Summary of Motor Industrial Energy Conservation Policies in China

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Abstract. Starting from the 12th Five Year Plan, in order to promote industrial energy conservation and consumption reduction, industrial energy conservation policies are implemented in the industry, and different levels of industrial energy conservation responsibilities are assessed in different regions of the industry. As an effective tool for upgrading the industrial structure, energy conservation audit supports the continuous promotion of energy conservation work in accordance with relevant energy standards. In this paper, we survey all regulations, standards and policies and analysis them to get conclusion, industrial energy conservation policies in China is effectively to promote China energy conservation.

1. Introduction
The industrial energy conservation policy system has been further improved since the 12th Five-Year Plan. On the one hand, for the effective energy conservation target responsibility assessment, energy conservation assessment and review in the 11th Five-Year Plan, based on the new circumstances and requirements of energy conservation, the content of energy conservation target responsibility assessment is adjusted and strengthened, the system and capacity building for energy conservation assessment and review is enhanced, the supporting role of energy conservation standards is highlighted, the “hundreds of Energy Efficiency Standards Project” is implemented, and the industrial energy conservation standard system is further improved; on the other hand, aggressive innovation is made in terms of, for example, energy conservation economic policies, comprehensive demonstration of fiscal policies for energy conservation and emission reduction and comprehensive urban pilot of power demand side management are carried out, preferential tax policies for contract energy management are launched, step tariff policies for electrolytic aluminum industry are introduced, and new breakthroughs are made with respect to industrial energy conservation policies[1].

2. Energy Conservation Audit
Since the beginning of the 12th Five-Year Plan, the energy conservation assessment and audit still functions as an effective tool in upgrading industrial structures, suppressing the excessive growth of high energy consumption and high emission industries[2]. The Notice of the State Council on Printing and Distributing the Comprehensive Work Plan for Energy Conservation and Emission Reduction During the 12th Five-year Plan (GF(2011) No. 26) and the Notice of the State Council on Printing and Distributing the Energy Conservation and Emission Reduction Plan for the 12th Five-year Plan...
(GF(2012) No. 40) clearly require to audit the energy conservation audit strictly and apply higher standards for new energy conservation projects.

According to the “Use reasonable measures to control the total energy consumption volume” requirements stipulated in the Resolution of the National People's Congress on the Outline of the Twelfth Five-Year Plan for National Economic and Social Development, the energy conservation assessment will be a key measure to control the incremental energy consumption and the total volume of energy consumption in all regions. For new fixed asset projects, the energy conservation assessment shall be adopted to dynamically control the incremental energy consumption brought by projects, assess the influence of projects on the total energy consumption target and energy conservation indicators to provide early warning support for energy conservation, help the country and all regions to adjust the project approval and ensure that the energy conservation target is reached.

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Figure 1. Effect of Energy Conservation Assessment and Audit.

During the first three years of the 12th Five-Year Plan, the energy conservation assessment has made positive progress in both system construction and capability building.
4. Industrial Energy Conservation Standards

4.1. Industrial energy conservation standard system framework
Since 1980s, the comprehensive ordered industrial energy conservation standard system framework has been formed in the context of the industrial energy conservation standard from nothing, from few to many and from dispersed to systematic. The standard system framework includes 7 sub-systems: basic common standard, mandatory energy efficiency standard for energy consumption products, mandatory standard for energy consumption quota per unit product, standard for energy conservation design, test and measurement standard, calculation and assessment standard and constant improvement standard. Every sub-system also includes some categories, for instance, the sub-system of calculation and assessment standard includes energy savings determination, project energy conservation assessment, energy performance evaluation organization, conservation-oriented organization evaluation, rational energy consumption evaluation, energy audit, energy conservation calculation[4].

4.2. Current situation of industrial energy conservation standards

4.2.1. mandatory standards for energy consumption quota per unit product
By the end of 2013, there were 68 mandatory standards for energy consumption quota, involving the key energy-exhaustive industries such as steel, nonferrous metals, chemicals, building materials, electricity, and coal (see table 1).

Table 1. Industries and Products within Mandatory Standard for Energy Consumption Quota for Unit Product.

| Industry         | Qty. | Product                                                                 |
|------------------|------|-------------------------------------------------------------------------|
| Steel            | 4    | Crude steel, coke, ferroalloy, carbon                                   |
| Petrochemistry   | 20   | Caustic soda, synthetic ammonia, calcium carbide, yellow phosphorus, ethylene plant, refined oil, monoammonium phosphate, diammonium phosphate, sodium carbonate, industrial sulfuric acid, industrial glacial acetic acid, polyformaldehyde, potassium sulfate, carbon black, dilute nitric acid, tires, methanol from coal, oil from direct coal liquefaction, coal to natural gas, and coal to olefin |
| Building materials | 11 | Cement, building sanitary ceramics, sheet glass, glass fiber, cast stone, microcrystalline alumina ceramic grinding balls, friction materials, rock wool, mineral cotton and its products, asphalt-based waterproofing coils, aluminum-plastic panels, and photovoltaic rolled glass |
| Power            | 1    | Conventional coal-fired generating unit                                |
| Nonferrous metal | 26   | Alumina, electrolytic aluminum, copper smelting, zinc smelting, lead smelting, nickel smelting, tin smelting, antimony smelting, magnesium smelting, aluminum alloy building profiles, aluminum and aluminum alloy rolling, drawn pipes, bars, aluminum and aluminum alloy hot-rolled bars, graphite cathode carbon blocks for aluminum electrolysis, prebaked anodes for aluminum electrolysis, copper and copper alloy tubes, copper and copper alloy wires, copper and copper alloy plates, strips, foils, copper and copper alloy rods, roasted molybdenum concentrate, molybdenum concentrate, recycled lead, germanium, rare earth smelting, titanium sponge, polysilicon, titanium and titanium alloy ingots, |
| Coal             | 6    | Underground mining for coal, open mining of coal, coal preparation, coal based activated carbon, semi-coke, and coal slurry |
4.2.2. energy efficiency standards for end-use energy-consuming products and equipment

By the end of 2013, there were 68 mandatory standards for energy consumption quota, involving household energy consumption appliances, lighting appliances, industrial general equipment, commercial equipment, electronic information communication products and transportation[5] (see Table 2).

Table 2. Categories and Products within Mandatory Energy Efficiency Standard.

| Category                           | Qty. | Product                                                                 |
|------------------------------------|------|-------------------------------------------------------------------------|
| Household energy consumption appliances | 15   | Household refrigerator, room air conditioner, electric washer, color TV, electric fan, electric cooker, electric water heater, gas heater, inverter air conditioner, induction cooker, flat-screen TV, microwave oven, solar hot water system, heat pump water heater, and exhaust hood |
| Lighting fixtures                  | 12   | Fluorescent lamp ballast, double-capped fluorescent lamp, single-capped fluorescent lamp, self-ballasted fluorescent lamp, HV sodium lamp, HP sodium lamp ballast, metal halide lamp, metal halide lamp ballast, self-ballasted electrodeless lamp, single-end electrodeless lamp, electrodeless lamp ballast, and non-directional self-ballasted LED lamp |
| General industrial equipment       | 14   | Small- and medium-sized three-phase asynchronous motors, air compressor, ventilator, clear water centrifugal pump, distribution transformer, power transformer, AC contactor, petroleum heating furnace, industrial boiler, low-power machine, centrifugal blower, electric welding machines, permanent-magnet synchronous motor, HV three-phase asynchronous motor |
| Business equipment                 | 6    | Unitary air conditioner, water chilling unit, multi-coupled air conditioner, external power supply, remote condensing unit refrigerated display case, and lithium bromide air conditioning unit |
| Electronic information communication products | 5   | Computer display, copier, printer / fax machine, set-top box, and microcomputer |
| Transportation means               | 6    | Passenger car, light commercial vehicle, tricycle, low-speed truck, goods truck, and passenger vehicle |

5. Economic Policies for Energy Conservation

Energy conservation is advanced mainly depending on legal, economic and necessary administrative means. The legal means is mainly for giving rules, the economic means focuses on guiding, and the administrative means is for strengthening governmental responsibilities. Since the 11th Five-Year Plan, more administrative means are applied for energy conservation in China. With large energy conservation potential space, the effects of the administrative means are obvious, and the society and enterprise costs are rather low. With the increasing energy efficiency level, the effects of administrative means will gradually decrease, but the social costs will sharply rise. In this case, energy conservation must focus on economic policies, and the energy conservation target can be realized using the more economic means by virtue of the effective stimulation and constraining mechanisms.

Since the 12th Five-Year Plan, China has further stepped up budgetary investments and investments for special funds of financial energy conservation and emission reduction, focused on integrated demonstration of financial policies for energy conservation and emission reduction, financial rewards for management on urban comprehensive pilots at the power demand side to strengthen financial fund guide, actively promote and implement energy conservation and tax support
policies, and implement differential and punitive electricity prices to play an important role in promoting the energy conservation target. (see Table 3-5).

Table 3 Comprehensive Demonstration under Financial Policies for Energy Conservation and Emission Reduction

| Demonstration contents | Policy guarantee |
|------------------------|-----------------|
| Strengthen industrial structure adjustment on industrial low carbon, reform urban transportation system on traffic cleaning, promote building energy conservation on building greening, accelerate development of service industry on intensification, promote urban environmental quality improvement on reduction of main pollutants, and optimize urban energy structure on large-scale utilization of the renewable energy sources. | The NDRC and other relevant departments approve the annual implementation projects reported by the demo cities according to the existing systems and methods. The Ministry of Finance disburses funds at different times and categories in batches according to the review of the approved implementation plans and projects. Various existing policies for supporting energy conservation and emission reduction and development of renewable energy sources give priority to the pilot cities, and the projects in conformity with the conditions and incorporated into the implementation plan are supported based on the existing policies. The Ministry of Finance gives the comprehensive rewards to the projects listed into the implementation plan but not incorporated into the existing policies according to project investment, local investment and effects of energy conservation and emission reduction. |

Table 4 Financial Reward Policies for Management on Urban Comprehensive Pilots at the Power Demand Side

| Reward standards | Rewarding method |
|------------------|------------------|
| For the permanent saving of power loads and transfer of peak power loads achieved by implementing energy efficiency power plant and peak load shifting technologies, CNY 440 is awarded per kW in eastern regions, and CNY 550 is awarded per kW in central and western regions. CNY 100 is awarded per kW in peak power load which is temporarily decreased by demand response. | The Ministry of Finance and the NDRC approve the implementation plans of administrative pilot cities submitted by the relating provincial departments after review and sign the agreements with their provinces to specify pilot work objectives, investment arrangement, local supporting funds, annual work plans and demands for funding awards. The Ministry of Finance releases the rewarding funds by means of “advance appropriation by the year, post liquidation”. |

Table 5 Financial Reward Policies for Energy Performance Contracting Project

| Support range | Application conditions |
|---------------|------------------------|
| The financial reward funds are provided for reformation projects of industry, building, transportation and public organizations supporting energy performance contracting. The energy performance contracting projects enjoying other relevant subsidy policies shall not be included into the support range of these measures. | The energy services companies make over 70% investment and agree the energy conservation benefits sharing methods in the contract; the annual energy savings per project (refer to the energy conservation capacity) is below 10,000 tce and 100 tce (inclusive), in which the annual energy savings of the industrial project is over 500 tce (inclusive); with complete energy consumption measurement devices and improved energy statistics and management systems, the energy savings may be measured, monitored and examined. |
The reward funds are borne by the Ministry of Finance and the provincial finance department. The reward standard of the Ministry of Finance is CNY 240/tce, and the reward standard of the provincial finance department is no lower than CNY 60/tce. The reward standards can be approximately improved depending on the circumstances in localities where conditions permit.

6. Conclusion
The industrial energy conservation policy system has been further improved. For the effective energy conservation target responsibility assessment, energy conservation assessment and review in the last few years, based on the new circumstances and requirements of energy conservation, the content of energy conservation target responsibility assessment is adjusted and strengthened, the system and capacity building for energy conservation assessment and review is enhanced, the supporting role of energy conservation standards is highlighted, the “Energy Efficiency Standards Project” is implemented, and the industrial energy conservation standard system is further improved; on the other hand, aggressive innovation is made in terms of, for example, energy conservation economic policies, comprehensive demonstration of fiscal policies for energy conservation and emission reduction and comprehensive urban pilot of power demand side management are carried out, preferential tax policies for contract energy management are launched, step tariff policies for electrolytic aluminum industry are introduced, and new breakthroughs are made with respect to industrial energy conservation policies. Based on analysis above, Policies of China energy efficiency will do more work in the future.

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