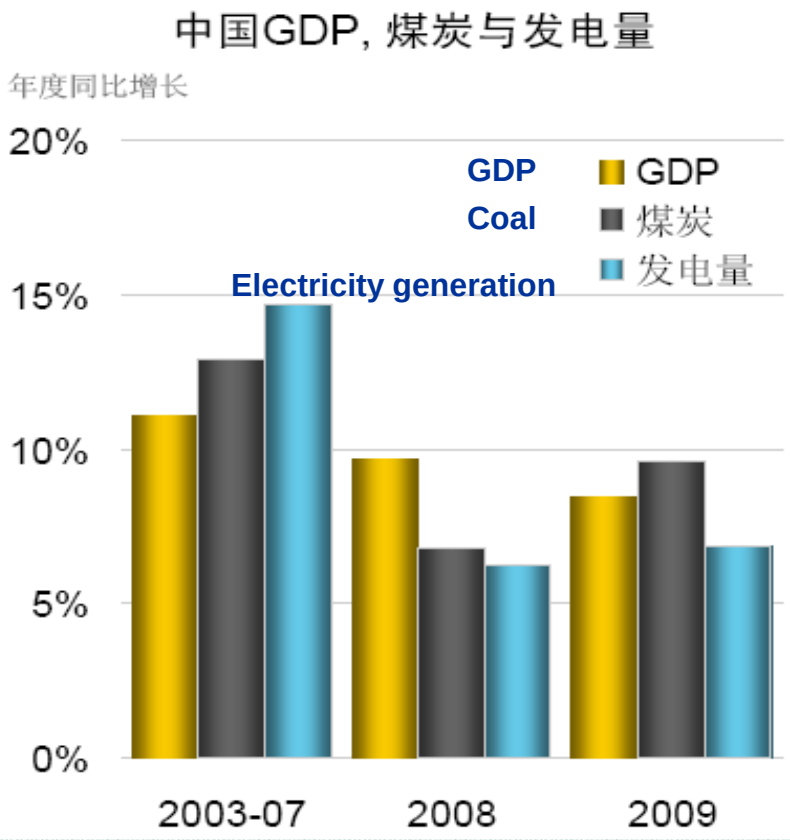
(BM: The new and renewable sources of energy)

2009 China Coal Consumption

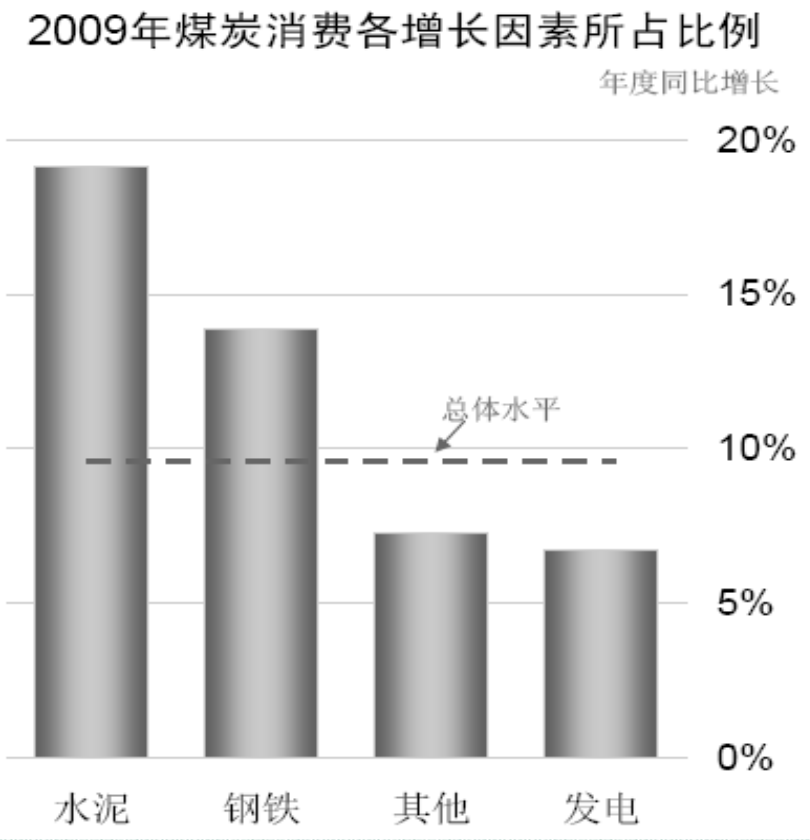
2009年中国煤炭消费

bp

China GDP, Coal and Electricity generation



The Share of Various Component in China Coal Consumption

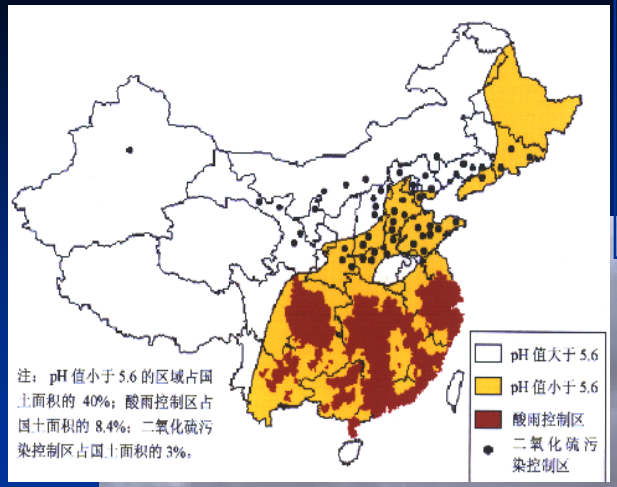


来源：包括来自于根据中国国家统计局数据估算所得的煤炭用量

BP 世界能源统计年鉴 2010

BP 2010

Most of the environmental issues under the based-coal structure have not been resolved and the environment will further deteriorate under the background of rapid economic growth in China.



❖ China's sulfur dioxide and carbon dioxide emission has been in the world's first place in recent years.

❖ The emission of sulfur and dioxide is expected to surpass environmental capacity by 30% and 46% by 2020.

Acid rain area accounts for 30% of China’s mainland area

Resources and the environment cost for China's economic and social development is too large, situation is grim, and so that governance is not easy to improve it.

The Chinese government facing series huge contradictions: with the in-depth development of globalization, China as a manufacturing power is deeply restrained and limited by the role and position of the world economic structure. China is paying the big cost of environment and resources and bear the bigger and bigger pressure of international politics created by "transfer discharge" With the industry products shared by the world. China may become the most polluted country in the world on a short period. At the same time, it must make the most of reducing pollution and energy consumption. At home, it is not only to ensure that economic development but also to maintain political stability.

“EMBODIED ENERGY”AND “EMBODIED CARBON” PROBLEMS IN CHINA‘S ECONOMY

“EMBODIED ENERGY”, IS A BASIC CONCEPT OF ENERGY ANALYSIS, WHICH CONTAINS TWO MEANINGS: 1、 IT REFERS TO THE SUM TOTAL OF THE ENERGY NECESSARY FOR AN ENTIRE PRODUCT LIFECYCLE; 2、THIS RESOURCE CONSUMPTION IS "INVISIBLE" AND TAKES PLACE IN THE FIRST STAGE, MAINLY IN TRADING.

“EMBODIED CARBON”, THE PRODUCTION OF ANY KIND, DIRECTLY OR INDIRECTLY, WILL HAVE CARBON EMISSIONS. EMBODIED CARBON REFERS TO CARBON DIOXIDE EMITTED AT ALL STAGES OF PRODUCTION CHAIN. FROM THE PERSPECTIVE OF FOREIGN TRADE, THE "EMBODIED CARBON" AND "TRANSFER EMISSIONS" MEAN BASICALLY THE SAME.

A global view shows CO_2 emission are mainly from the industrialized countries. They account for 60% In the cumulative total of CO_2 emission from 1900 to 2004, the United States accounts for 28% of the emission, about 3.5 times that of China.

- China’s carbon emissions rank first in the world in 2009. China must take action in the emission field.

Relevant research estimates the embodied energy of import and export trade in China between 1997-2006 and shows that despite China's rapid increase in import of energy products, equally rapid growth in net export of energy makes energy which is embodied in products leave China. It may share 25% of Chinese total energy consumption.

At the same time, relevant research estimates embodied carbon of the import and export trade in China between 1997 and 2006, and finds that in 1997-2006, with form of products, China has transferred a large amount of foreign carbon emissions. It may share 25% of Chinese total CO2 emission.

As a producer, China has become the victim of these emission while as a consumer, importing country has become beneficiary of these carbon emissions. Therefore, it is unfair to only blame China for its growth of carbon emissions.

in June 2009, the celebrated American scholar professor Ken Lieberthal （李侃如） delivered a speech entitled *China's Search for Energy Security and Implications for US Policy* in the Council On Foreign Relations（CFR）of Senate. He made a concrete description for the contradictions of social development and energy reduction as follows：

- **The coal accounts for about 70 % in china's energy and in future decades, no other energy can replace it.**
- **In last 30 years, China's urbanized advancement has been developing rapidly in a unimaginable scale. China is facing the most large-scale wave of immigration in human history. Since 1992, there are nearly 200 million Chinese people who had been removed from rural to urban. Every year, about 15 million people moved into the city. This kind of immigration speed will last for 15 to 20 years.**

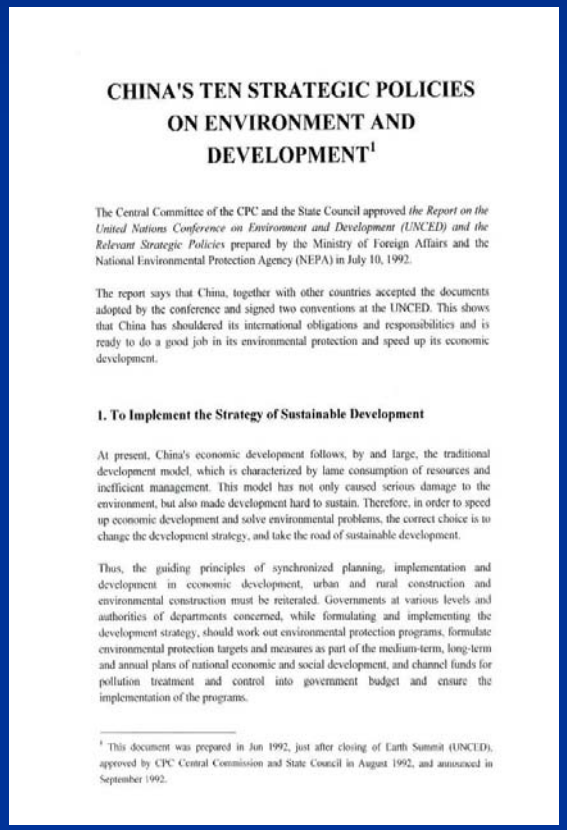
Worse, China's position and its role in the global economic structure cannot be changed in a foreseeable future. Environment-resource problem has been the strategic bottleneck impeding China's development. The Chinese authority will have to face ever-increasing environmental-political pressure in domestic issues, as well as international and diplomatic pressure in the climate-change gaming.

II. The key to China's green economic and social development in future is to change the traditional development way from GDP-based into human-centered and focuses the fundamental goals of economic and social development on pursuing human dignity and people's well-being.

The goal of “11th Five Year Plan ” in 2010：

- **The energy consumption intensity drops by 20%**
- **The main pollution discharge drops by 10%**

China's ten strategic policies on environment and development



CHINA'S TEN STRATEGIC POLICIES ON ENVIRONMENT AND DEVELOPMENT[1]

The Central Committee of the CPC and the State Council approved *the Report on the United Nations Conference on Environment and Development (UNCED) and the Relevant Strategic Policies* prepared by the Ministry of Foreign Affairs and the National Environmental Protection Agency (NEPA) in July 10, 1992.

The report says that China, together with other countries accepted the documents adopted by the conference and signed two conventions at the UNCED. This shows that China has shouldered its international obligations and responsibilities and is ready to do a good job in its environmental protection and speed up its economic development.

1. To Implement the Strategy of Sustainable Development

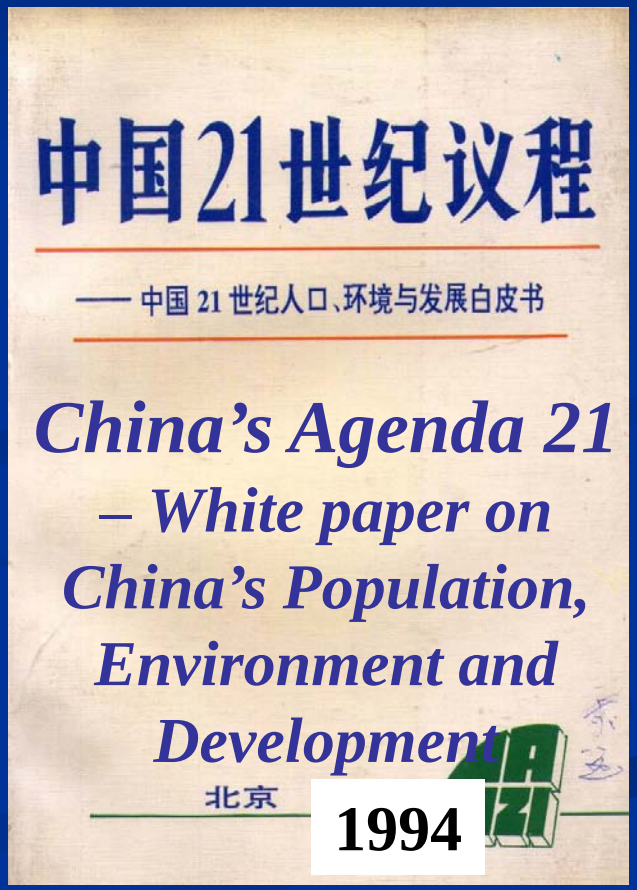
At present, China's economic development follows, by and large, the traditional development model, which is characterized by lame consumption of resources and inefficient management. This model has not only caused serious damage to the environment, but also made development hard to sustain. Therefore, in order to speed up economic development and solve environmental problems, the correct choice is to change the development strategy, and take the road of sustainable development.

Thus, the guiding principles of synchronized planning, implementation and development in economic development, urban and rural construction and environmental construction must be reiterated. Governments at various levels and authorities of departments concerned, while formulating and implementing the development strategy, should work out environmental protection programs, formulate environmental protection targets and measures as part of the medium-term, long-term and annual plans of national economic and social development, and channel funds for pollution treatment and control into government budget and ensure the implementation of the programs.

[1] This document was prepared in Jun 1992, just after closing of Earth Summit (UNCED), approved by CPC Central Commission and State Council in August 1992, and announced in September 1992.

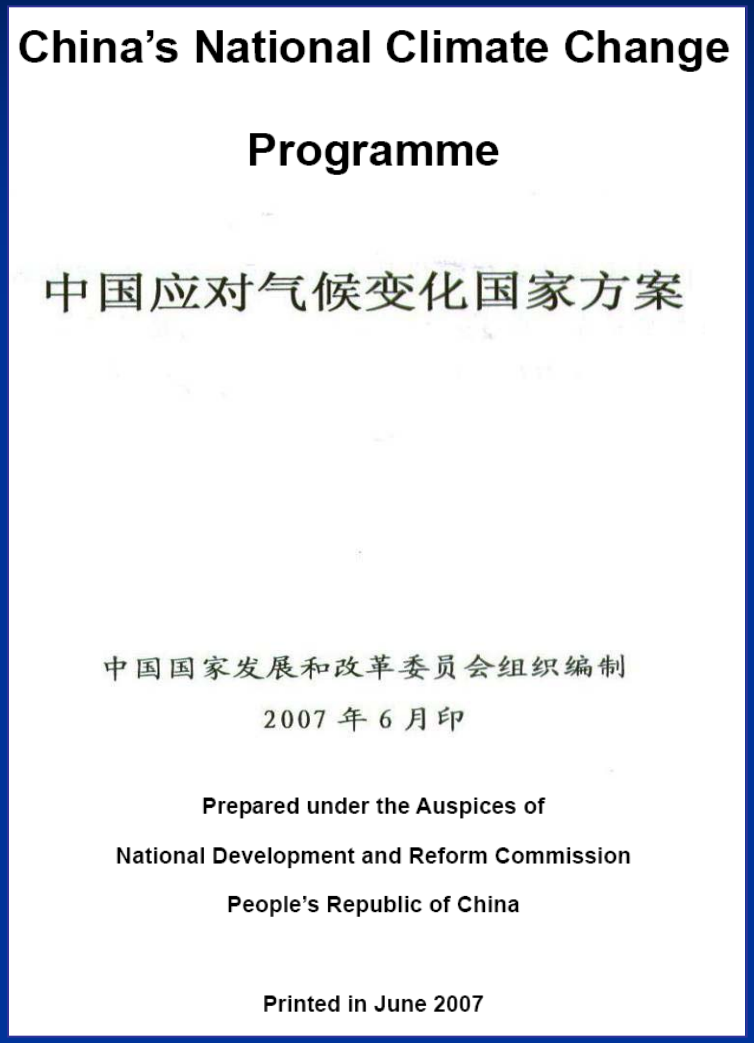
中国环境与发展十大对策 China's Ten Strategic Policies on Environment and Development

1992



1994

China's National Climate Change Program


China's National Climate Change

Programme

中国应对气候变化国家方案

中国国家发展和改革委员会组织编制

2007 年 6 月印

Prepared under the Auspices of

National Development and Reform Commission

People's Republic of China

Printed in June 2007

In June 2007, China released the first policy program for settling global warming:
The plan describes the effects of climate change and maintains that China will adopt the policy framework,
China has adopted a series of measures, including: transforming economic growth mode, adjusting economic structure and energy structure and controlling population growth,
China will strive to develop new and renewable energy and new saving technologies, and actively promote the carbon and other relevant technology.

China's Scientific & Technological Actions on Climate Change


China's Scientific & Technological Actions

on Climate Change

Jointly Issued by

Ministry of Science and Technology

National Development and Reform Commission

Ministry of Foreign Affairs

Ministry of Education

Ministry of Finance

Ministry of Water Resources

Ministry of Agriculture

State Environmental Protection Administration

State Forestry Administration

Chinese Academy of Sciences

China Meteorology Administration

National Natural Science Foundation

State Oceanic Administration

China Association for Science and Technology

June, 2007

The Ministry of Science and Technology and other 13 departments establish the program together for implementing the national plan.
The important task is:
The scientific issues of climate change,
The technical development of controlling greenhouse gas emission and mitigating climate change,
The technologies and measures of adapting to climate change,
The major strategies and policies for settling the climate change.

III. The status quo and trend of China's new energies development

After the financial crisis, the world is brewing a new round of industrial structure adjustment; the new economic model characterized by low carbon and green is gradually developing. At present, the climate factors are to become the major impetus of global industrial adjustment and energy revolution. The climate change will lead to another industrial revolution in human history.

Around the climate industry and low-carbon economy, it will be to establish the new global trading rules, a new energy industry structure even a new pattern of the economic development mode. The field may be to become a stage of building the new international political and economic order. It is important to note, globalization will promote the accelerated growth of the climate industry and low-carbon economy, and it will also be the new tools of the international political and economic order dominated by developed countries and the new barriers developing countries have to face.

Global Energy Development Trend

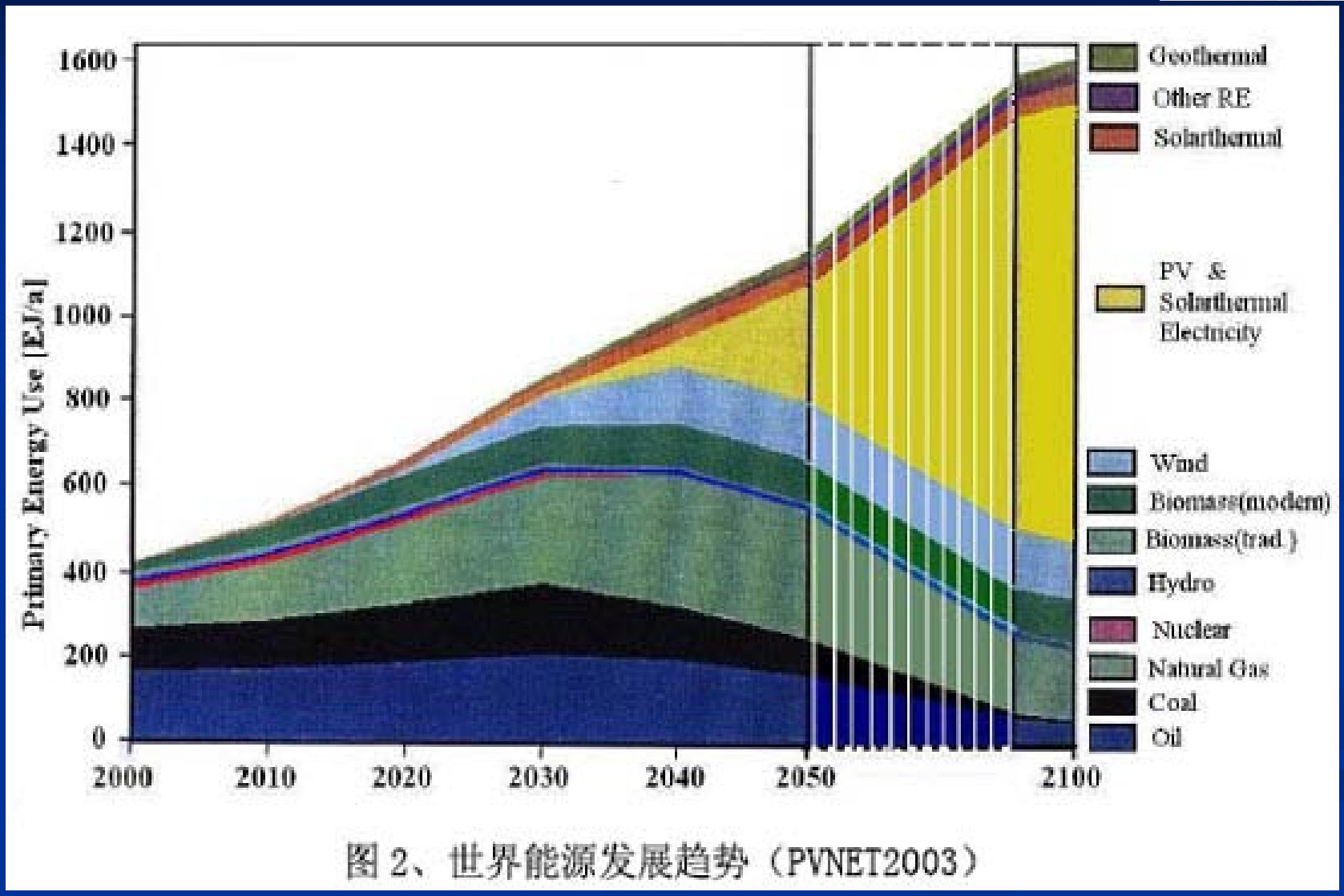
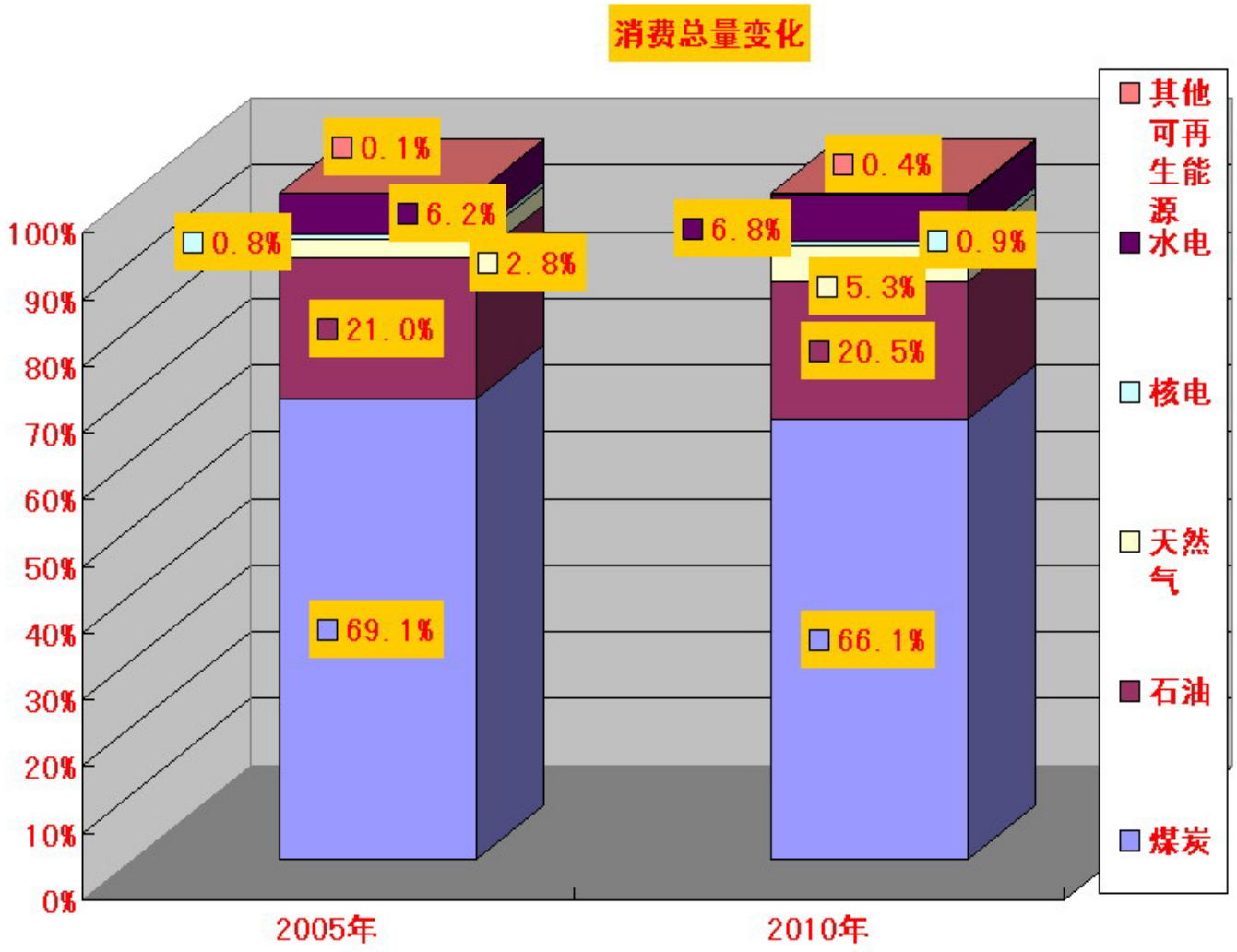


图 2、世界能源发展趋势（PVNET2003）

The Share of Renewable energy in Energy Demand

China Energy Consumption Structure Change



Other renewable energy

Hydroelectric

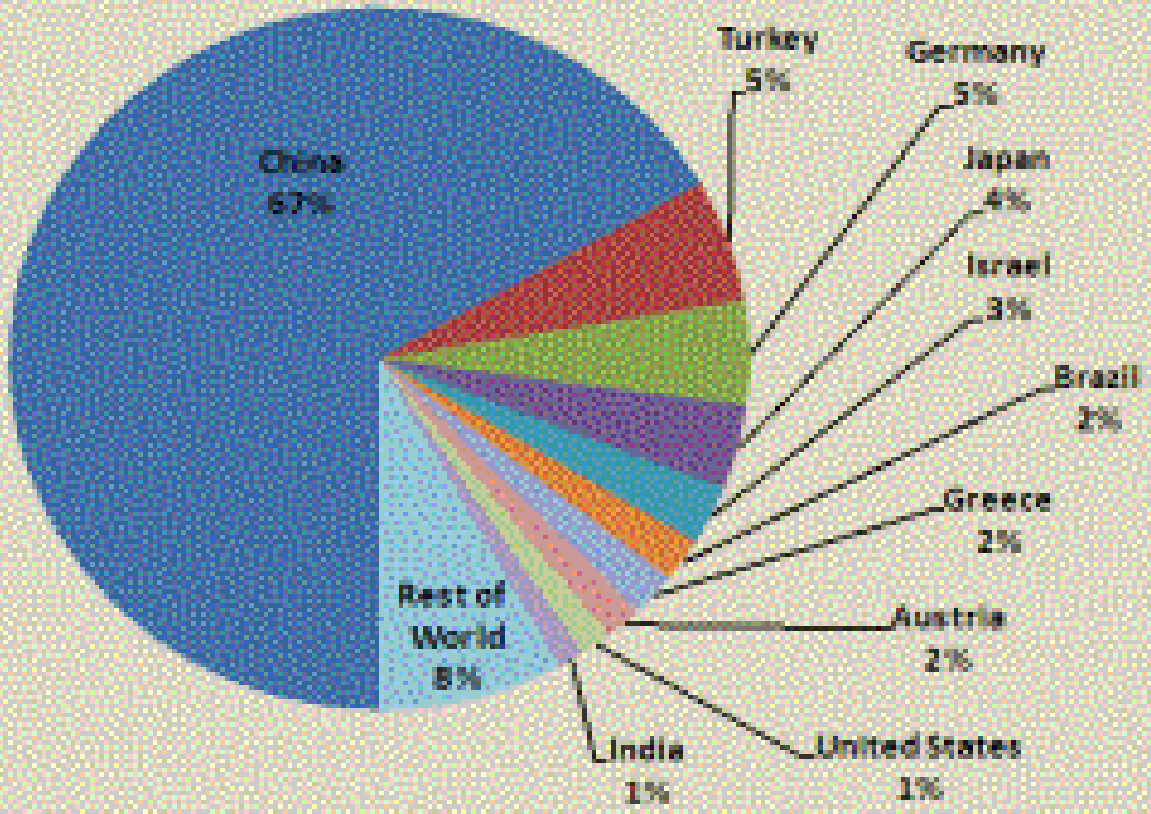
Nuclear

Natural Gas

Oil

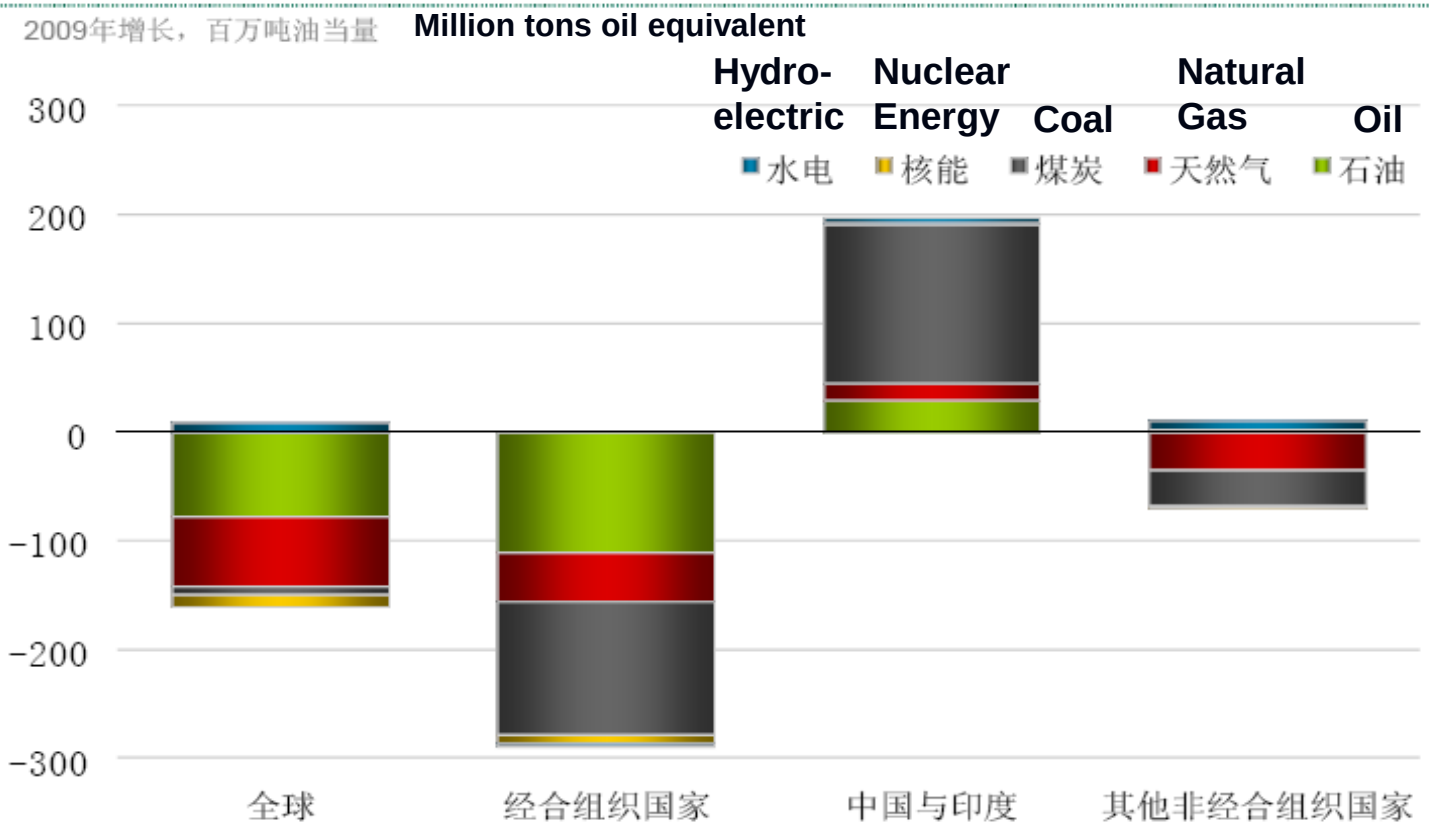
Coal

Figure 3. Share of World Solar Water Heating Capacity by Country, 2007

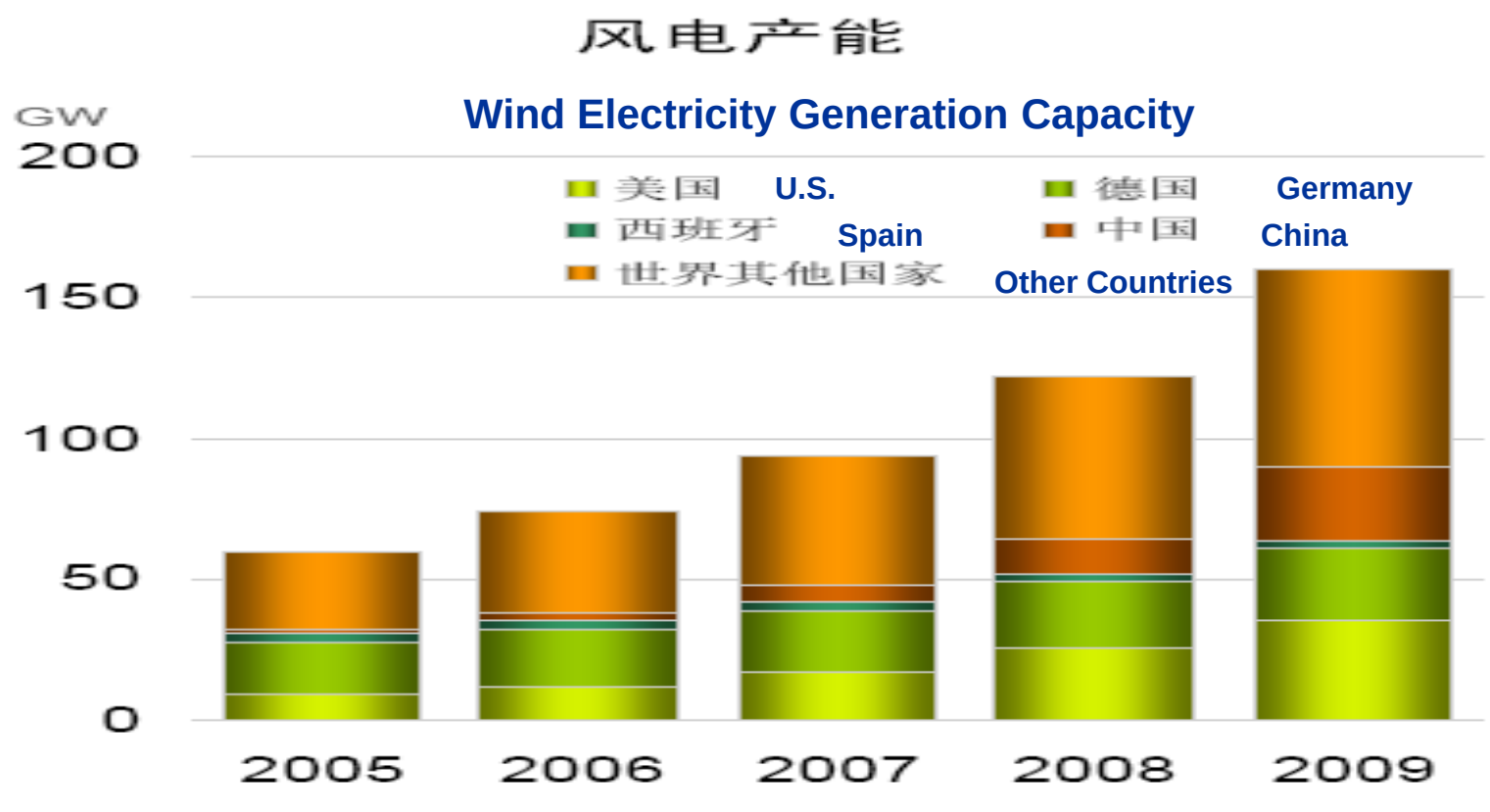


Source: IEA; REN21

一次能源消费 Non-renewable Energy Consumption



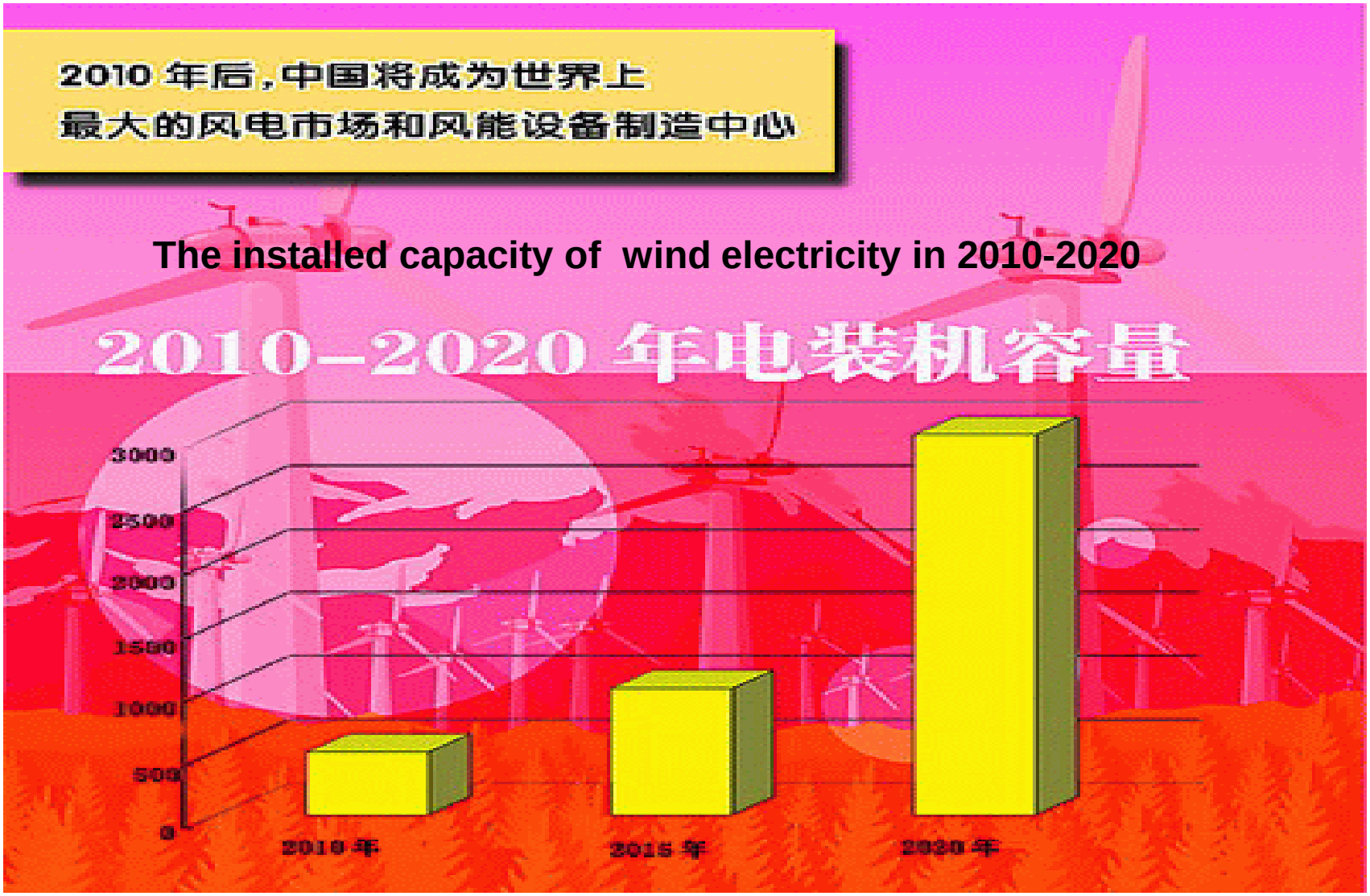
可再生能源 Renewable Energy Resources



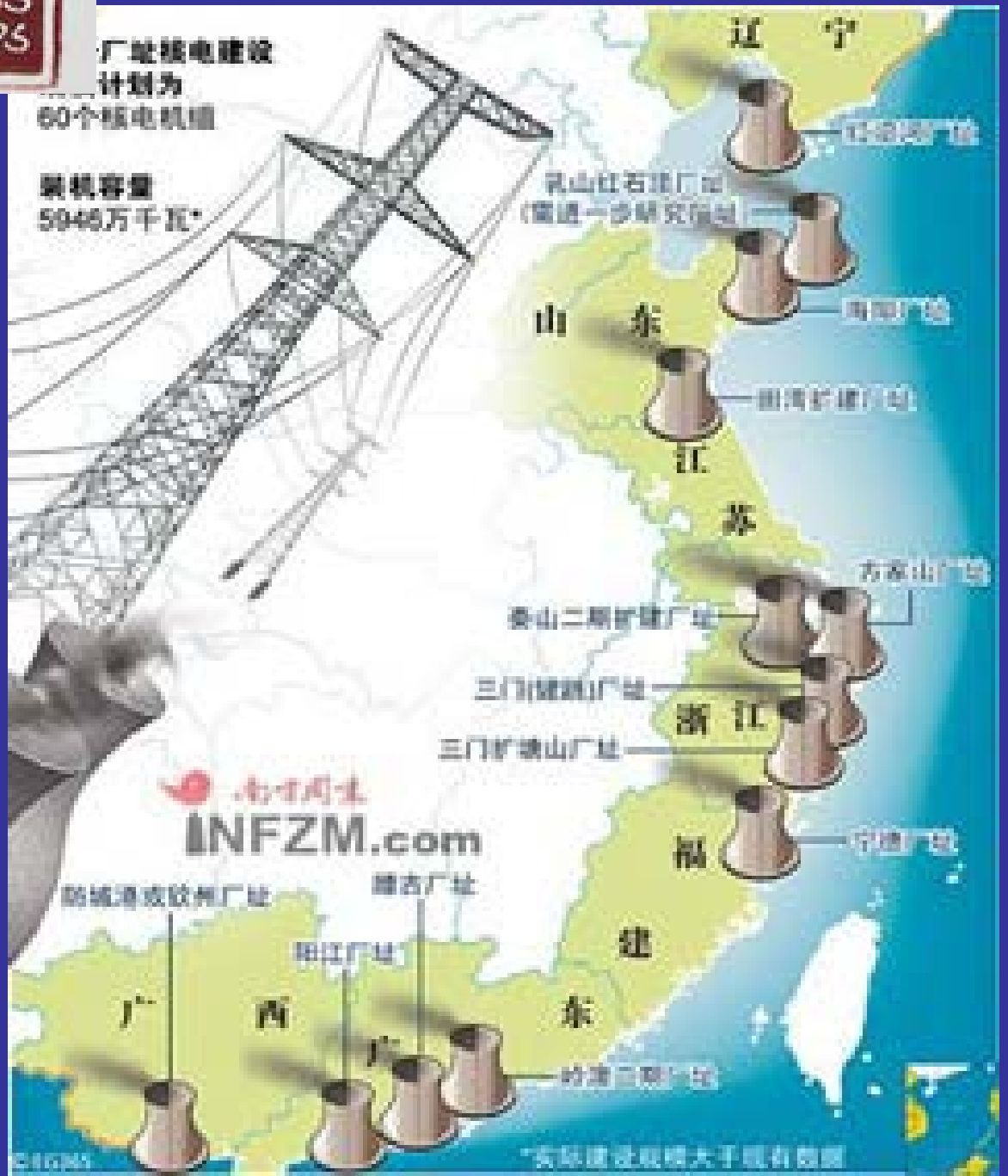
来源：包括来自于BTM Consult，美国能源信息署和德国统计分析机构F.O. Lichts的数据

BP 世界能源统计年鉴 2010

After 2010, China will become the largest wind power market and the biggest country of wind power equipment manufacturing in the world.



The installed capacity of wind electricity in 2010-2020



Nuclear plants under-construction in coastal areas: 13 sites, 60 nuclear electricity units and 59460 MW installed power-generating capacity

Nuclear Power Plant in China

核电建设项目进度设想

单位：万千瓦

	New constr.	New operat.	Become next 5 y	Total operated
Before 2000				226.8
2001-2005	346	468	558	694.8
2006-2010	1244	558	1244	1252.8
2011-2015	2000	1244	2000	2496.8
2016-2020	1800	2000	1800	4496.8

目前核电占中国装机容量的1.6%, 2020 年目标是占5%.

Source: NDRC, Medium- & Long-term Target Program on NPP, Oct. 2007.

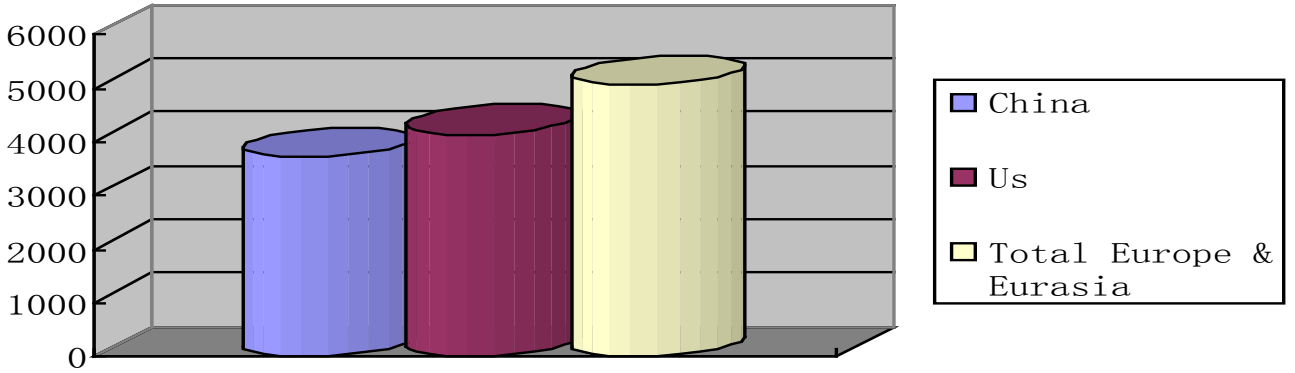
an example of Chinese electrical industry:

- At present, China's electrical network scale has surpassed the US and leaps to the world leader.
- China became the largest country of hydroelectricity's installed capacity in the world.
- The constructing scale of nuclear power is to occupy the world leader.

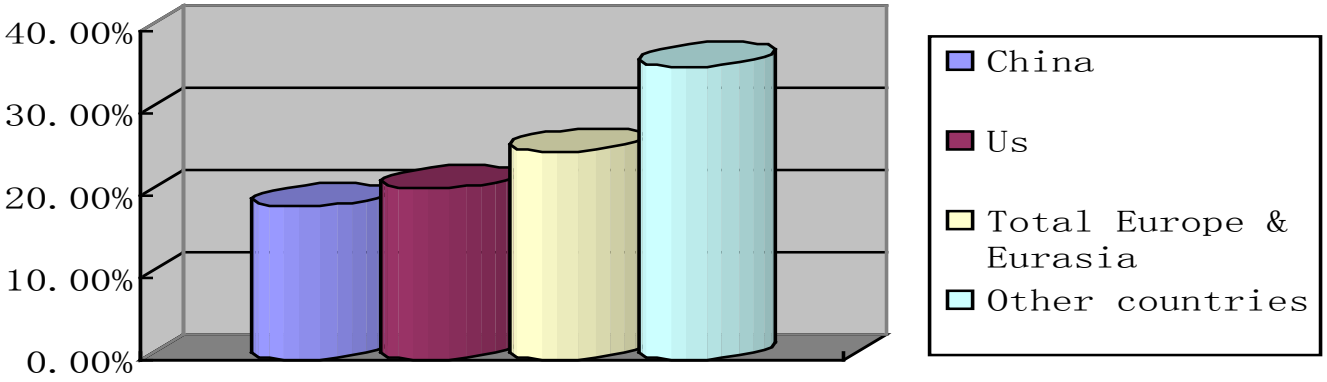
- The year 2009 is a year when the small thermal power plants with the installed power-generating capacity of 26170 MW closed. In the last four years of the 11th five-Year Plan on an accumulative basis The Chinese government has shut down the small thermal power plants about 60060 MW totally.
- The proportion of installed power-generating capacity of renewable energies such as the hydroelectricity, nuclear power, wind electricity, solar energy, geothermal energy, tidal energy and the resource, the biological energy, and such like, is getting larger. The total of installed power-generating capacity these new energies contributed is about 222 million KW.

2009 International Compare of Electricity generation

Terawatt-hours

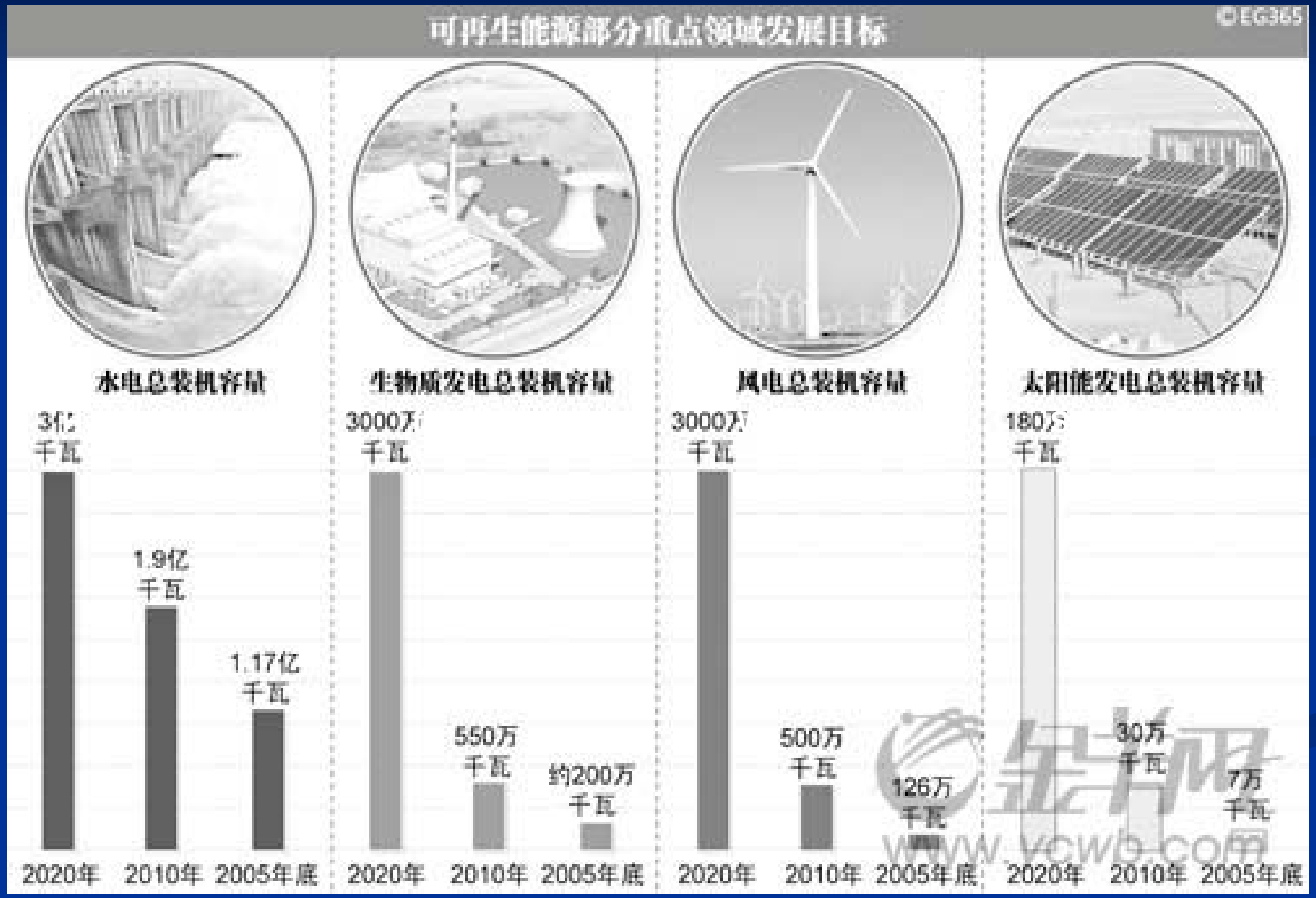


2009 share of total



Data Resource：Statistical Review of World Energy 2010

The Development Goal of Renewable Energy (KW)



The Share of China Renewable Energy Resource

Renewable energy	2008	2009	Change 2009 Over 2008	2009 share of total
Geothermal （Cumulative installed geothermal power capacity*（Megawatts）	**24.0**	**24.0**	**0**	**0.2%**
Solar （Cumulative installed photovoltaic (PV) power*） （Megawatts）	**145.0**	**305.0**	**110.3%**	**1.3%**
Wind （Cumulative installed wind turbine capacity*） （Megawatts）	**12121**	**25853**	**113.3%**	**16.1%**
fuel ethanol （Thousand tonnes of oil equivalent）	**1021**	**1024**	**0.5%**	**2.7%**

Data Resource：Statistical Review of World Energy 2010

有效开发利用煤层气（瓦斯）

To drew coal bed/mine methane

A coal bed/mine methane service car

2009年世界银行提供贷款8千万美元

Using coal bed / mine methane in public transportation

燃料电池汽车

氢燃料电池自行车。该车售价2万元 (US$2,632)，在大量生产后，可以降低4 000 元。

A Low-carbon Building in Shenzhen

Bio-gas Power Generation Device
生物质制气发电

Disen Tech. Ld. in Guangzhou
广州迪森技术有限公司

CCS in China

A CCS demonstration project of Coal-fired power plant in Beijing, China Huaneng Group

a CCS project started in Erdos, China Shenhua Group

Fuel cells and electric vehicles （Shanghai）

The Tianjin ecological City between China and Singapore

保护湿地，低碳产业，绿色交通，低碳指标，等等

Thank you very much for your patience.