Analysis on Long-Term Mechanism for Energy Conservation and New Mechanism of China

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Abstract. The government must handle the relation between energy conservation and development in promoting the energy conservation. China is a developing country with a large population, and development has been a prior strategic mission for China for a long time. The energy conservation is an important tool to promote the development, gain better development and serve the development. In promoting the energy conservation, the government shall provide stronger support for the advancement of energy-saving technologies in R&D, engineering demonstration and application, promote innovation for energy conservation technologies and application of energy conservation technologies in industries, develop hi-tech industries and energy-saving industries to help enterprises improve their energy-saving technology level, build a energy-saving industrial system, greatly increasing the competitiveness of national economy and using energy conservation to promote the economic development and scientific development.

1. Introduction
To establish a long-term mechanism for long-term mechanism, the position of energy conservation in the social-economic development must be clarified first, based on this, the energy-saving principles to be followed in energy-saving are determined[1].

China has enormous potential in energy conservation, and the potential is a kind of very precious invisible clean energy resources, and the most part of the potential is more economical than conventional energy resources. The government needs to keep the exploration of energy conservation resources in the energy development plan, plan as a whole, prioritize the exploration of energy conservation resources and provide support in energy-saving industrial policies, investment policies, and credit policies[2,3]. The energy problem is, ultimately, an economic problem. The prerequisite of energy conservation is to improve the economic efficiency of energy utilization, which means gaining big economic benefit while investing minimum energy resources. The energy conservation and consumption reduction shall focus on improving the energy utilization efficiency. The government needs to regulate and allocate energy resources and other resources to economic fields with high energy input-output ratio, and restrain and control the blind expansion of economic sector with low energy input-output ratio, use the energy conservation to promote the transformation of economic growth pattern and strive to support sound and sustainable economic development with reasonable energy consumption growth.
2. Principles for Promoting Long-term Mechanism for Energy Conservation and Improving Energy Efficiency

2.1. Using both market mechanism and government regulation
There are two modes, i.e. the Japan mode and Europe and US mode, for energy conservation management for governments in market economy countries. The two modes use both the market mechanism and the government intervention. The energy conservation and emission reduction in China is a large social system engineering that requires strong support and promotion from the government. China has basically established the socialist market economy system, and the system is gradually revealing its fundamental role in allocating resources. Therefore, the government must strengthen the macro control and guiding policies for the energy conservation management mode and use the energy conservation mechanism of the market to provide a system, policies and market that are good for the energy conservation.

2.2. Applying laws and incentive policies
With the continuous progressing of the socialist democracy and legal system, the government performs the energy conservation management by laws has become an objective requirement of the era. In addition to administrative means, the government need to focus on making laws and regulations and basic and major energy conservation system for energy conservation, carry out energy conservation management by laws, regulate and restrain the energy consumption behaviors of enterprises and the whole society by laws, strengthen the law enforcement and earnestly enforce laws and regulations on the energy conservation. Because the energy conservation sector may experience a lot of market failures, the socialist economy system is imperfect and there are so many obstacles in investment, technologies and information for the energy conservation sector, in addition to performing energy conservation management by laws, the government needs to strengthen and improve the fiscal and taxation policy and price policy, use these policies and laws and regulations to guide and encourage enterprises and residents in the energy conservation[4]. Energy consumption elasticity coefficient in China as figure 1 and detail data in table 1 below.

![Figure 1. Historical Energy Consumption Elasticity Coefficient in China.](image-url)
Table 1. Energy Consumption Elasticity Coefficient in Several Typical Periods.

| Year       | GDP growth rate | Growth rate of energy consumption | Energy consumption elasticity coefficient |
|------------|-----------------|-----------------------------------|------------------------------------------|
| 1978-2005  | 9.7%            | 5.4%                              | 0.56                                     |
| 1980-2005  | 9.8%            | 5.6%                              | 0.57                                     |
| 1990-2005  | 10.2%           | 6.0%                              | 0.59                                     |
| 2000-2010  | 10.5%           | 8.4%                              | 0.80                                     |
| 2000-2013  | 10.0%           | 7.6%                              | 0.76                                     |
| 2005-2010  | 11.2%           | 6.6%                              | 0.589                                    |
| 2011-2013  | 8.2%            | 4.9%                              | 0.594                                    |

2.3. Highlighting key points along with overall progress
First, the industrial sector is the largest energy-consuming sector, and the industrial sector has the biggest potential in energy conservation and is a key sector for the government to manage the energy conservation. Good energy conservation performance in the industrial sector ensures a success in the nation-wide energy conservation[5]. As the energy consumption in building and transportation sector is increasing rapidly, the government needs to strengthen energy conservation in the industrial sector and building and transportation sector. As the energy consumption in key energy-consuming enterprises in the industrial sector such as the steel, non-ferrous metals, coals, electric power, petrochemicals, building materials accounts for a great part of the overall energy consumption in the industrial sector, it is very important for the government to manage the energy conservation in these energy-consuming enterprises. Besides, the energy consumption of medium and small-sized enterprises have reached nearly 50% of the overall energy consumption in the industrial sector, but the energy efficiency of them is lower than that of key energy-consuming enterprises. Therefore, medium and small-sized enterprises have larger potential in energy conservation than key energy-consuming enterprises. The government must highlight the energy conservation in both key energy-consuming enterprises and medium and small-sized enterprises, with the progress of 13rd five-year energy conservation target promotion, average annual energy consumption growth in 100 million TCE decreased by year. The figure 2 show the change of the annual energy consumption growth averagely at different periods.

![Figure 2. Historical Energy Consumption Elasticity Coefficient in China.](image)

2.4. Controlling the source and discovering the potential in energy conservation
As the industrialization and urbanization will last for a long time in China, the production capacity and living standards will continue to be increased rapidly. There is considerable energy conservation potential in the new production capacity and living consumption, and improving the energy efficiency by formulating energy conservation standards requires small investment and works very rapidly. Currently, the energy efficiency is low in our existing production capacity and living standards, which
provides the largest energy conservation potential in China. The source control shall be strengthened. Bigger efforts shall be made to fully explore the energy conservation potential in the stock production equipment and energy-consuming equipment for living.

3. Main path to reach the energy conservation target

The energy conservation indicator highlighting GDP energy consumption is a comprehensive reflection of the economical structure, growth pattern, scientific and technological level, management capability, consumption model and the populace's cultivation of a country. The government on behalf of public interest should work hard on energy conservation. With regard to the energy conservation, the government must take combined measures to proceed and team up with other parties.

3.1. the economic structure should be adjusted

Energy conservation is not just microcosmic issue. It is a macroscopical matter in the first place, i.e. economic structure. In the long run, the government at all levels and enterprises rely too much on the secondary industry for economic growth, and are lacking in experience in developing the tertiary industry with low energy consumption. At present, although the proportion of tertiary industry is just over that of the secondary industry, we should keep learning and accumulate experience in how to develop service industries (like catering, television, file, advertisement, education, medical treatment and nursing) and new service mode (production servicing business), as well as how to make the service industry bigger and stronger. From the perspective of internal industrial structure, we rely too much on heavy industry for a long time, but we are lacking in experience in how to develop modern industries (like electronics, communication and Internet) and how to develop strategic emerging industries (like energy conservation, environmental protection, electromobile, semiconductor lighting and modern medicine). To solve the energy conservation issue, efforts should be made on the adjustment and optimization of economic structure in the first place, and the over dependence of the economic growth on energy consumption should be reduced through raising the proportion of the tertiary industry and modern manufacturing continuously.

3.2. technical advance should be applied

There is a big gap between the energy consumption indexes of unit products in China and the international advanced level. In order to narrow down the gap, the energy use efficiency should be improved mainly through the technical advance, and scientific & technological innovation capacity in energy conservation should be strengthened. The government should be responsible for subsidizing the R&D and popularization of major energy-saving technologies that have in common.

3.3. the management of energy conservation should be strengthened.

Currently, the management of energy conservation is weak regardless of production, circulation and consumption. Energy waste and leak are still prevalent. The management should be strengthened. Also, the energy conservation management system should be established, with specific goals, responsibilities in place and clear award & punishment.

3.4. Energy conservation should be done through deepening the reform

There are prominent problems on the promotion of energy conservation systems and mechanisms: There is neither energy price formation mechanism that can reflect the resource scarcity, supply & demand and environmental cost as well as can effectively restrain unreasonable consumption and waste, nor fiscal and tax policy system that encourages the production & use of energy-efficient products and develops energy-conserving building, or stable investment mechanism that supports energy conservation and consumption reduction. Systems, mechanisms and policies conducive to energy conservation should be established through deepening the reform and improving policies.
3.5. Rule of law should be strengthened to save energy
At present, the legal system on energy conservation is not complete, and the subject of law enforcement is not definite; non-compliance with law and undemanding law enforcement are prevalent. The energy conservation measures and beneficial experience from practice and reform should rise to laws and regulations; a batch of laws and regulations should be formulated and amended; energy conservation laws, regulations, and standard systems involved should be further improved. Law popularization and law enforcement examination should be strengthened, so as to create a good environment of energy conservation by law.

4. Promote the Long-Term Mechanism of Energy Conservation
With regard to the promotion of energy conservation in the 13th Five-Year Plan, the government should not only think about the current situation, but also work out policies and measures that can push forward the energy conservation in the near future, accelerate the establishment of complete energy conservation and consumption reduction promotion policies and systems that can adapt to national conditions and requirements of socialist market economy system, thus supporting the energy conservation targets from many perspectives and laying a solid foundation for long-time and continuous implementation of energy consumption tasks.

From the macroscopical frame of creating an energy-saving and long-term mechanism, consideration on six aspects should be taken into account for the promotion of energy conservation work in China: First, strengthen the ecological civilization construction concept as well as energy conservation and emission reduction awareness; second, consolidate the construction of laws, regulations and standards on energy conservation; third, improve the construction of government management system on energy conservation; fourth, improve economic support policies for energy conservation in many ways; fifth, strengthen the policy support for the technological innovation and application of energy conservation; sixth, implement major actions against important energy conservation approaches.

4.1. Strengthen the ecological civilization construction concept as well as energy conservation and emission reduction awareness
In the face of increasingly severe environmental pollution, apart from attaching the importance to the treatment of environmental pollution by the central government, it is suggested to put more emphasis on the synergistic effect of energy conservation on the reduction of pollutant emission, take the energy conservation as an important source to declare a war against the environmental pollution, stick to driving forward the energy consumption reform with a firm resolution; the goal should be quantified, measures strengthened and punishment strict; in addition, all areas, industries and major energy-consuming enterprises should be encouraged to work hard on the energy conservation targets set out by the government above the quota.

4.2. Accelerate the improvement of laws, regulations and standard systems on energy conservation
The task of establishing a resource-saving and environment-friendly society should be taken as a goal; the legal construction of energy conservation should be sped up, and legal & regulatory system with the Energy Conservation Law of the People’s Republic of China as the core, so as to provide effective legal guarantee for pushing forward energy consumption reform, controlling the total energy consumption, implement priority strategies for energy conservation, and promote the energy use efficiency.

The establishment and improvement of energy conservation regulation should be accelerated. In combination with the modification of Energy Conservation Law of the Energy Conservation Law of the People’s Republic of China, the establishment and improvement of energy conservation regulation should be accelerated. It is suggested to formulate and revise energy conservation monitoring rules, energy conservation assessment rules for fixed assets investment, advanced rules for energy-saving technologies, management rules for electric power demand side and others by the State Council or
departments concerned of the State Council. The revision of local energy conservation regulations should be sped up. All provinces and cities should expedite the revision of local energy conservation regulations in combination with the revision of the Energy Conservation Law of the People's Republic of China and prominent problems on the implementation of national and local energy conservation regulations during the examination of law enforcement for energy conservation, as well as by referring to the advanced experience of other areas.

4.3. Improve and strengthen the construction of government management system
The energy conservation and emission reduction is a large social system engineering that requires strong support and promotion from the government. In this way, it is required to complete the system of government energy conservation management organization, specify and strengthen its functions, and allocate personnel, so as to give a full play to the leading role of government on energy conservation and emission reduction, work hard on organization, coordination and driving of energy conservation, and ensure the realization of energy conservation and emission reduction.

4.4. Speed up the issuance of economic policies on energy conservation
It is suggested to further give a play to the decisive role of the market, and accelerating the improvement of economic policies in energy conservation. Such as improve energy-saving pricing policy, strictly implement the differential electricity price, penalty electricity price & residential tiered electricity and gas prices, study tiered price of industrial, commercial & service electricity based on energy consumption standards, and strictly organize locally issued preferential electricity price policy for heavy energy-consuming enterprises. Work hard on the investment within the budget of the central government and the investment of special fund in energy conservation by the Ministry of Finance, integrate the special fund for energy conservation, link the fund allocation with tasks and work performance, and improve the efficiency of fund use. Implement taxation reducing policies for contract energy management projects. Speed up the reform of resource tax, and change the resource tax of coal as “taxation according to price”. Try to levy energy tax or coal tax as early as possible. Implement green financing, support listing of eligible energy-saving equipment manufacturing enterprises and service enterprises, and support their issuance bonds for financing. Carry out blacklist system against the energy conservation performance of enterprises, and enable sharing of energy conservation information among financial institutions.

4.5. Implement major actions against energy conservation
With regard to pushing forward the energy conservation in the 13th Five-Year Plan, the government should not only work hard on the layout of laws & regulations, management organization, economic policies, and technical advance, but also implement major actions against important energy conservation approaches for “the 13th Five-Year Plan”, strive to conserve major energy, and provide solid support and strong guarantee for the realization of national energy conservation target. Figure 3 shows that total energy savings of the whole society in China from 11th FYP to 13th FYP.
5. Conclusion for Energy Conservation System to be Established

5.1. “Double Control” System for Energy Consumption Intensity and Total Consumption
The control goal of total energy consumption should be raised in the five-year plan, and included in the five-year plan of national economy and social development. Given that economic development of all provinces (autonomous regions and municipalities directly under the central government), requirements on control goal of total air pollutants emission, local energy conservation potential, development & planning of fossil energy base, the energy consumption intensity and total consumption should be broken down to each province (autonomous region and municipality directly under the central government). In combination with current energy conservation assessment and audit platform of fixed-asset investment, budget system of energy consumption and trading system of energy consumption right should be created, so as to combine the control goal of total energy consumption in each area with the issuance and withdrawal of enterprises’ energy consumption right, and enhance the operability of control policies for total energy consumption.

5.2. Energy Efficiency top runner regulations
By referring to the advanced experience in Japan, new mechanism should be studied, so as to continue to encourage final energy consumption equipment manufacturers to invest the R&D of advanced energy conservation technologies and develop advanced products with higher energy efficiency. The energy efficiency standard updating mechanism for end-use energy-consuming products should be improved. While product standards are released, the exact time and date for elevating the minimum energy threshold should be specified, so as to force all equipment manufacturers to improve the energy efficiency. The third party agencies should be arranged to investigate the energy efficiency of final energy consumption equipment implementing leader system in an overall and objective way on a yearly basis, track the energy efficiency improvement, and issue the investigation results. Independent, objective and just platform that can test the energy efficiency of final energy consumption equipment; and test methods should be improved to support the detection of energy efficiency. Free public service advertising time should be allocated to national energy efficiency leading products during the prime time on CCTV, so as to build an excellent platform for free publicity for energy efficiency leaders, and enable them to obtain more real economic benefits.

5.3. Energy Conservation Fund Support System
The energy conservation fund support system should be developed, to be more specific, establish special funds such as energy-saving renovation project financing guarantee funds, energy-saving...
service enterprise venture capital funds, so as to provide interest subsidies for energy conservation projects or enterprise loans. For those who get loans from commercial banks, energy conservation foundation can provide a guarantee. Funds can be sourced from seed money subsidized by the government or attracting social funds, and the funds operation should be managed through professional marketing operation team, so as to support energy efficiency financing and mitigate enterprises’ problems of energy conservation financing.

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