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## Current Status of Energy Efficiency and Energy Efficiency Standards

In *China-US Joint Announcement on Climate Change* issued in 2014, China expressed its two intentions. First, China intend to achieve the peaking of CO<sub>2</sub> emissions around 2030 and to make best efforts to peak early. Second, China intend to increase the share of non-fossil fuels in primary energy consumption to around 20% by 2030. At present, energy consumption per GDP in China is more than twice higher than the world average. To reach the promised emission level, energy-saving is one critical point besides other weighty tasks like industry structure adjustment and renewable energy development.

Energy-saving consists of two parts, the reduction of energy consumption and the improvement of energy efficiency. Energy efficiency is generally defined as the ratio of input energy and output energy or other numerical relationship (efficiency), or it can be defined as the wastage of some specific products, like the ultra-supercritical coal-fired units. 207g standard coal will be used to generate 1 kWh of electricity by the ultra-supercritical coal-fired units, therefore, the efficiency of this kind of coal-fired unit can be defined as 207g /kWh.

The implementation of energy efficiency labeling system in China was started in 2005, and all the related efficiency standards are developed by China National Standardization Technical Committee for Energy Basis and Management (SAC/TC 20). It is regulated by the Committee that products without efficiency label or under the admittance criterion could not be allowed to go into production and commodity market. *Minimum Allowable Values of Energy Efficiency and Energy Efficiency Grades for Power Transformer* (GB 24790-2009) regulated the limit value of no-load loss and load loss by what the power transformer efficiency is rated into three levels. The first level is the one with the highest efficiency and lowest loss, like 35kV/ 3150kVA Three-phase oil-immersed type double winding excitation voltage regulation of power transformer. The limits values of no-load loss of 1, 2, and 3 level are as follows: 3.0, 3.3, 4.3kW, that is, transformers with a no-load loss bigger than 4.3kW cannot go into the market.

By now, National Development and Reform Commission (NDRC) together with General Administration of Quality Supervision, Inspection and Quarantine of China (AQSIQ) and Certification and Accreditation Administration of China (CNCA) have jointly promulgated and implemented ten groups of EEL product catalogs.

- First group: household refrigerator, room air-conditioner
- Second group: electric washing machine, unit air conditioner
- Third group: Self-ballasted lamps, High pressure sodium lamp, small and medium three-phase asynchronous motors, cold water cooling unit, domestic gas instantaneous water heater and gas fired heating and hot water combi-boilers.



- Fourth group: variable speed room air conditioners, multi-connected air-conditioning (heat pump) unit, electrical storage water heaters, Household Induction Cooker, computer monitor, copier
- Fifth group: automatic rice cooker, A.C. electric fans, A.C. contactor, displacement air compressors
- Six group: Transformer, ventilator
- Seven group: flat television, microwave oven
- Eighth group: Imported printer, fax, digital TV receiver
- Ninth group: Refrigerated display cabinets with remote condensing unit, domestic solar water heating systems
- Tenth group: microcomputer

Products like medium three-phase asynchronous motors, A.C. contactors and transformers belong to electrical industry.

IEC set up SG1 in 2007, which analyzed the development of energy efficiency and renewable energy, and under the suggestion of SG1, ACEE was set up in charge of the formulation of standard guides for energy efficiency and other related fields. ACEE aims at making guides for every IEC TC on energy efficiency work and integrating energy efficiency into IEC standards in a consolidated and systematical way. By now, ACEE has established two project teams and one study team.

The admission of the no.1 project team is to make the *Guide on Integrating Energy Efficiency into Electrical Products*, in which terms, general principles and means, and basic methodology needed in the integrating will be involved. This standard remains unfinished, and the main content can be seen by now is as follows:

### 1. Standard and Energy Efficiency

(1)Energy efficiency: to define the system efficiency, it is needed to determine the system boundary and the energy in and out of the boundary. The definition of system boundary includes some relevant variables, like load curve and control strategy, etc. And, the change of system boundary will affect the change of energy efficiency, thus, it is needed to determine the related driving parameters, like temperature, lightness, weather, output and the change of them.

(2) Systematical method: one of the efficient energy-saving method is being systematical. That is components and application being considered as a whole; the energy efficiency increase of a single part may have a limited effect towards the complete unit. The energy efficiency increase of some parts may be offset by poor operation conditions.

(3) Barriers to energy efficiency: the difference between the investment fees based on the economic analysis and the real fees is mainly caused by the neglect of energy-saving potency, the lack of related information on efficiency, the lack of wide measurement of

efficiency, the wrong idea of focusing on energy statistics of components but the whole, the neglect of incentives, the wrong idea of concerning about the cost of initiative investment but the whole life circle. Standards are needed to eliminate the barriers, that includes to determine general measurement and testing method to access the increase and decrease of energy consuming due to the use of new technologies, to normalize the optimal operations, and management procedures and develop specifications to ensure energy-saving, to make manuals and guides to direct the design of new systems and the transformation of old ones, and to determine practical measurements to access the changes of energy efficiency bring by new technologies.

### 2. Enhance the energy efficiency

Much work has to be done to design a circulation and workflow system aiming at high energy efficiency, such as to define the boundary, to determine, access and evaluate loss as well as to decline the loss.

- The definition of system boundary: Boundary can be physical or functional, and it can include one or several equipment. To define the system boundary there are some factors needed to be taken into account, such as application, the input and output of energy, driving parameter (static and dynamic state), energy efficiency index, and the interaction between internal components and with other systems.
- The determination of loss: determine the energy loss by the analysis of loss condition with energy models. All these factors are involved in the Energy model including changes of energy consuming, energy flow and energy balance, changes of energy inputs with different time, the relationship between energy input and driving parameters, and several energy efficiency evaluation indexes.
- Loss access: it's mainly the impact analysis of energy loss on the system, which includes the impact on the relationship among loss sources and the impact level towards energy efficiency.
- Loss evaluation: determine how much the energy loss affects the system efficiency, including: whether the loss is unacceptable, whether the loss can be reduced, how to balance the revenue, loss and measurement, whether new loss could come when reducing loss.
- Loss decrease: there are many factors that should be considered to reduce energy loss, such as function, performance, cost, marketability, durability, law & regulations, and security. Loss decrease means less energy input, more product output, and more product output with less energy input. Loss decrease can be realized via system optimization, energy recycling and new technology introducing.

### 3. Energy efficiency in standards:



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## SESEC III Translated Report: Current Status Energy Efficiency Standards

Standard developer shall take into account the energy efficiency of the introduced standard and the reason of its introducing as well as how to define, measure, access, promote and start using energy efficiency.

This standard is developed to help developers of standards for electrical products understand the impact of standards requirement to energy efficiency.

China Electrical Equipment Industrial Association (CEEIA) became the mirror committees of IEC/ACEE in April 2013, and established an Expert Working Group. And now the adoption work for *Guide to Integrating Energy Efficiency Factor into Electrical Products* has begun.

### Introduction of SESEC Project

The Seconded European Standardization Expert in China (SESEC) is a visibility project co-financed by the European Commission (EC), the European Free Trade Association (EFTA) secretariat and the three European Standardization Organizations (CEN, CENELEC and ETSI).



Since 2006, there has been two SESEC projects in China, SESEC I (2006-2009) and SESEC II (2009-2012). In Dec 2014, SESEC III was officially launched in Beijing, China. Dr. Betty XU was nominated as the SESEC expert and will spend the next 36 months on promoting EU-China standardization information exchange and EU-China standardization cooperation.

The SESEC project supports the strategic objectives of the European Union, EFTA and the European Standardization Organizations (ESOs). The purpose of SESEC project is to

- Promote European and international standards in China;
- Improve contacts with different levels of the Chinese administration, industry and standardization bodies;
- Improve the visibility and understanding of the European Standardization System (ESS) in China;
- Gather regulatory and standardization intelligence.

### SESEC III Monthly Newsletter

SESEC III Monthly Newsletter is the gathering of China regulatory and standardization intelligence. Most information of the Monthly Newsletter were summarized from China news media or website. Some of them are the first-hand information from TC meetings, forums/workshops, or meetings/dialogues with China government authorities in certain areas. Regulatory and standardization information summaries, translations, and strategic analyses in the prioritized areas selected by SESEC partners, were offered by SESEC III expert. With the limited resources of SESEC III, detailed translations of some news items only can be available on request.

### SESEC III Special Reports

SESEC III Special Reports are the regulatory and standardization reports on some areas with deeper and wider overview or analyses. SESEC III Special Reports also cover the prioritized areas selected by SESEC partners. They also can be some hot topics or lobby activities reports in China.