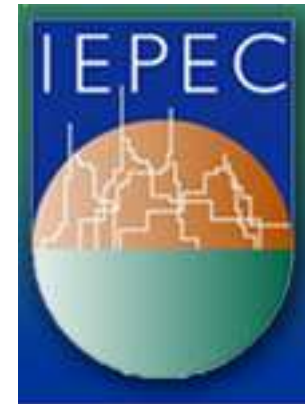


International Energy Program Evaluation Conference 2012

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China's Practices on Evaluating the Energy Savings of Mandatory Energy Efficiency Standards

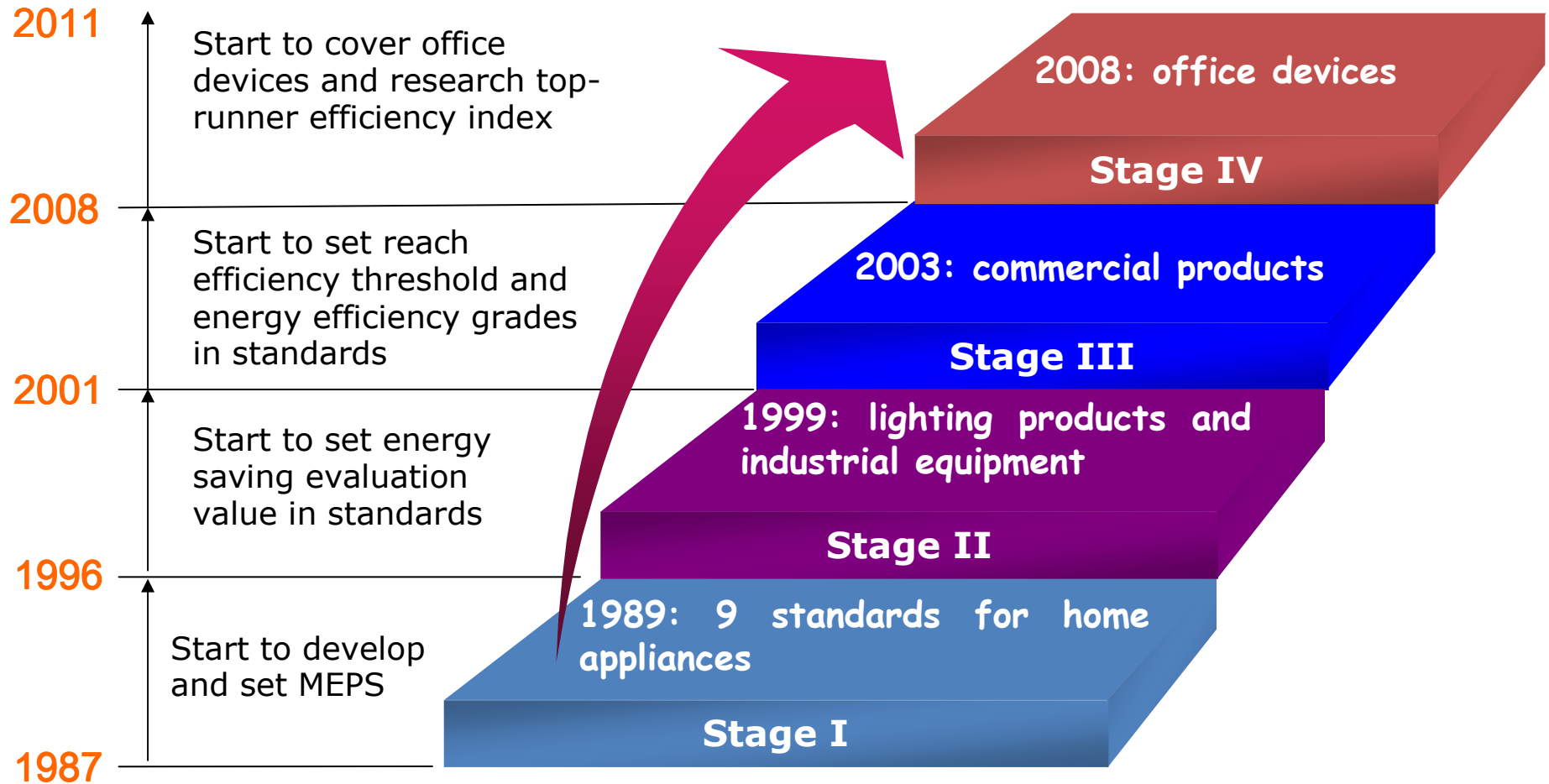
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History of China's energy efficiency standards



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Main contents of energy efficiency standards

- **Minimum energy performance requirement**
 - Energy efficiency threshold for entering market
- **Evaluation index of energy saving products**
 - The minimum requirement of energy performance for energy saving products
- **Energy efficiency grades (optional)**
 - 3 or 5 grades, supporting energy labeling program
- **Reach minimum energy performance requirement (optional)**
 - Effective in 3 to 5 years, guiding the direction of efficiency requirement
- **Test procedure**
 - ISO/IEC standards
 - Foreign standards/specification, such as Energy Star, CoC of ErP Directive
 - Domestic standards

List of China's energy efficiency standards

- **13 household appliances:**
 - Refrigerators, room ACs, washing machine, rice cooker, TV sets, electric fans, VS room ACs, electric water heaters, gas water heaters, induction cookers, flat TV, microwave oven, set-top boxes
- **8 Lighting products:**
 - Tubular FL, double-capped FL, single-capped FL, CFL, high voltage sodium lamp, metal-halide lamps, ballast for TFL, ballast for MHL, ballast for HVSL
- **9 Industrial equipments:**
 - Motors, air compressor, fans, centrifugal pumps, distribution transformer, AC contactor, industrial boilers, power transformers, heating furnaces for oil industry, small-capacity motors
- **3 Office equipments:**
 - Copiers, monitors, printers & fax machines
- **4 Commercial equipments:**
 - Unitary ACs, water chillers, MC AC units, external power supply
- **6 Vehicles:**
 - Passenger cars, commercial vehicle, low-speed goods vehicles, tri-wheel vehicles, mopeds, motorcycles

Fundamental Methodology of Evaluation

- **National standard: Methods for Calculating and Evaluating the Economic Value of Electricity Saving Measures (later revised in 2009).**
- **The basic methodology of this standard is an aggregated method for individual product/working load consuming energy. The basic equation**

is:

$$\Delta A_c = \sum_{i=1}^m (a_{qi} - a_{hi}) Q_{ni}$$

- **This method has been used to evaluate the energy savings of standards by using the annual sales of new products and the difference of energy consumption between products before and after the implementation of mandatory minimum efficiency standards.**

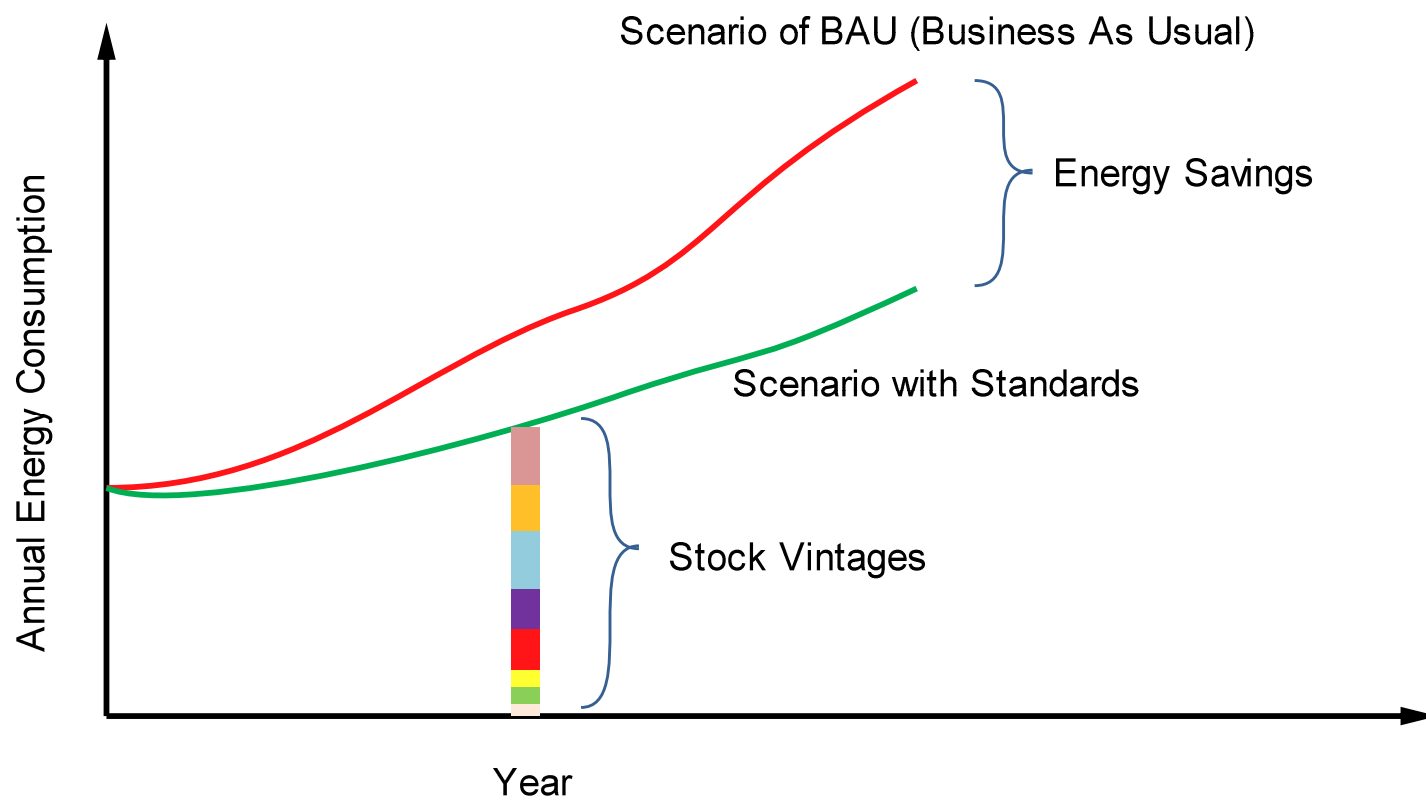
Fundamental Methodology of Evaluation



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- In 2010, a new bottom-up method was introduced by Lawrence Berkeley National Laboratory to evaluate the energy savings by energy efficiency standards for energy-using products.
- This model is based on a scenario analysis of annual stock change for targeted products and those products' average energy intensities. The key factors that influence the annual stock include new sales and product lifetime. The average energy intensity depends on the energy efficiency, power, and usage of the product. Annual and cumulative energy savings can be evaluated and compared among different scenarios.

Framework of the Evaluation Methodology



Fundamental Methodology of Evaluation

Step 1: Determination of scenarios for analysis.

Step 2: Evaluation of the annual sales of target product in different scenarios.

Step 3: Evaluation of the annual stock of the target product.

Step 4: Evaluation of the annual average energy consumption of the target product.

Step 5: Evaluation of annual energy savings by comparison of the energy consumption of different scenarios.

Results of Evaluation



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- **The main intent is to appraise the contribution of energy efficiency standards within the larger policy framework.**
- **The six groups of products accounted for an energy savings of 4.89 TWh in 2010, or about 0.8% of total energy consumption for those products.**
- **The cost of development of energy efficiency standards in China is very low. Energy efficiency standards may be a very cost-effective way to achieve energy savings in China if we do not consider the social costs (costs to manufacturers and consumers) and implementation costs (costs to administrations).**

Results of Evaluation

Products	Year of Standards Effected	Estimated Energy Consumption in 2010	Evaluated Energy Savings in 2010 resulting from Energy Efficiency Standards
Refrigerators	2008	76.4 TWh	1.2 TWh
Room air conditioners	2010	241 TWh	2.3 TWh
Electric water heaters	2008	33.1 TWh	0.11 TWh
Rice cookers	2008	40.1 TWh	0.38 TWh
Computer monitors	2008	5.5 TWh	0.4 TWh
Compact fluorescent lamps	2003	220.4 TWh	0.5 TWh
Total	-	616.5 TWh	4.89 TWh

Key factors impacting the results of evaluation

Data quality

- China does not have a complete survey and statistics system. Double counting and inconsistent results were found in most survey reports or statistics books.

Market Situation

- It is difficult to get good quality data for product categories that change so quickly. It is also difficult to set scenario and distinguish energy savings caused by standards as opposed to those caused by technology evolution in such a short time period.

Mixed Standard System

- It would be a valuable for future evaluations to be able to separate the energy savings caused directly by mandatory standards from the savings caused by energy labeling or certification schemes.

Implementation Status

- The compliance levels for standards in China were not very good as those in the EU or US markets. The implementation level of energy efficiency standards is difficult to quantify.

Conclusions



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- **Energy efficiency standards for energy-using products play an important role in China's policy framework to improve energy efficiency. In 2010, a new bottom-up method was introduced to evaluate the energy savings by energy efficiency standards for energy-using products. This model was based on a scenario analysis of the stock change and average energy efficiency of targeted products.**
- **Standards that are effectively implemented can achieve large energy savings. In 2010, six groups of product produced a total annual energy savings of 4.89 TWh or around 0.8% of total energy consumption for those products. We find that the development and implementation costs for new standards are relatively low and that energy efficiency standards are a cost-effective way to achieve energy savings.**
- **Some fundamental factors like data quality, market situation, mixed standards, and implementation status suggest areas for improvements in the evaluation methodology.**

Thank you for your attention!



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