



**Asia-Pacific  
Economic Cooperation**

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## **Principles of Top Runner Program**

Submitted by: Institute of Energy Economics, Japan (IEEJ)



**Aligning Energy Efficiency Regulations for  
ICT Products: Developing a Strategic  
Approach  
Seoul, Korea  
18 July 2012**

## Aligning Energy Efficiency Regulations for ICT Products: Developing a Strategic Approach

18 July, 2012 – Seoul, South Korea

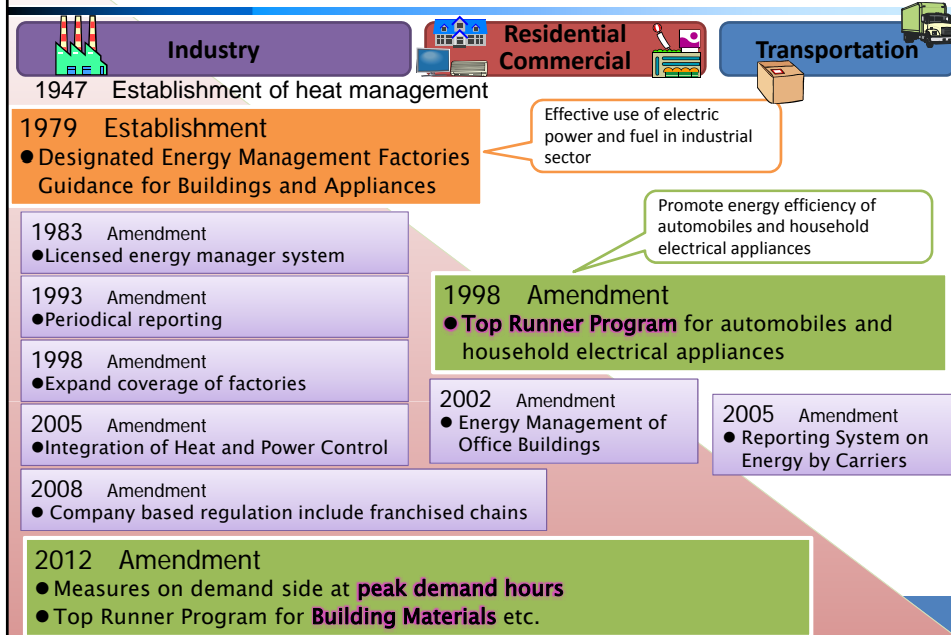


# Principles of Top Runner Program


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## Historical Development of EE Act

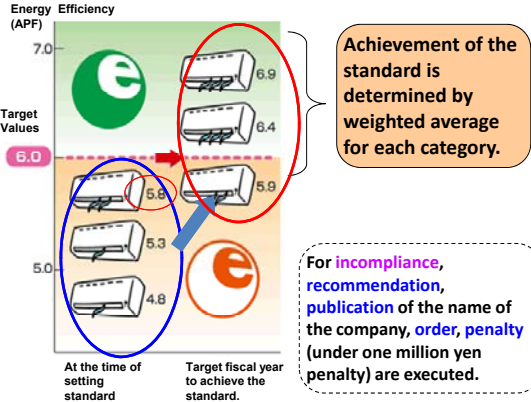


## Top Runner Program Encourages Technologies



**Purpose**

Top Runner program aims to **raise energy performance of future products above that of the most energy efficient product in the current market.**



**Achievement of the standard is determined by weighted average for each category.**

**For non-compliance, recommendation, publication of the name of the company, order, penalty (under one million yen penalty) are executed.**


**Regulated devices/appliances (23)**

1. Passenger cars	12. Heating stoves
2. Freight vehicles	13. Gas cooking appliances
3. Air conditioning units/systems	14. Gas water heaters
4. Television sets	15. Oil water heaters
5. Videotape recorders	16. Electric toilet seats
6. Lighting equipment	17. Vending machines
7. Copiers	18. Transformers
<b>8. Computers</b>	19. Electric rice cookers
<b>9. Magnetic disc devices</b>	20. Microwave ovens
10. Electric refrigerators	21. DVD recorders
11. Electric freezers	22. Routers
	23. Switching devices

➤ Under the Energy Conservation Act, energy efficiency target for household appliances and vehicles are determined by Top Runner method, and manufacturers (and importers) are obligated to meet the standards.

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## Three Requirements for Top Runner Program



**3 requirements to consider regulation under TR program.**

- (1) Devices and appliances that are **used in large volume** in Japan.
- (2) Devices and appliances that **consume a significant amount of energy** when in use
- (3) The presence of special need to improve efficiency in energy consumption by the device or appliance (for example, **device/appliance that has potential for better energy efficiency**)

Candidate Product Selection by METI

Working Group 1 year

Standard Committee

(product specific) Standard Sub-Committee

Up to 1 year

**10 Principles** (slide #5)

Scope, Category, Target Value, Measurement, Target Year, Evaluation, etc.)

Up to 1 year

- Report to WTO/TBT (Technical Barriers to Trade)
- Revision of Orders
- Enforcement of Standards

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## 10 Basic Principles for Top Runner program (1/3)



- Top Runner standards are established in compliance with the [Act concerning the Rational Use of Energy](#) and with the "Basic approach concerning the establishment and revision of the standards for manufacturers, etc., pertaining to the improvement of performance of specific appliances" for practical application of such standards that had been adopted by the [Energy Efficiency Standards Subcommittee](#) (revised at the 10th Meeting of the Energy Efficiency Standards Subcommittee under the Advisory Committee for Natural Resources and Energy; hereinafter called the "Top Runner Principles").

### Top Runner Principles

- 1. Scope of Regulation**
  - [\(1\) Target standard value \(standard energy consumption efficiency\):](#)
- 2. Establishment of criteria and target levels**
  - [\(2\) Category setting:](#)
  - [\(3\) Target Value Setting:](#)
  - [\(4\) Treatment of Additional Features in Setting Target Values:](#)
  - [\(5\) Treatment of High-priced, Highly Efficient Products:](#)
  - [\(6\) Exclusion of Customized Devices:](#)
  - [\(7\) Reduction of Stand-by Energy Consumption:](#)
- 3. Target Year**
  - [\(8\) Target year:](#)
- 4. Evaluation Method**
  - [\(9\) Method for evaluation of achievement:](#)
- 5. Measurement Method**
  - [\(10\) Measurement method:](#)

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## 10 Basic Principles for Top Runner program (2/3)



- 1. Scope of Regulation**
  - [\(1\) Target standard value \(standard energy consumption efficiency\):](#)  
The scope of regulation is defined with attention to the general structure, uses and forms of use of the product and **excludes** (a) devices that are used for special purposes; (b) devices for which **technical measurement methods** and **evaluation methods** are **yet to be established**, making establishment of target standard levels difficult; and (c) devices that are **extremely small in use in the marketplace**, etc.
- 2. Establishment of criteria and target levels**
  - Category setting:
  - Target Value Setting:
  - Treatment of Additional Features in Setting Target Values:
  - Treatment of High-priced, Highly Efficient Products:
  - Exclusion of Customized Devices:
  - Reduction of Stand-by Energy Consumption:

← To be explained in the next slide
- 3. Target Year**
  - [\(8\) Target year:](#)  
The target year is established for each product criterion in the **range of 3 to 10 years**, taking into account the **product development period** required for the specific device, **prospects in technology improvement**, etc.
- 4. Evaluation Method**
  - [\(9\) Method for evaluation of achievement:](#)  
Achievement is judged based on **a weighted average for each category** per manufacturers (vendors).
- 5. Measurement Method**
  - [\(10\) Measurement method:](#)  
The measurement method is based on **domestic and international standards**. If a standard exists, it is appropriate to implement the method in a way that assures **harmony with** such a standard to the best possible extent. Additionally, **if a standard does not exist** for the measurement method in question, it is appropriate to adopt a measurement method that is **practical, objective and quantitative**, based on the **actual uses** of the device in question.

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## 10 Basic Principles for Top Runner program (3/3)



### 2. Establishment of criteria and target levels

#### (2) Category setting:

Regulated devices are defined into categories based on specific indicators. However, such indicators (basic indicators) are indicators on physical volume, function, etc., that are closely linked to energy efficiency rates and are defined with attention to benchmarks that consumers employ in choosing products (those that represent typical consumer needs).

#### (3) Target Value Setting:

The target values are determined for each category under the basic indicators, in the form of a single numerical figure or related equation that is deemed plausible and suitable in increasing energy efficiency in the said criterion.

#### (4) Treatment of Additional Features in Setting Target Values:

In the definition of categories, additional features are ignored as a general rule. However, if the target standard value is defined with a product that does not have a certain function and if a product with the function in question may not be able to reach the target level, despite large market needs for such products, and may be forced to withdraw from the market, a separate criterion (sheet) may be created.

#### (5) Treatment of High-priced, Highly Efficient Products:

Although a criterion may be created for devices that are high-priced and highly energy-efficient, due to application of advanced energy-efficient technology, handling of such devices in a single criterion is recommended to the greatest possible extent, in order to enable manufacturers, etc., to actively market products with outstanding energy efficiency rates.

#### (6) Exclusion of Customized Devices:

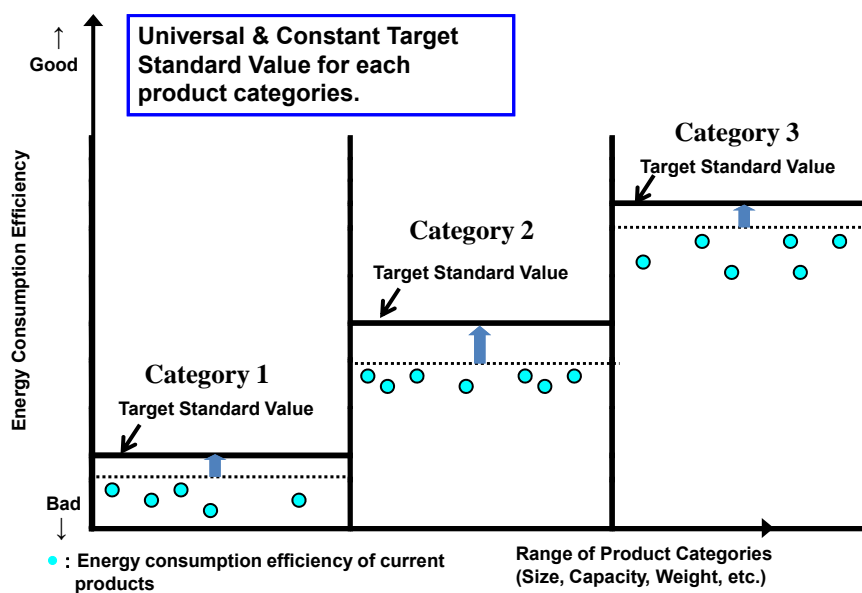
In the establishment of target values in a single criterion, customized devices are excluded. However, the technologies used for such customized devices may be reviewed in the study of energy efficiency improvement through technology development (to set the target value).

#### (7) Reduction of Stand-by Energy Consumption:

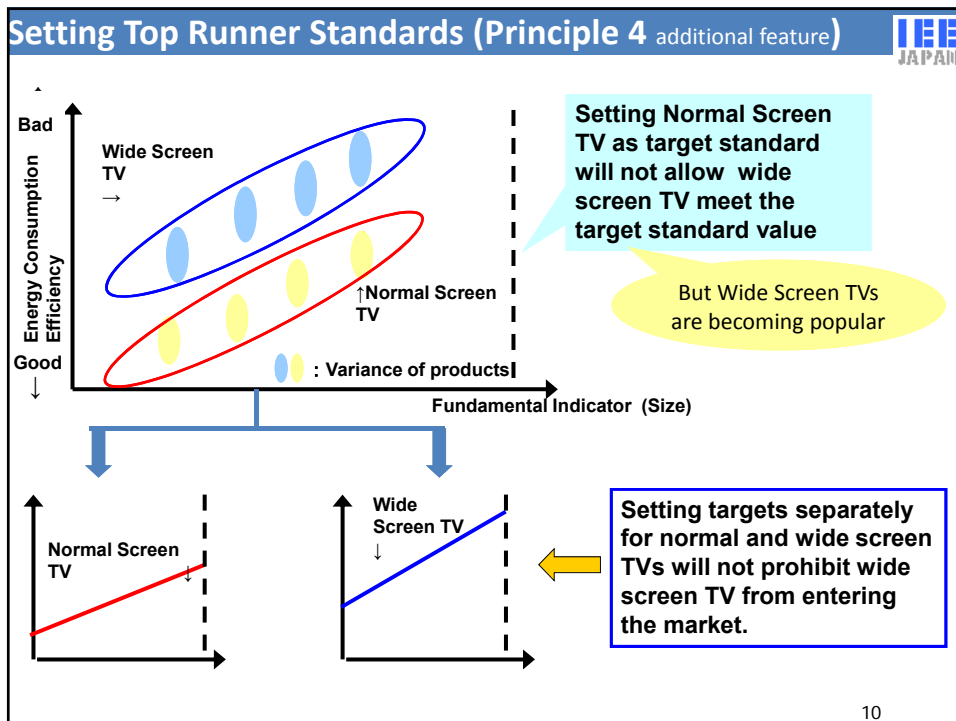
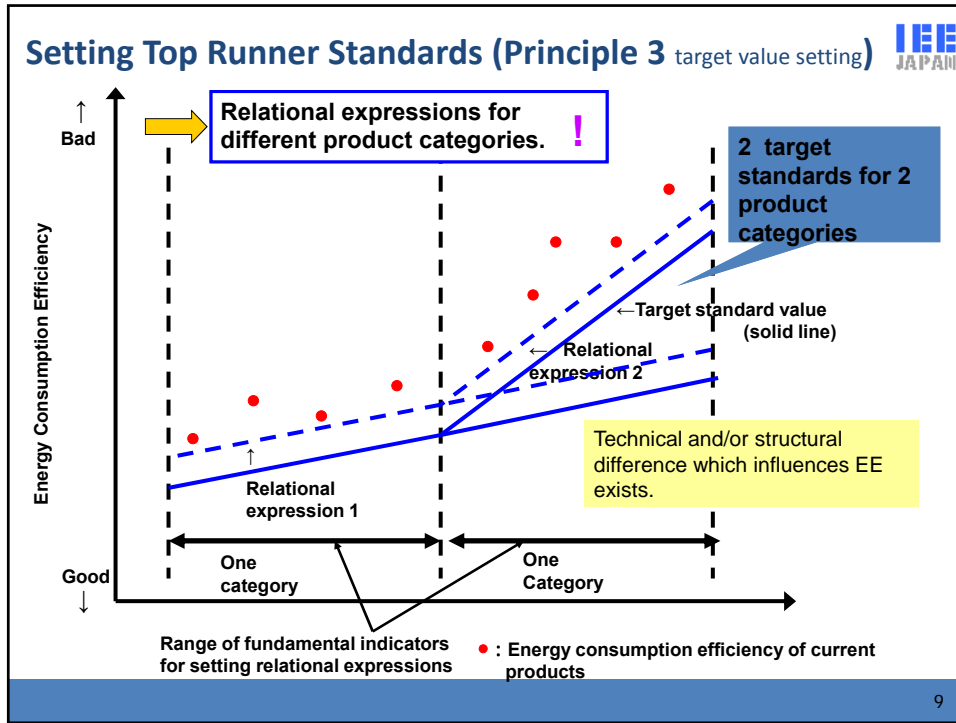
Target values for household appliances and office equipment must take into consideration the reduction of standby energy consumption.

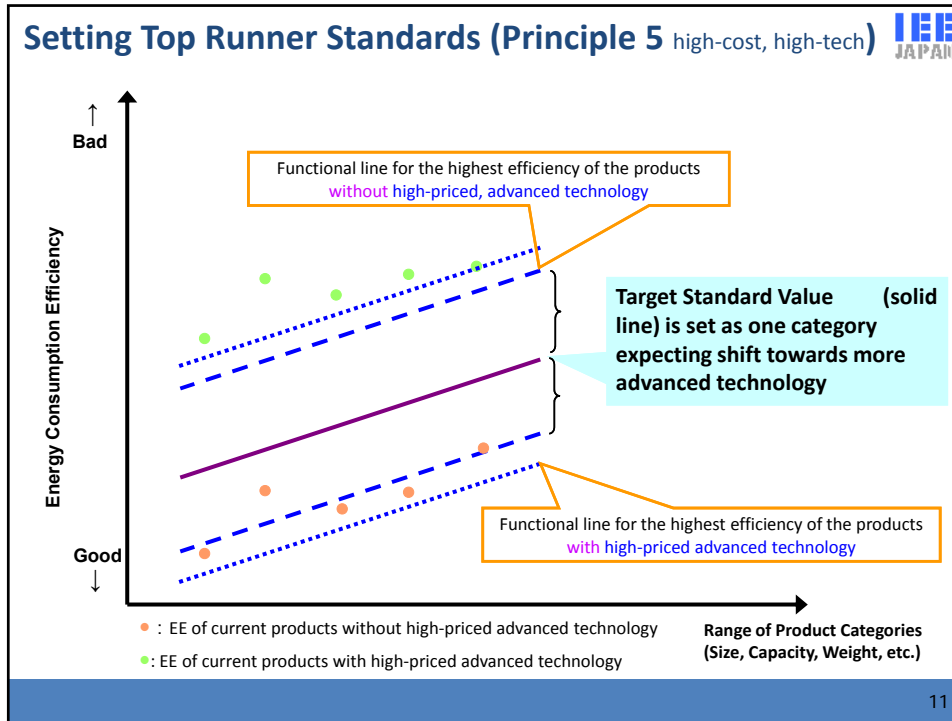
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## Setting Top Runner Standards (Principle 3 target value setting)



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### Example: Computer (FY2011 Top Runner Standard)

**(1) Target standard value (standard energy consumption efficiency):**  
It is product's energy consumption efficiency. Taking the best energy consumption divided by CTP (W/GTOPS) as a base, target standard values are decided with an allowance for technological improvement (except for mainframe servers which require longer period for development and thus the target is set at the top runner's level). \*CTP=Composite Theoretical Performance

**(2) Category:**  
For computers, products are divided into (1)Servers and (2)Client Type Computers (PC). Then further classified by CPU types, I/O slot counts, and CPU socket counts (servers), power source, memory channel counts, main memory capacities, and screen size speed (PCs).

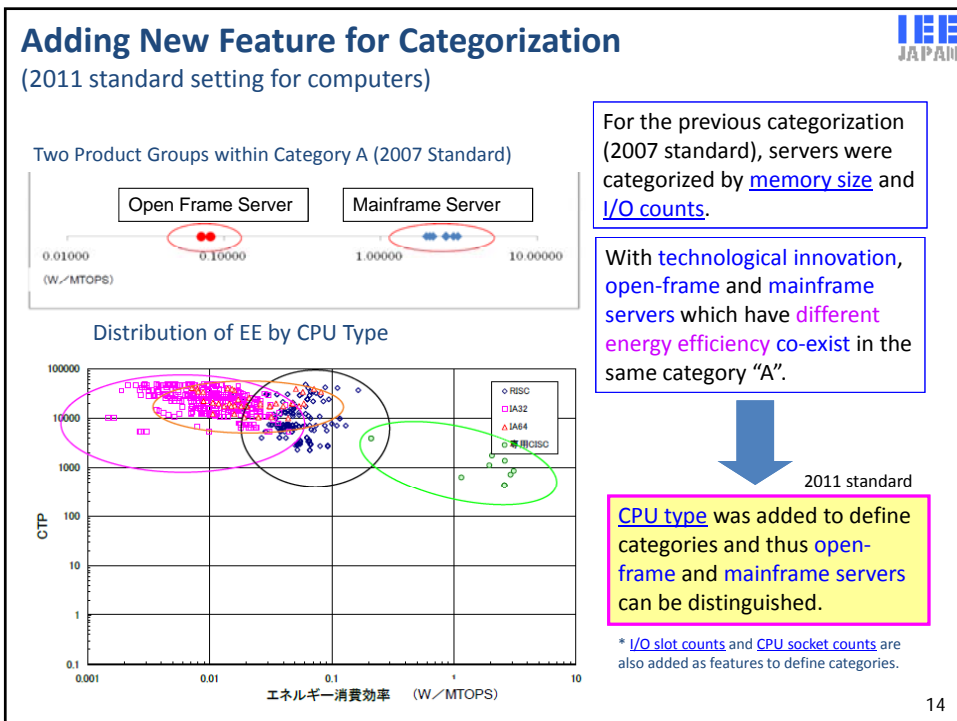
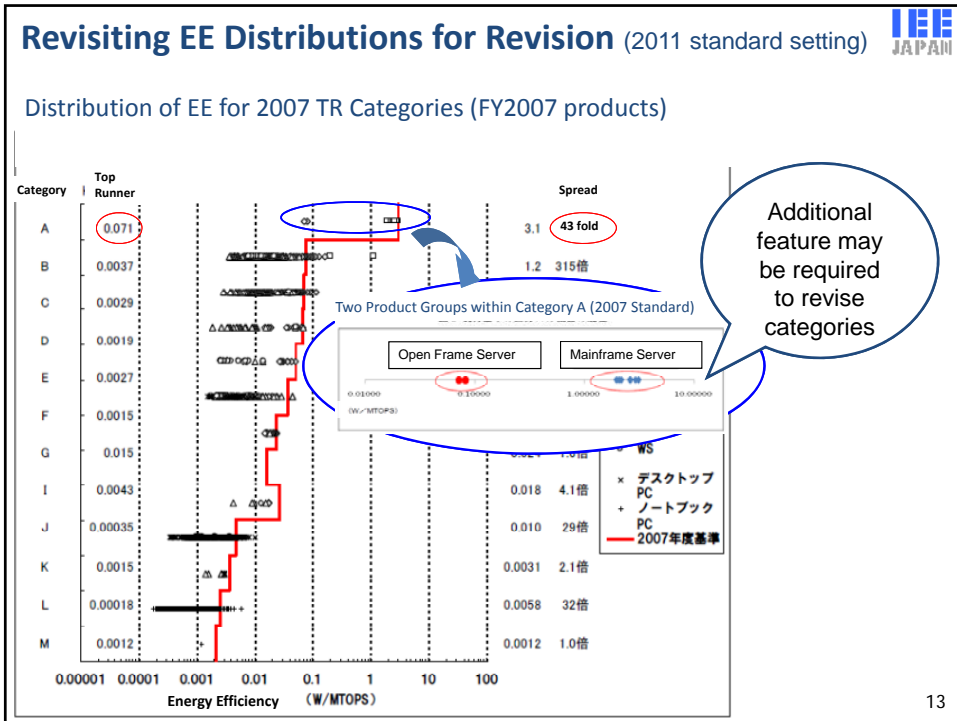
**(3) Target year:**  
For computers, the target fiscal year is FY 2011 and every fiscal year after that (the standard was developed in FY 2009).

**(4) Method for evaluation of achievement:**  
Achievement is judged based on a weighted average for each category per manufacturers (vendors).

**(5) Measurement method:**  
Measurement method takes into account **idling mode** and **low-power mode** (for PC).

**(6) Display:**  
Product's **energy consumption efficiency (W/GTOPS)** measured by the defined methodology is required to be displayed in catalogs, on product bodies, etc.

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## Recommendations

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Three points:

- **Revisiting categories** is essential in **revising national standards** to promote further **EE improvement** and where **technology innovation** is expected.
  - ➔ Setting **basic principles** assists such analyses and discussion.
- It is important to **develop** “**National Standards**” for **power consumption measurement methodologies aligning with** “**International Standards**”.
- Each **economy** should develop its **National Standard** reflecting the users’ “**actual usage patterns**” in the **economy** and **aligning with** “**the latest**” **International Standards** (as in **Top Runner’s Principle #10**).

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- Development of **National Standards** based on **International Standards** observing the basic principles of WTO/TBT leads to **promotion of international trade and investment**.
- This is in line with **APEC/SCSC activities** which aim at **avoiding unnecessary standards and conformity assessment procedures** which may **prevent promotion** of trade and investment.

**Thank you for your attention! Any question?**

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## 1. The Top Runner Program (1) Outline of the Top Runner Program

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○ Energy conservation standards based on the Top Runner Program was introduced for motor vehicles, household appliances, etc., under the 1996 amendment of the Act concerning the Rational Use of Energy. As of 2011, 23 product categories are being regulated.

<Devices regulated by the Top Runner Program based on the Act concerning the Rational Use of Energy>

(1) The fuel efficiency standards for motor vehicles and standards for regulating manufacturers, etc., pertaining to improvement in performance of specific devices and equipment such as electrical appliances (household and office devices and equipment), etc., (hereinafter called “energy conservation standards”) are to be **established with attention to the performance of the most energy-efficient (top runner) products currently in the market and to future prospects in technology development** in order to promote further improvement in energy efficiency of devices and appliances.

(2) Devices and appliances specified for regulation under the Top Runner Program are those that consume energy and at the same time satisfy the following **3 requirements**.

(1) Devices and appliances that are **used in large volume** in Japan.  
 (2) Devices and appliances that **consume a significant amount of energy** when in use  
 (3) The presence of special need to improve efficiency in energy consumption by the device or appliance (**device/appliance that has potential for better energy efficiency**)

**Example of Top Runner approach**

Fuel efficiency (km/L)

At establishment of standard: 12km/L, 13km/L, 14km/L, 15km/L

Target year: 15km/L, 17km/L, 18km/L, 19km/L

Achievement judged with the weighted average for each product criterion

Energy-saving standard based on the Top Runner approach

**Regulated devices/appliances (23)**

1. Passenger cars	9. Magnetic disc devices	17. Vending machines
2. Freight vehicles	10. Electric refrigerators	18. Transformers
3. Air conditioning units/systems	11. Electric freezers	19. Electric rice cookers
4. Television sets	12. Heating stoves	20. Microwave ovens
5. Videotape recorders	13. Gas cooking appliances	21. DVD recorders
6. Lighting equipment	14. Gas water heaters	22. Routers
7. Copiers	15. Oil water heaters	23. Switching devices
8. Computers	16. Electric toilet seats	

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## Reference: Outcome of the Top Runner Program



Equipment	Improvement of energy efficiency (Achieved)	(Expected)
TV sets (CRT televisions)	25.7 % (FY1997→FY2003)	16.4%
Video-cassette recorders	73.6 % (FY1997→FY2003)	58.7%
Air-conditioners * (Room air-conditioners)	67.8 % (FY1997→FY2004)	66.1%
Electric refrigerators	55.2 % (FY1998→FY2004) 43.0 % (FY2005→FY2010)	30.5% 21.0%
Electric freezers	29.6 % (FY1998→FY2004) 24.9 % (FY2005→FY2010)	22.9% 12.7%
Gasoline passenger vehicles *	22.8 % (FY1995→FY2005)	22.8%(1995→2010)
Diesel trucks *	21.7 % (FY1995→FY2005)	6.5%
Vending machines	37.3 % (FY2000→FY2005)	33.9%
Computers	80.8 % (FY2001→FY2007)	69.2%
Magnetic disc units	85.7 % (FY2001→FY2007)	71.4%
Fluorescent lights *	35.7 % (FY1997→FY2005)	16.6%

**Bigger improvement than expected!**

\* The energy conservation criteria for the products marked \* are fixed by the energy consumption efficiency per unit (for example, km/l), while the energy conservation criteria for those not marked \* are fixed by the amount of the energy consumption (for example: kWh/year). The "improvement of energy consumption efficiency" said in the above table indicates the improvement factor based on each criteria (for example: if 10km/l becomes 15km/l, it is regarded as 50% improvement (not that fuel consumption was improved by 33%, i.e. from 10 liter to 6.7 liter consumed to drive 100km), and if 10kWh/year becomes 5kWh/year, it is regarded as 50% improvement).