

Policies and Standards for “Double Control” of Total Energy Consumption and Energy Intensity

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Abstract: This paper introduces the background of goals regarding “double control” of total energy consumption and energy intensity, sorts out policies regarding “double control” action and their implementation, and points out that the standards for “double control” are efficient for the realization of “double control” goals. This paper also analyzes the shortcomings of standards for “double control” and gives some suggestions on the construction of the standard system for “double control” considering the demands of standards for “double control” and current status of the energy conservation standardizations in China.

1. Introduction

With the rapid development of the global economy, large amount of greenhouse gas (GHG) emissions caused by great energy consumption further aggravate the global warming and ecological environment problems. Thus, reducing carbon emission has become a hot topic of common concern across the globe. China is now in a critical period to upgrade its industrial structure. As the economy rapidly develops, demand for energy remains high. For one thing, the ecological and environmental problems caused by excessive resource acquisition and energy use are getting worse. [1]China is among the list of countries with the highest carbon emissions, facing increasing pressure in emission reduction. For another thing, China depends heavily on foreign energy sources due to shortage of energy, which seriously affects its energy security. As a result, for China, controlling energy consumption and improving the energy situation are effective ways to cope with global climate change and restriction of domestic resources for rapid economic development. The “double control” of total energy consumption and energy intensity is a new attempt to deal with climate change, improve the energy situation and promote the energy conservation and emission reduction.[2]

2. Policies and Actions regarding “Double Control” of Total Energy Consumption and Energy Intensity

To accelerate the realization of the “double control” goals specified in the 13th Five-Year Plan, the Chinese government has enacted a series of relevant policies and action plans, carried out a variety of pilot demonstration actions, and proactively drew lessons therefrom, laying

solid foundation for comprehensive and effective promotion.

2.1 Pilot of System of Paid Use and Trading of Energy Use Rights

The energy use rights refer to the right of an enterprise to directly or indirectly use the total consumption amount of various energy sources (including power, coal, coke, steam, natural gas and other energy sources) in the year. Paid use of energy use rights refers to an enterprise shall obtain energy use right quota in accordance with the law under the premise of budget management of total energy consumption. Meanwhile the enterprise shall pay for the energy use right quota as required.

During the 12th Five-Year Plan period, Yantai of Shandong, Haining of Zhejiang and other places started their attempt of applying the paid use of energy use rights, with initial achievements made and many challenges encountered. These challenges mainly include methods for verification of energy use right quota, unclear criteria for fees imposed for different energy consuming enterprises, unclear trading methods, disordered trading platforms, unreasonable pricing mechanism, and lack of reasonable reward and punishment mechanism, etc.

After summing up the above experience, the Chinese government proposed in Integrated Reform Plan for Promoting Ecological Progress issued in September 2015 to carry out energy-conservation trading of projects in combination with energy-conservation actions of key energy-consuming organizations and energy assessment review of new projects, and gradually shift to energy use right trading based on total energy consumption management. It is also put forward in the Pilot Scheme for Paid Use and Trading of Energy Use Rights (FGHZ [2016] No. 1659) issued in

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September 2016 to launch a pilot scheme for paid use and trading of energy use rights in four provinces including Zhejiang from 2016 to 2020, and to evaluate the effect of the pilot scheme, sum up experience and gradually promote the said scheme as appropriate.

Contents of the pilot include: (1) determine the energy use right quota in a scientific and reasonable manner by means of benchmarking methods, historical methods and other methods for initial determination of energy use rights according to the total energy consumption control target issued by China in combination with such factors as the local economic and social development level, industrial structure, and energy-conservation potential; (2) A system of paid use of energy use rights would be designed, considering fairness and benefits and balances the benefits of existing and new production capacities in order to promote paid use of energy use rights; (3) establish a system for reporting, auditing and verification of energy consumption; formulate and issue technical specifications such as energy consumption reports, auditing and verification guidelines and standards, and formulate management measures for auditing institutions; (4) The responsibility subject of “double control” target such as key energy-consuming organizations should be taken as the trading subjects. The trading rules for energy use rights quota (in TCE) should be specified and the trading system should be improved. As a result, a fair and orderly market environment would be built and the performance mechanism would be implemented.

2.2 Energy-consuming Organization Program

The “Energy-consuming Organization Program” of key energy-consuming organizations refers to the target responsibility assessment of “100”, “1,000” and “10,000” key energy-consuming organizations at the national, provincial and municipal levels in accordance with the principle of combining territorial management with hierarchical management, which was proposed in the Comprehensive Work Plan for Energy Conservation and Emission Reduction during the 13th Five-year Plan Period issued by the State Council.

The Notice on Matters Related to the “Energy-consuming Organization Program” for Key Energy-consuming Organizations ([2017] No. 1909) issued in November 2017 clearly defines the scope of implementation of the “Energy-consuming Organization Program” for key energy-consuming organizations: (1) 100 key energy-consuming organizations with the highest energy consumption in the country (“100” enterprises) will be chosen from key energy-consuming organizations with an overall energy consumption of more than 3 million TCE in 2015, and the National Development and Reform Commission (NDRC) will be responsible for the completion of their “double control” targets; (2) 1,000 key energy-consuming organizations with high energy consumption (“1,000” enterprises) will be chosen from key energy-consuming organizations with comprehensive energy consumption of 500,000 TCE or more in 2015, and the

departments in charge of energy conservation of the provincial people’s government will be responsible for the completion of the “double control” target; (3) other key energy-consuming organizations other than “100” and “1,000” enterprises (“10,000” enterprises) will be chosen from key energy-consuming organizations with a comprehensive energy consumption of less than 500,000 tce in 2015, and the completion of the “double control” target will in principle be the responsibility of the departments in charge of energy conservation under the people’s governments of prefecture-level cities (including districts, counties or county-level cities under special circumstances).

The Notice also outlines specific principles and methods for decomposition of total energy consumption control and energy conservation targets of “100”, “1000” and “10,000” enterprises: the total energy consumption control target can be decomposed by benchmarking method or historical method, i.e. it can be determined by combining the factors such as recent annual output of key energy-consuming organizations and advanced level of energy efficiency in the industry, or by referring to the comprehensive energy consumption of key energy-consuming organizations in recent years. Energy-conservation targets can be selected from such targets as energy consumption per unit product, energy consumption per unit output value, energy consumption per unit transportation turnover volume, energy consumption per unit construction area of public institutions, or the rate of decline. It is also proposed that the implementation of the “Energy-consuming Organization Program” by key energy-consuming organizations should be effectively promoted by taking energy-conservation management measures, strengthening supervision and inspection of energy conservation, strengthening energy-conservation capacity building, and enhancing news publicity and public opinion guidance.

2.3 Coal Consumption Reduction & Substitution Action

To further optimize the energy structure, achieve the goal of total coal consumption control, and reduce air pollution, NDRC issued the Interim Measures for the Substitution and Management of Coal Consumption Reduction in Key Areas in 2014 (FGHZ [2014] No. 2984). Coal consumption reduction actions have been practiced in Beijing, Tianjin, Hebei, Shanghai, Jiangsu, Zhejiang and Guangdong’s Pearl River Delta Region, requiring all these provinces and areas to propose specific measures for coal consumption reduction and quantities to be reduced^{[3][4]}.

After drawing lessons from actions of coal consumption reduction in key areas, the Chinese government issued the Notice on Properly Practicing the Coal Consumption Reduction and Substitution in 2016” (FGHZ [2016] No. 1623), requiring to further practice the coal consumption reduction and substitution from the following aspects: (1) study and formulate the 2020 coal consumption reduction target in combination with

the goal of “double control” of total energy consumption and energy intensity in the 13th Five-year Plan, air pollution prevention requirements and actual situations in the region; (2) for overcapacity industries such as steel, coal, cement clinker and flat glass, and coal and power industries facing potential overcapacity risks, new production capacity should be strictly controlled (strictly prohibited), outdated production capacity and overcapacity should be eliminated in strict accordance with laws; (3) accelerate the coal consumption reduction projects by implementing energy-conservation transformation projects such as utilization of residual heat and pressure, comprehensively promoting the energy-conservation and environmental protection transformation of coal-fired boilers and coal-fired industrial kilns, and implementing such measures as residual heat and pressure heating; (4) supervise and assess the coal consumption reduction and substitution in various regions by announcing the results of the supervision and inspection to the public and criticizing cities that fail to achieve the goals.

3. Standards for “Double Control” of Total Energy Consumption and Energy Intensity

3.1 Necessity of Developing and Implementing the Standards for “Double Control”

Energy-conservation standards are not only the basis for enterprises to implement energy-conservation management, but also the basis for government to strengthen energy-conservation supervision. As an effective means and an important technical basis for achieving China’s energy conservation and emission reduction targets, energy conservation standardization is related to the research and development, demonstration, preliminary commercialization and industrialization of technologies (products). It covers all aspects of energy development, production, transportation, use, recycling, etc. and involves all energy-consuming organizations such as enterprises, public institutions and buildings. It plays an irreplaceable role in improving the energy use efficiency of products, enhancing the energy conservation management level of energy-consuming organizations, promoting technological innovation and industrial upgrading of enterprises, optimizing industrial structure, promoting the introduction of energy-conservation policies and providing technical basis for

policy implementation, which positively accelerating the energy conservation in China.^[5]

As an important component of the energy-conservation standards, the standards for “double control” will play a decisive role in supporting the realization of goal of “double control” of total energy consumption and energy intensity. The implementation of standards for control of total energy consumption accelerates the establishment and operation of total energy consumption trading mechanism through such market-oriented means as energy use right and energy-conservation trading, and urges to take the control of total energy consumption as the goal at the organization level during production, so as to eliminate backward and inefficient technologies, restrict the production, marketing and import of high-energy consuming products and equipment, and promote the optimization of energy structure and use of new and renewable energy in place of traditional energy. Standards for control of energy consumption intensity can urge enterprises to take improvement of energy efficiency and application of advanced energy-conservation technologies as their main objectives during design, R&D and production of products, strengthen scientific management of in-use equipment and its systems, improve system matching, reduce system losses, strengthen technological transformation, effectively improve operating efficiency, optimize and upgrade energy-consuming systems as a whole.

3.2 Current Situation of “Double Control” Standardization

Energy-conservation standards are the foundation of China’s energy-conservation system, an important means to improve economic quality and benefits, promote green and low-carbon circular development and build ecological civilization, and an effective support to resolve overcapacity and strengthen energy conservation and emission reduction.

At present, China’s energy-conservation standard system^[6] (see Scheme for Construction of Energy Conserving Standard System) divides energy-conservation standards by energy-conservation process links, and provides an energy-conservation standard system framework including seven standard subsystems, i.e. basic generality standard subsystem, target standard subsystem, design standard subsystem, construction standard subsystem, operation standard subsystem, evaluation standard subsystem and optimization standard subsystem, as shown in Figure 1.

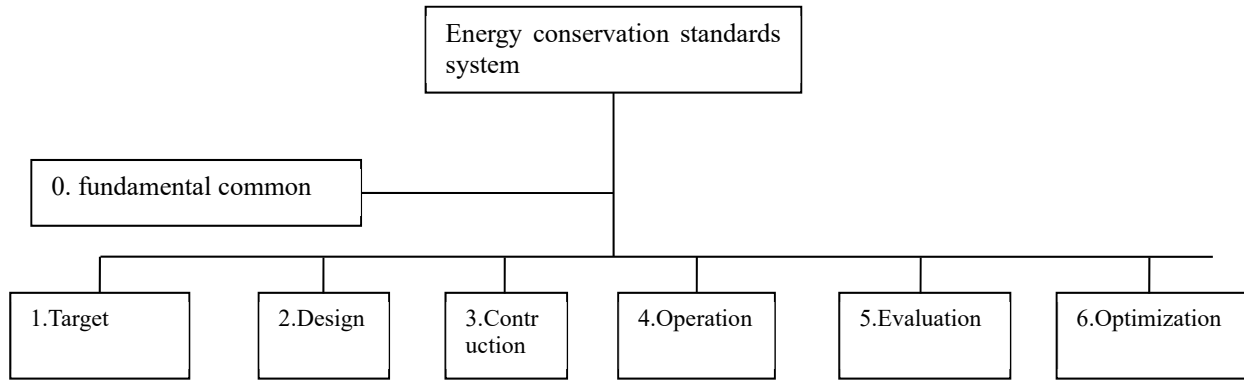


Fig.1 Framework of Energy savings standards system

The Standardization Administration of the People’s Republic of China and NDRC have jointly launched two phases of the “100 Energy Efficiency Standards Promotion Program” since the 12th Five-Year Plan. As of December 2017, a total of 206 national standards on energy efficiency, energy consumption quota and energy conservation foundations have been approved and issued. Among them, 64 are mandatory national standards for energy efficiency, 106 are mandatory national standards for energy consumption quota and nearly 140 are recommended national standards for energy conservation. These standards play important role in resolving overcapacity, optimizing industrial structure, and achieving the goal of energy conservation.

3.3 Deficiencies of Standards for “Double Control”

The standards for “double control” of total energy consumption and energy intensity contain enjoy great potential in energy-conservation and are the key content of China’s energy-conservation standardization, which are of great significance in promoting the upgrading of industrial structure, coping with climate change, upgrading products and equipment, and industrial development. In face of grim international energy situation and urgent needs for rapid development of the national economy and society, there are still large gaps and deficiencies in standards for “double control” of total energy consumption and energy intensity in China, which are highlighted as follows:

First, standards cover a narrow range of categories with low coverage. The standards for “double control” includes a number of categories such as setting of goal of total energy consumption, total energy consumption trading mechanism, accounting verification, setting of goal of energy intensity, operation management, analysis and evaluation, system upgrading, etc. It covers all aspects such as the target, operation, optimization and upgrading of the “double control” of total energy consumption and energy intensity. However, there are still few such standards in China. In terms of standards for control of total energy consumption, the number of standards related to setting of goals, trading, accounting

and verification is very small, with extremely low coverage.

Second, cycle for revision and updating of standards is too long and there is no reasonable review plan. Except for mandatory standards on energy consumption quota and energy efficiency for energy-consuming products, quite a number of energy-conservation standards in China have been implemented for 10 years, which makes it impossible to reflect new achievements of theoretical research and energy-conservation technology development in real time and keep up with the needs of social and economic development. The outdated energy-conservation standards used to support the goal of “double control” of total energy consumption and energy intensity will make enterprises and management departments confused, and even affect the implementation and promotion of major energy-conservation activities.

Third, the basic capability of standard research needs to be strengthened. A careful study of standards for “double control” of total energy consumption and energy intensity in China indicates that the lack of breakthroughs and innovations in theoretical methods and insufficient emphasis on capacity building at the basic research level have affected the improvement of the quality and level of relevant standards. Taking the technical indicators in energy-conservation standards for example, due to the lack of strong theoretical guidance and sufficient data resources support, it is impossible to accurately analyze and grasp the current market situations, industrial demands, technology selection, expected effects, etc., and the determination of core technical indicators is always made with a view to adapt to international standards or accommodate “the majority of the market”. In addition, there are still some problems to be tackled, such as insufficient samples for market inspection and social investigation, insufficient experimental verification capability, and almost no evaluations made after the standards are issued and implemented.

Fourth, standards are not developed in a systematic and well-planned manner. The standards for “double-control” of total amount and intensity of energy consumption in China, especially the energy-

conservation standards related to total energy consumption control, are developed after the total energy consumption goals set in the “13th Five-Year Plan” are achieved, so they are relatively new, without systematic, standardized and integrated researches made on each sub-system. In the meantime, there is no overall idea, coordinated and long-term plan for energy-conservation standardization development in various energy-conservation fields and levels that is compatible with the national economic development and special energy-conservation plans of China.

Generally speaking, as for the development of standards for “double control” of total energy consumption and intensity in China, it is urgent to orderly expand their categories, promptly revise and update the standard contents, strengthen breakthroughs and innovations in standard formulation theory and methods, establish and improve basic researches on energy-conservation standards, and formulate coordinated development plans at all levels in a scientific manner, so as to meet the current requirements of the rapid development of energy-conservation technologies and the overall deepening of energy-conservation.

4. Suggestions on the Construction of Standard System for “Double Control” of Total Energy Consumption and Energy Intensity

As a blueprint for the development of standardization, the establishment of a standard system makes it possible to prepare efficient plan for overall standardization, offer scientific basis for the research, preparation and implementation of standards, and guarantee the orderly and efficient development of standardization by strengthening macro guidance, clarifying the development direction and determining the focus of work. Therefore, to solve various challenges currently facing the development of standardization of “double control”, it is imperative to establish a scientific and reasonable standard system for “double control”. In other words, we should carry out researches on the standard system for “double control” of total energy consumption and energy intensity according to the overall goal of energy-conserving standardization development, the goal of “double control” in China specified in the “13th Five-Year Plan”, clarify the development thoughts and direction of the standards for “double control”, put forward the focuses on the preparation of standards for “double control” in the near future, in the medium and long term, guide the revision of the standards for “double control”, strengthen the systematic and integral “double control” standardization, and promote the overall promotion and breakthrough of “double control” standardization in China in close combination with the market mechanism of energy-conservation services, development trend and demand of energy-conservation technologies.

5. Summary

The “double control” of total energy consumption and energy intensity is an important measure to build ecological civilization and practice the strategy of green development. The policies and activities focusing on goals of “double control” will effectively ensure the completion of goals of “double control” and corresponding tasks from such aspects as goal decomposition, implementation and evaluation. The standardization of “double control” action is of great significance for promoting the completion of goals of the “13th Five-Year Plan” and “double control”, supporting the construction of ecological civilization and green and low carbon development, and serving key energy conservation projects in China.

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Reference

1. Ou wenwen, etc. Research on total energy consumption control of region. Masters thesis of Zhejiang Industry University, 2012.
2. China's National Bureau of Statistics. China Energy Statistical Yearbook [M]. China Statistical Publishing House, 2013.
3. Jiming Hao, etc. Technical route of air pollution control in medium and long-term utilization of coal[M]. Chinese Engineering Science, 2015(17)9.
4. LEI Lijun, JING Zhefeng. Development of International Carbon Market And Its Enlightenment for
5. Chinese Carbon Market Construction, China Population, Resource and Environment, 2011(21):4.
6. Energy-saving standard system construction program (FGHZ[2017]No.83)