

Development of Renewable Energy in China: Significance & Strategic Objectives

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1、Introduction

Research Background

- The Research is conducted in a context, where the global oil price undergoes drastic changes, energy supply tightens, and the worsening environment draws worldwide attention to renewable energies and where China is faced with increasing gap between energy supply and demand, in the meantime, energy and environment issues arouse wide concerns, and the Chinese Government launches the Law on Renewable Energy;



1、Introduction

Research Background

- **The Law on Renewable Energy went into effect on Jan. 1, 2006, followed by a number of support laws and regulations. Industries such as wind power, biomass energy and solar energy have been advancing faster than expected. Many problems arise, in particular, early presentations of hasty profit-oriented projects, inappropriately planned work that rushes into implementation, and out- of- order while ignoring the availability of resources.**



1、 Introduction

Purposes of Research:

- To provide the state with strategic recommendations on macro decision-making regarding development of renewable energies;
- To provide businesses and investors with policy directions;
- To provide scientific references for the healthy and orderly development of renewable energies in China.



1、Introduction

Organization

■ Institution in Charge:

CAE officially launched the key consultation program of China Renewable Energy Development Strategy Research in Oct., 2005. relevant CAE divisions as Energy and Mining Engineering, Agriculture, Environment, Light and Textile Industries Engineering, Civil, Hydraulic and Architecture Engineering, and Engineering Management, along with over 20 CAS academicians have been involved;

■ Participation of more than 100 experts from dozens of research institutions, universities, businesses and academic societies.



1、Introduction

Organization

- Support and assistance from Office of National Energy Leading Group, Energy Bureau of National Development and Reform Commission, Department of Economic Development, Ministry of Finance, Department of High and New Technology Development and Industrialization, Ministry of Science and Technology, Rural Electrization Bureau, Ministry of Water Resources, and many other governmental departments;
- Most of the experts participating IVA-CAE Renewable Energy and Environment Project are involved in the consultative research.



1、Introduction

Division of Research Fields

- **Technical Subjects in Renewable Energy Research:**
 - ◆ **Wind Energy: Led by China Renewable Energy Society;**
 - ◆ **Solar Energy: Led by Tsinghua University;**
 - ◆ **Biomass Energy: Led by China Agricultural University;**
 - ◆ **Hydro-energy: Led by China Hydro Power Society;**
 - ◆ **Ocean & Geothermal Energies: Led by Energy Research Institute, National D&R Commission;**
- **Comprehensive Development & Policy Study:**
 - Led by Energy Research Institute, National D&R Commission.**



1、Introduction

Research Achievement

- Through two years' hard work, experts formulated the comprehensive project research report on the basis of survey and analysis, academic exchange, professional forums, subject research results, and over ten rounds of review and modification. Main contents of Report include strategic significance of renewable energy development; resource conditions and development potentiality; orientations for rational development and utilization; development objectives and technical road map; possible problems encountered in renewable energy development and assurance measures; and important recommendations on renewable energy development, etc.



1、Introduction

Research Achievement

- **One General Report: Consultative Report on China Renewable Energy Development Strategy Research**

(Full and abridged versions will be submitted to the State Council and other related departments)

- **Five Specialized Technical Reports:**

Including Hydro-energy, Wind Energy, Biomass Energy, Solar Energy, Geothermal and Ocean Energies.



1、Introduction

Innovative Points

- A comprehensive and systematic research into China's renewable energy development strategy;
- Preliminary understanding of China's renewable energy resources. For example, proposing a new idea and data that wind energy resource is on the land greater than it on the ocean, correcting some previous understanding;
- Applying an integrated analysis method combining technological instrument, economic instrument and environmental instrument, paying more attention on the entire production chain;
- Proposing a number of novel strategic ideas and recommendations.



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2、 Significance of Developing Renewable Energy in China

World Renewable Energy Development : Trend I

Governments of many countries are paying high attention to renewable energy development

■ On the eve of the 21st Century, energy security and environmental protection are becoming global issues. Governments of many countries are paying high attention to development of renewable energies, regarding which as a major measure to relieve energy supply-demand gap, reduce green-house gas emission, and a response to climatic change;

◇ EU points out that by 2020 and 2050 consumption of renewable energies will have made up 20% and 50% in total energy consumption;

◇ US points out that by 2030 wind power generation will have reached 20% of total electric power capacity, and bio-fuel will have replaced 30% of fossil fuels;

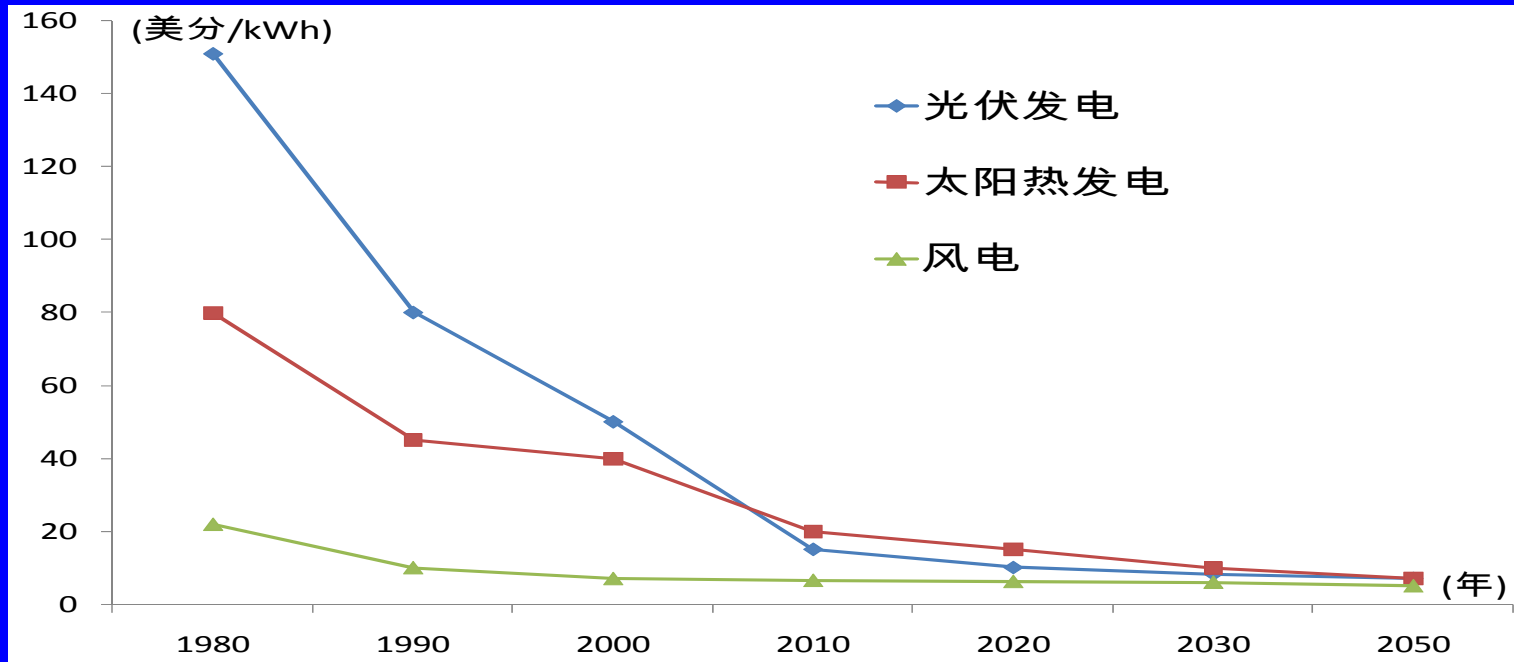
◇ Japan points out that by 2050 substitute energies such as renewable energy will have accounted for over 50% of energy supplies in Japan;

◇ Developing countries such as Brazil and India have also posed magnificent targets for renewable energy development.

2、 Significance of Developing Renewable Energy in China

World Renewable Energy Development : Trend II

Major advances in renewable energy R&D and equipment production lead to constant lowering of costs.



Lowering trend in costs for renewable energy generation in the world

(Source: Integrated World Development Roadmap)



2、 Significance of Developing Renewable Energy in China

World Renewable Energy Development: Trend III

The technologies are maturing, progress speeding up, and the scale keeps growing.

World Renewable Energy Development: Trend IV

Principal part and scale for investment continue to rise.

World Renewable Energy Development: Trend V

Policy support still acts as one of the leading drives for renewable energy development.



2、 Significance of Developing Renewable Energy in China

■ Rapidly Growing of Energy Demand

□ Total energy consumption reached 2.46 billion tce in 2006 in China, breaking the 2020 forecasting made by several Chinese and foreign institutions.

■ Grave Situation in Energy Supply

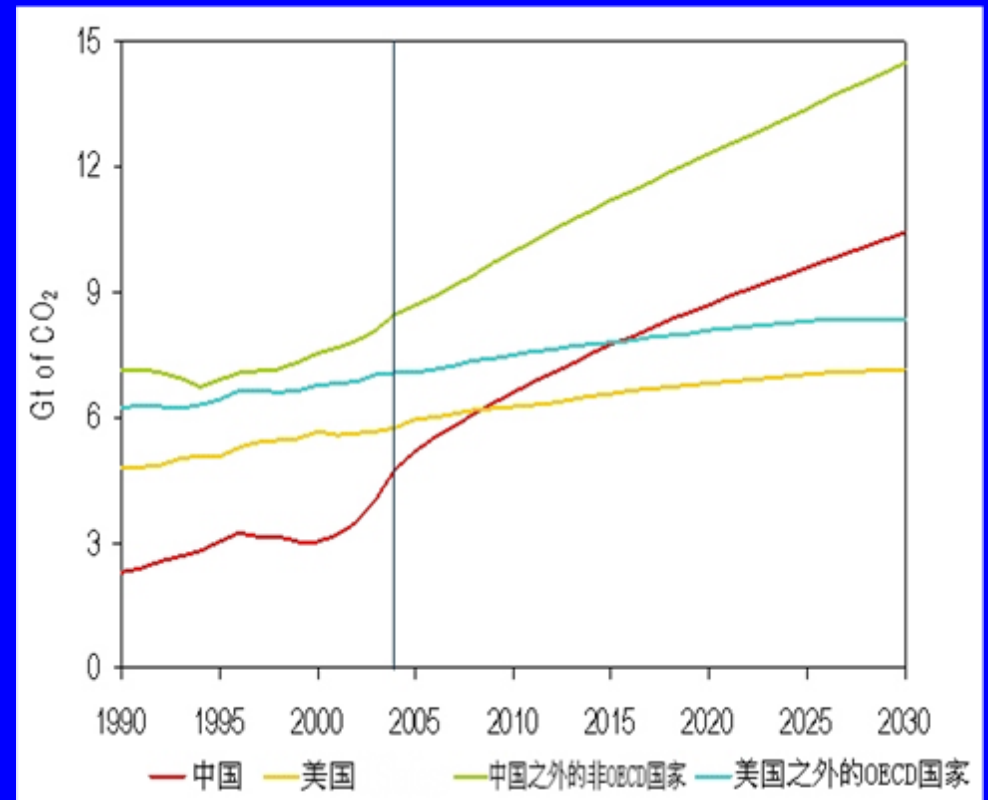
□ The energy reserve, production capacity and ensuring ability which sustain for China's economic development are in a critical state.

■ Increasing Environmental Pressure

□ Coal-burning fugitive dust pollution
□ Green-house gases emission reduction

Trend in Global CO₂ Emission in Reference Scenario, 1990-2030

(Source: World Energy Outlook 2006, IEA)





2、 Significance of Developing Renewable Energy in China

Significance of Developing Renewable Energy in China:

- Necessary for building an energy-saving society;
- Necessary for adjusting energy structure and assuring energy security;
- Necessary for new China's rural development;
- Necessary for protecting ecosystems, environment and reducing emission of green-house gases;
 - *Development of renewable energies should be considered as one of the two major measures to reduce green-house gas emissions as well as a strategic response to the issue of climate change*
- Necessary for exploring new areas for economic growth.



2、 Significance of Developing Renewable Energy in China

Conclusion about Significance for Development:

As socio-economic development marches forward at quick pace, constraints over sustainable development due to energy and environment are becoming increasingly tight.

It is crucial to saving energy to develop clean energy technologies and to quicken development and use of renewable energies in order to optimize China's energy structure, bridge the gaps in the conventional energies and protect the environment, which is also an inevitable approach to sustainable development.



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- Based on the current trend and the forecast analysis findings, the mid- and long-term energy demands should reach:

Year	2010	2020	2030	2050
Energy Demand (Unit : Billion tce)	3.0	3.5	4.2	5.0



- **Four measures to increase energy supplies and assure energy security effectively:**
 - **Save energy, control total consumption;**
 - **Explore conventional energies such as hydro energy, coal, petroleum and natural gas as well on the basis of domestic conditions;**
 - **Expand international cooperation, utilize international resources (mainly petroleum and natural gas) effectively;**
 - **Make potent efforts to develop and use nuclear energy and renewable energies.**
- **As one of the two measures for green-house gas emission reduction, renewable energy development serves as two basic points for the energy strategy in response to climate change, along with enhancing energy efficiency.**



Near Future – Around 2010

■ Near Future – Around 2010:

Non-hydro renewable energy are meant to be supplementary, meeting 60 million tce energy, amount to 2% of the total energy demand. With hydro energy on the account, renewable energy will supply about 0.29 billion tce, nearly 10% of the national total energy demand.



Medium Term – Around 2020

■ Middle Term – Around 2020:

Non-hydro energy will turn into a substitute sector, providing 0.18-0.33 billion tce, about 5-10% of the national total demand. It will go up to 0.54-0.69 billion tce when hydro energy is included, satisfying about 15.5-19.7% of the national total energy demand.



Long Term – Around 2030

■ Long Term – Around 2030:

Non-hydro renewable energy will become one of the mainstream energy supplies, contributing 0.4-0.8 billion tce, about 10-19% of the national total energy demand. With the share of hydro energy included, renewable energy will offer 0.86-1.26 billion tce, meeting about 20-30% of the national total energy demand.



Far Future – Around 2050

■ Far Future – Around 2050:

Renewable energies should strategically be one of the leading energy supplies, delivering 0.88-1.71 billion tce, reaching to 17-34% share of the national total demand or even higher. The supplies reach about 1.32-2.15 billion tce when the contribution of hydro energy is added, and providing 26-43% of the national total energy demand.



Effect of renewable energy development on greenhouse gas emission reduction based on middle – level plan.

Year	2010	2020	2030	2050
Reduce Emission (BIL TON)	0.7	1.2	2.0	4.0

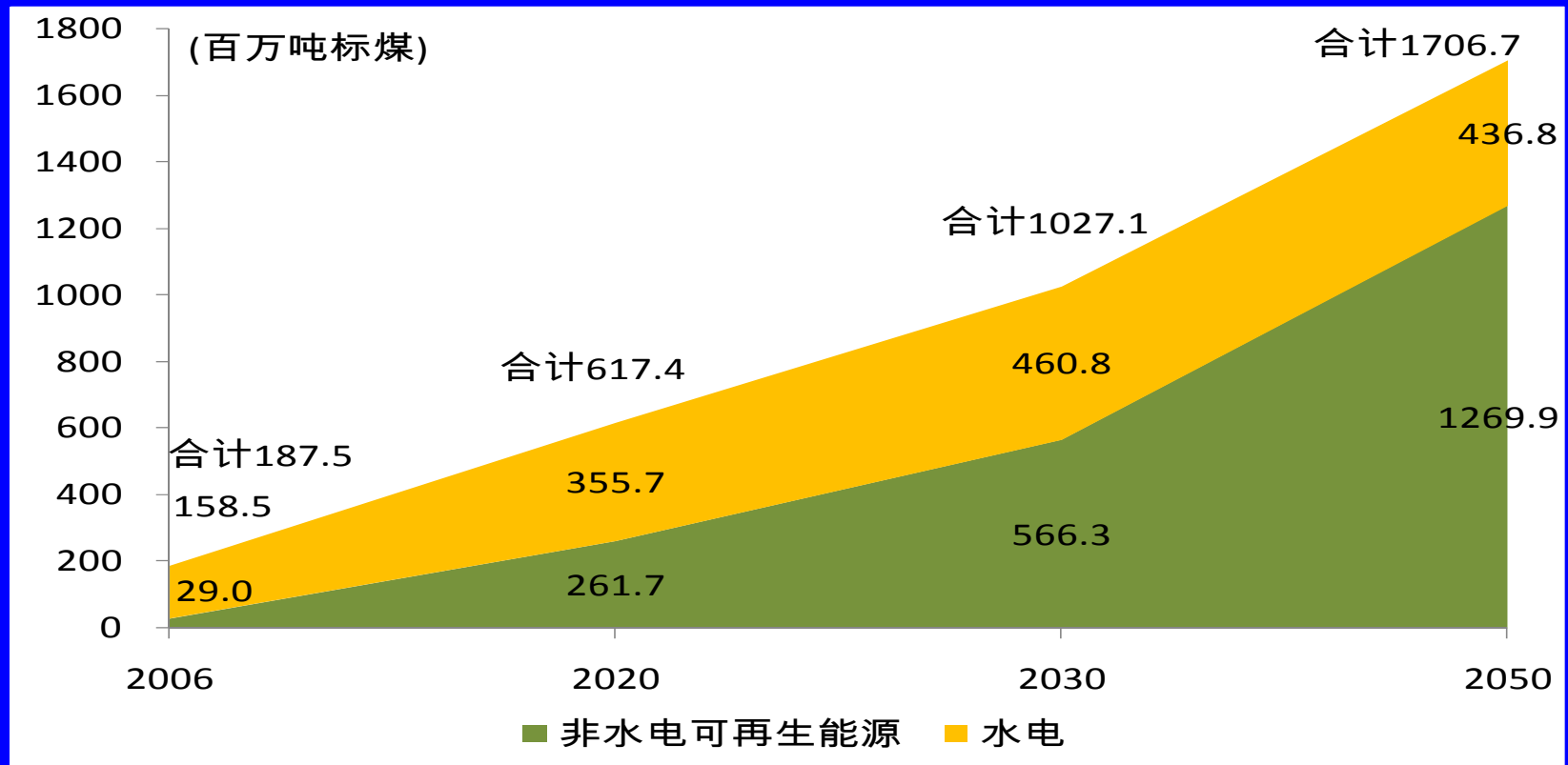
Help to reduce coal-burning air pollution and improve air quality considerably.



Intermediate Prediction

- By 2020, total utilization of renewable energies reaches 0.62 billion tce, of which hydro-energy contributes 58%, biomass energy 19%, solar energy 14%, wind energy 8%, and other energies 1%;
- By 2030, total utilization of renewable energies reaches 1.0 billion tce, of which hydro-energy contributes 45%, biomass energy 23%, solar energy 19%, wind energy 11%, and other energies 2%;
- By 2050, total utilization of renewable energies reaches 1.7 billion tce, of which hydro-energy contributes 26%, biomass energy 20%, solar energy 34%, wind energy 18%, and other energies 2%.

Summary of Objectives for China Renewable Energy Development



Trend in Development of Hydro- and Non-hydro Energies in China
 (Calculated by the intermediate protocol)



4. Conclusions

Step by step, renewable energy in China is to develop from their current supplementary position to substitute, mainstream and leading energy supplies and act a fundamental role in environment protection!

Thanks for your attention!

