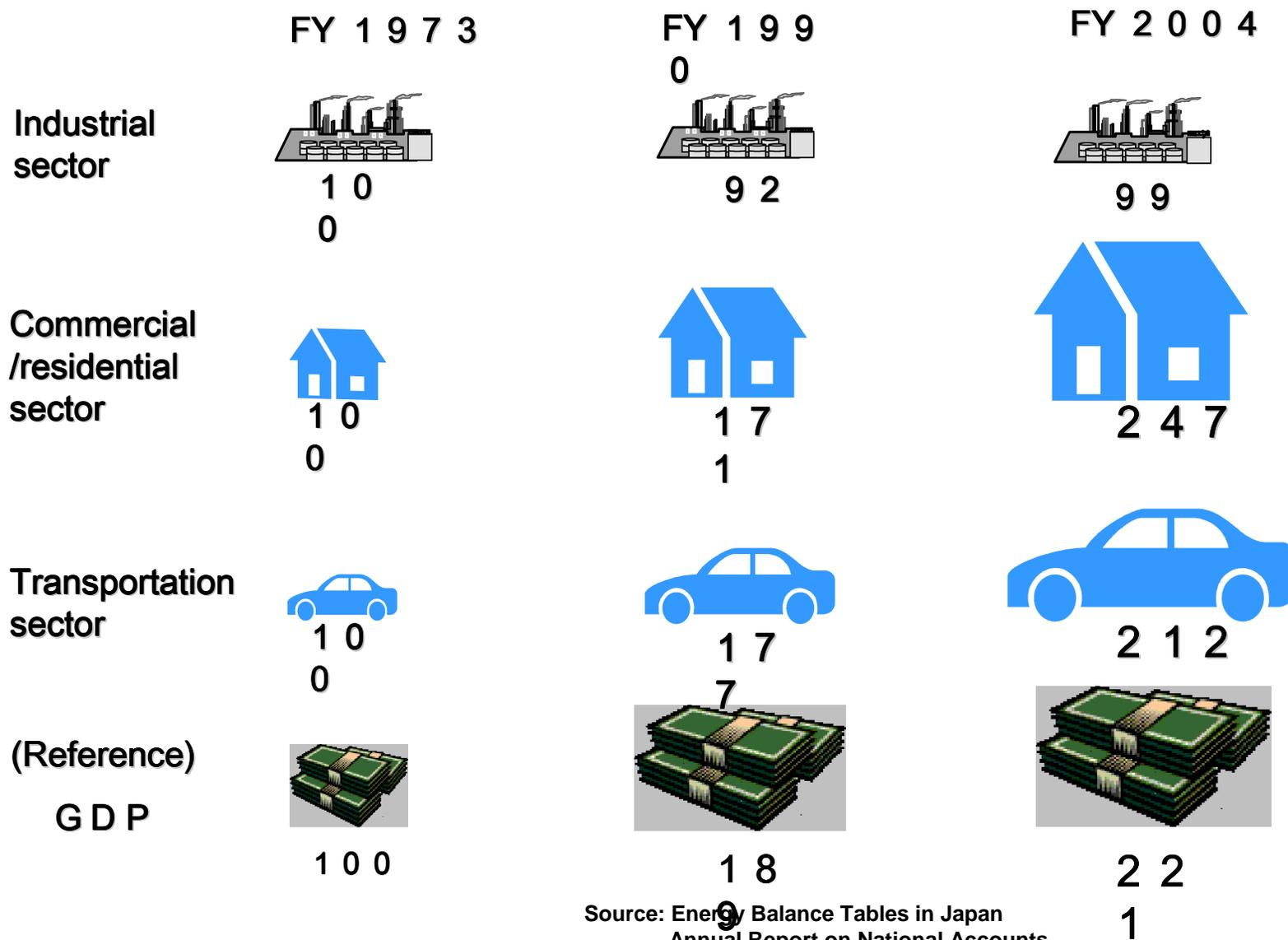


Japanese Experiences in Greenhouse Gas Emission Mitigation

Energy Conservation Center
Kayo Hayai

Transition of Final Energy Consumption in Japan



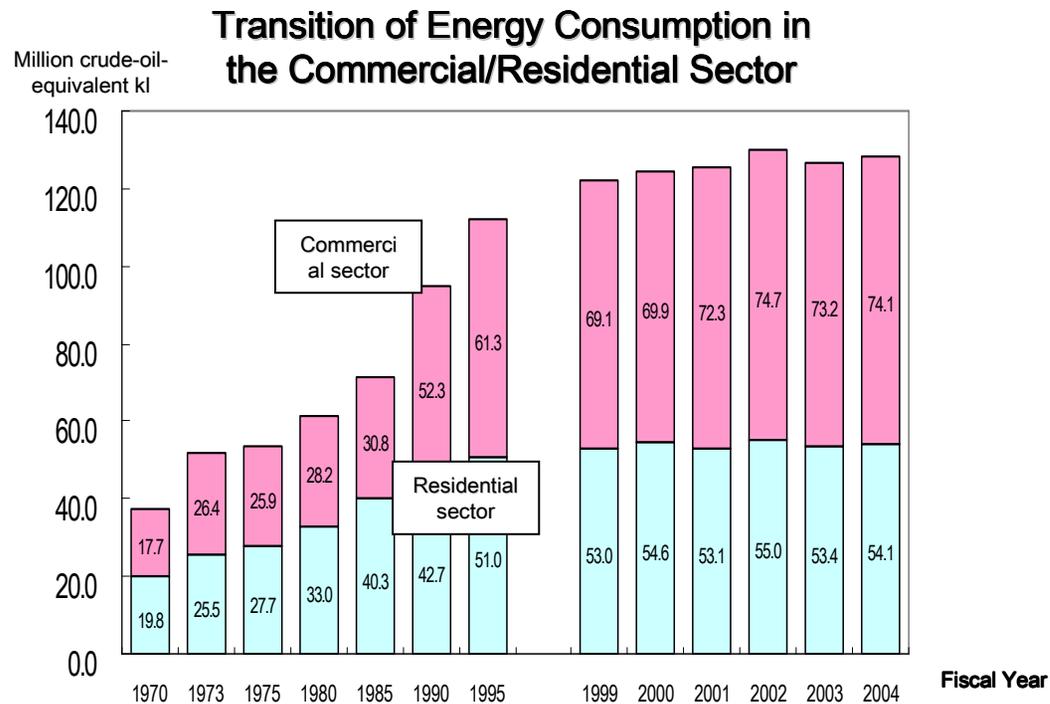
Source: Energy Balance Tables in Japan
Annual Report on National Accounts

(Note) The GDP is real GDP based on 1995 prices according to 93SNA.

Transition of Energy Consumption in the Commercial/Residential Sector

7 March 2007 ECCJ

- Energy consumption in the commercial/residential sector surged after the oil crisis and is still growing.
- Energy consumption is increasing in both of the commercial and the residential sectors.

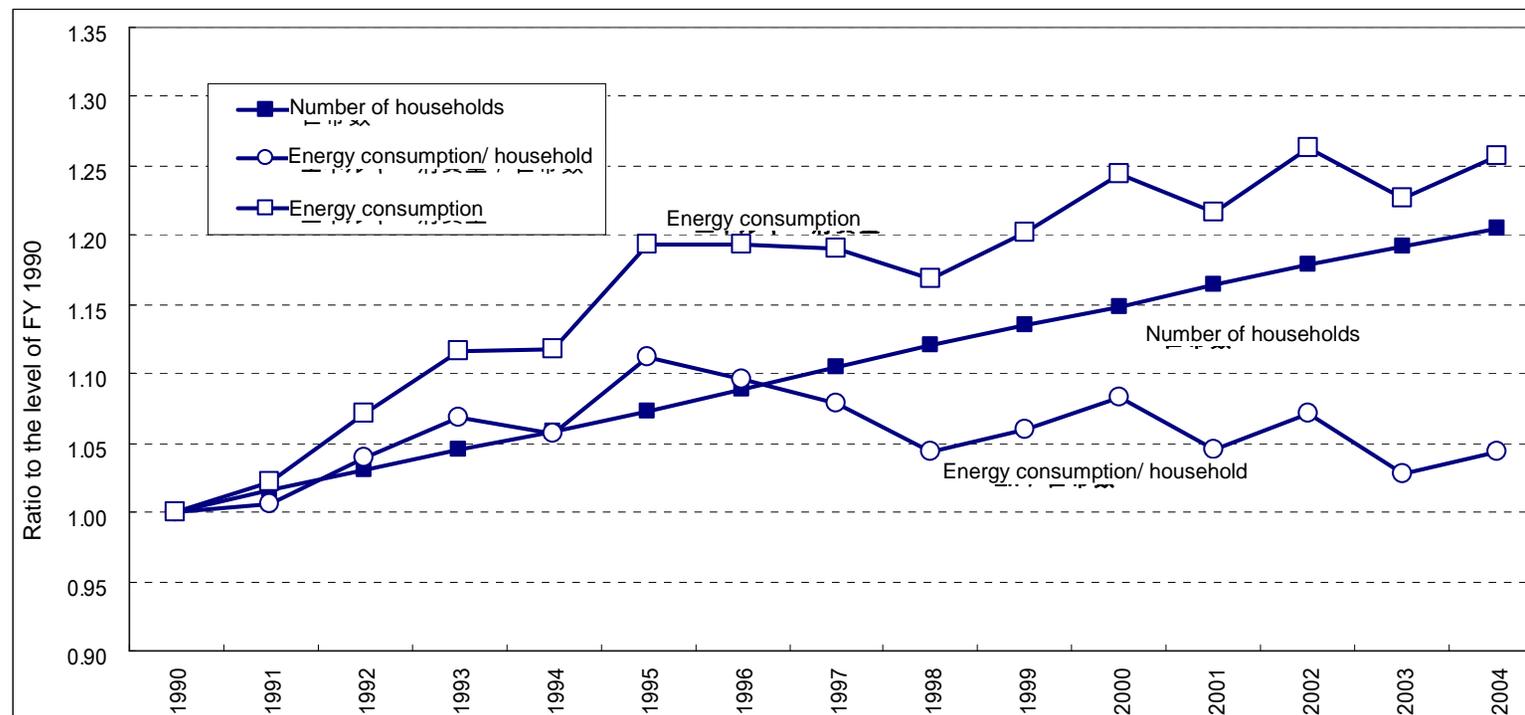


Source : Energy Balance Tables in Japan

Transition of Energy Consumption in the Residential Sector

- Energy consumption in the residential sector has made a steady increase due to changes in the social structure (e.g. increase of number of households).
- Despite the fact that energy efficiency of individual appliances has been improving, energy consumption per household remains on the same level, due to lifestyle change and other factors.

Transition of Energy Consumption and Number of Households

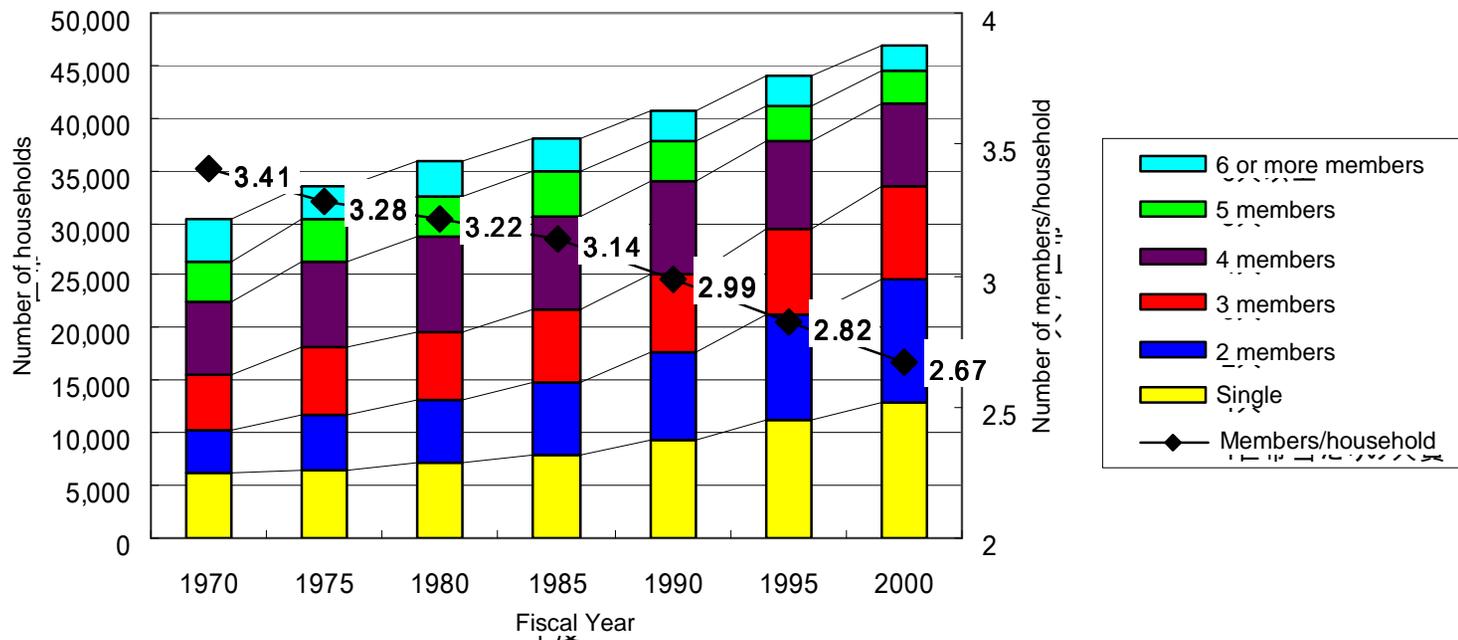


Compiled by Agency for Natural Resources and Energy based on Handbook of Energy & Economic Statistics in Japan

Transition of Number of Households and Household Members

- Number of single-person households and two-person households is increasing steadily. It contributes to the increase of total number of households.
- Number of members per household is decreasing year after year.

Transition of Number of Households and Household Members



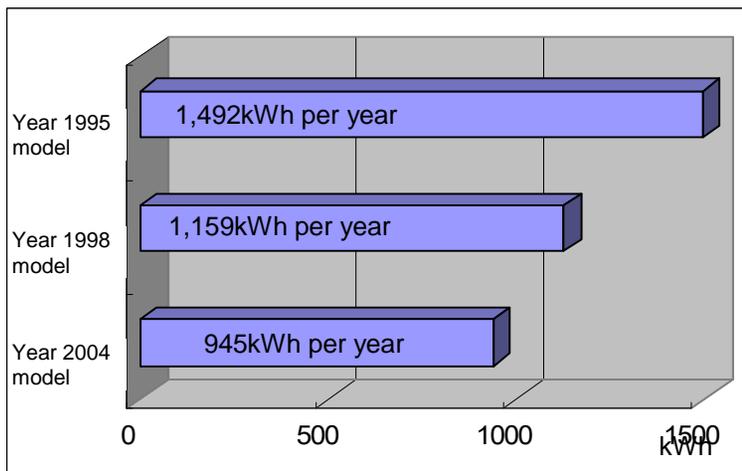
Source: The Population Consensus

Ownership Status of Energy Consuming Appliances in Household

- Many of appliances have improved their energy efficiency. On the other hand, in some appliances, number of which owned per household is increasing. As a result, energy consumption per household is rising.

Efficiency Improvement Status of Air Conditioners

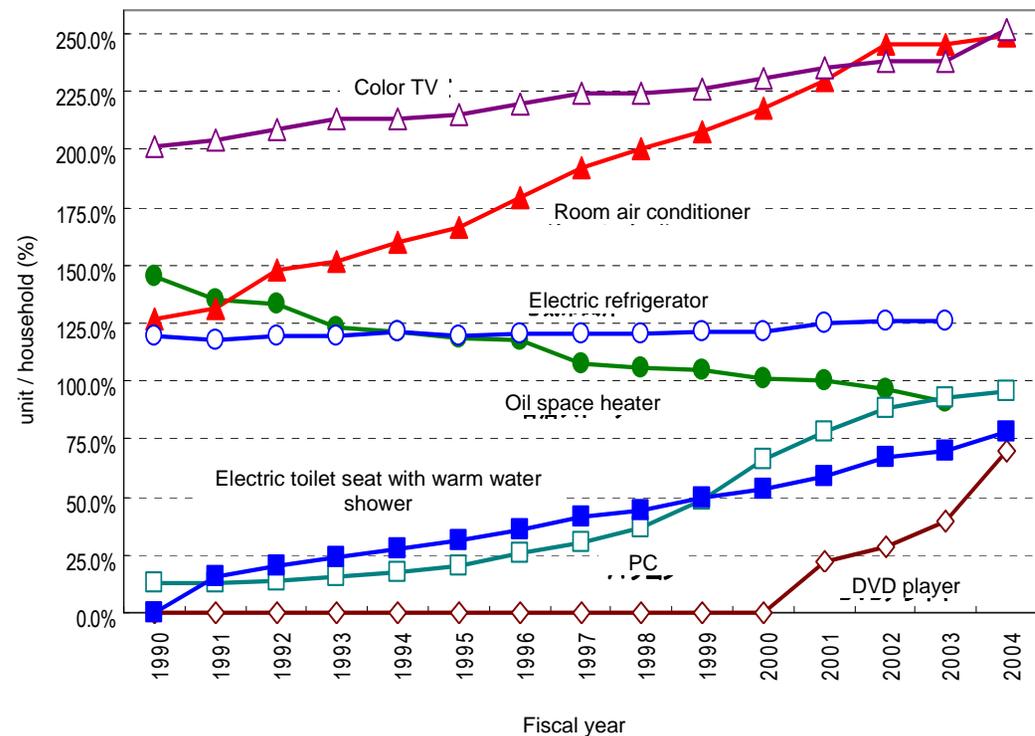
Transition of performance of cooling-cum-heating, wall-mounted type air conditioners with cooling capacity of 2.8 kW class (for a 10 tatami-mat room)



Standard of Japan Refrigeration and Air Conditioning Industry Association

Source: JRA4046 (Standard for the calculation of periodic power consumption of room air conditioners)

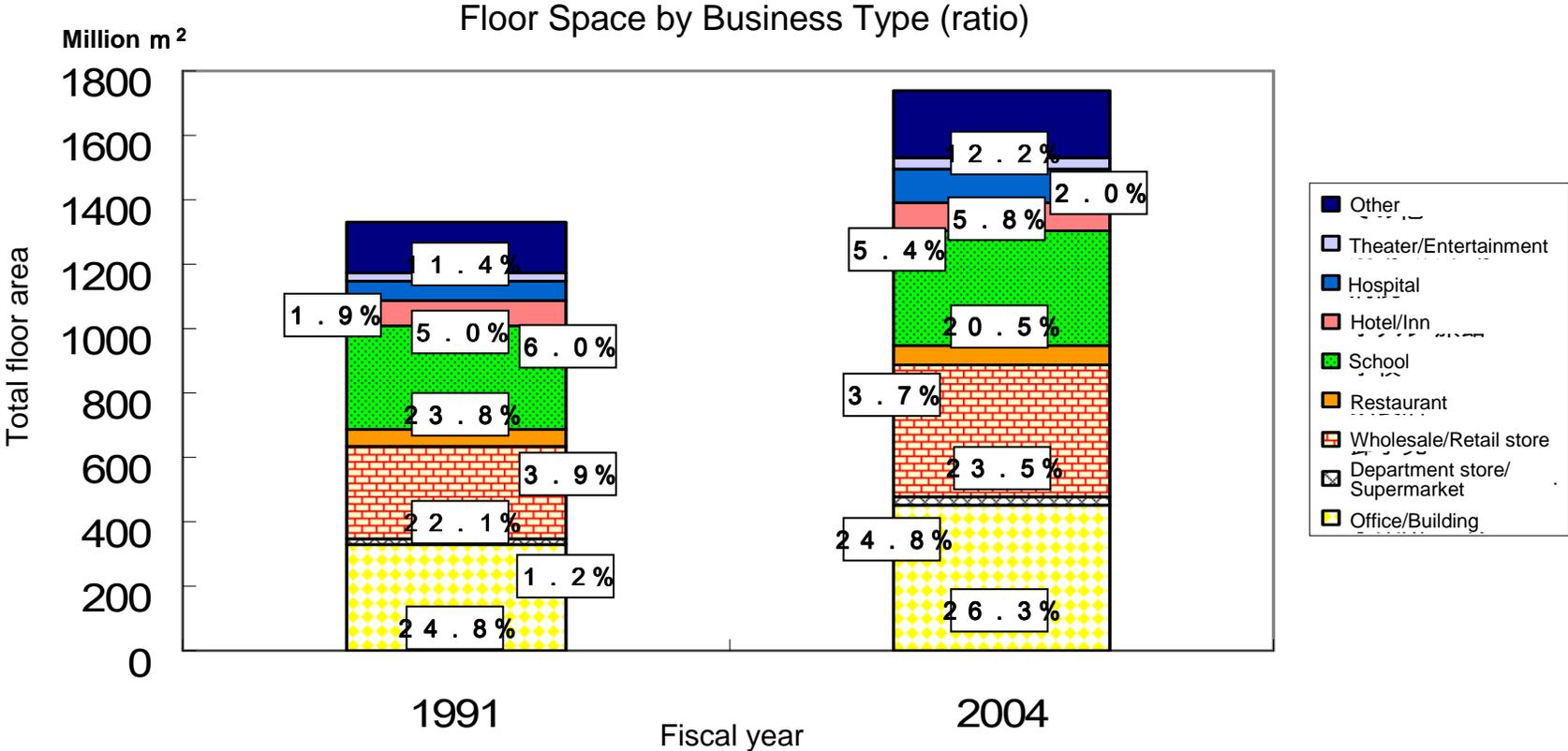
Penetration of Appliances



Source: FY 2006 Handbook of Energy & Economic Statistics in Japan

Transition of Floor Space by Type of Business in the Commercial Sector

- Energy consumption in the commercial sector increases along with an increase in total floor area of offices, business buildings, etc.
(Floor area increases by an average of 2.2% annually, and energy consumption increases by an average 1.6% annually.)

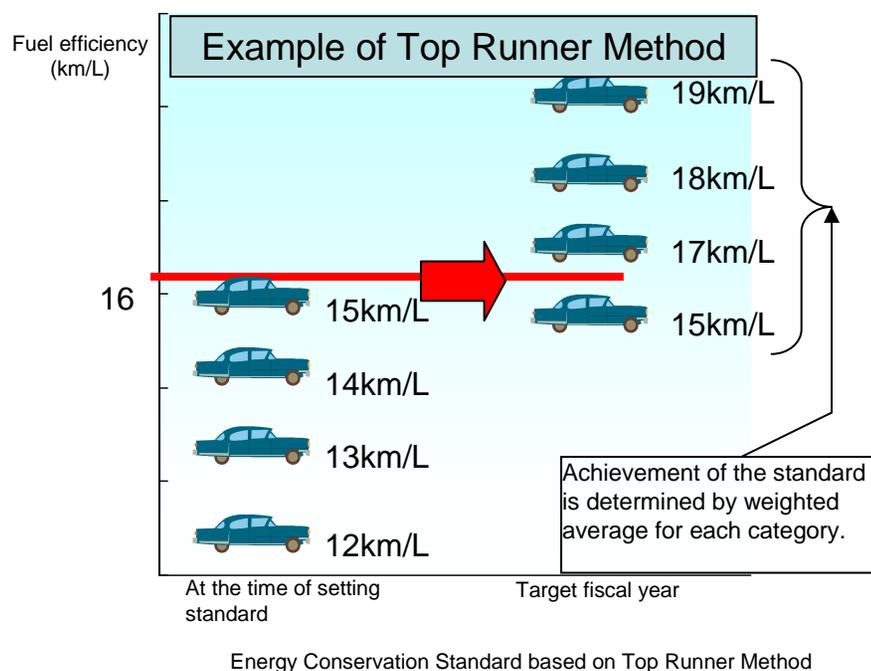


Source: Handbook of Energy & Economic Statistics in Japan
(Note) The figures in the graph represent each industry's floor area ratio against the industry total.

2. Top Runner Program

Top Runner Program

- Under Energy Conservation Law, energy conservation standards for appliances and vehicles are determined by Top Runner method, and manufacturers (vendors) are obligated to meet the standards. For those failing to comply with the obligation, punitive actions (e.g. recommendation, publication of failure, order, penal charge up to 1 million yen) are taken against.
- From FY 2006, the target products are increased to 21. LCD and plasma TV sets, electric rice cookers, microwave ovens, etc. are newly added.



Designated Products (21 products categories)

- | | |
|------------------------------|------------------------------|
| 1 . Passenger vehicles | 1 2 . Space heaters |
| 2 . Freight vehicles | 1 3 . Gas cooking appliances |
| 3 . Air conditioners | 1 4 . Gas water heaters |
| 4 . TV sets | 1 5 . Oil water heaters |
| 5 . VCRs | 1 6 . Electric toilet seats |
| 6 . Fluorescent lamps | 1 7 . Vending machines |
| 7 . Copiers | 1 8 . Transformers |
| 8 . Computers | 1 9 . Electric rice cookers |
| 9 . Magnetic disk units | 2 0 . Microwave ovens |
| 1 0 . Electric refrigerators | 2 1 . DVD recorders |
| 1 1 . Electric freezers | |

* Top Runner Method

Idea that is to set fuel efficiency standards for vehicles and energy conservation standards for appliances above the levels of best-performing vehicles/appliances currently sold in the market.

What is Top Runner Program? (Example: TV Sets)

(1) Target standard value (standard energy consumption efficiency):

It is product's annual energy consumption, expressed as energy consumption efficiency. Taking the best annual energy consumption (kWh/year) as a base, target standard values are decided with an allowance for technological improvement.

(2) Category:

For TV sets, products are classified by display device (CRT, LCD, or plasma), aspect ratio, number of pixels, TV receiver size, with/without DVD play function, and other additional functions.

(3) Target fiscal year:

For CRT TV sets, the target fiscal year is FY 2003 and every fiscal year after that (the standard was developed in FY 1999).

For LCD and plasma TV sets, the target fiscal year is FY 2008 and every fiscal year after that (the standard was developed in FY 2005).

(4) Method for evaluation of achievement:

Achievement is judged based on a weighted average for each category per manufacturers (vendors).

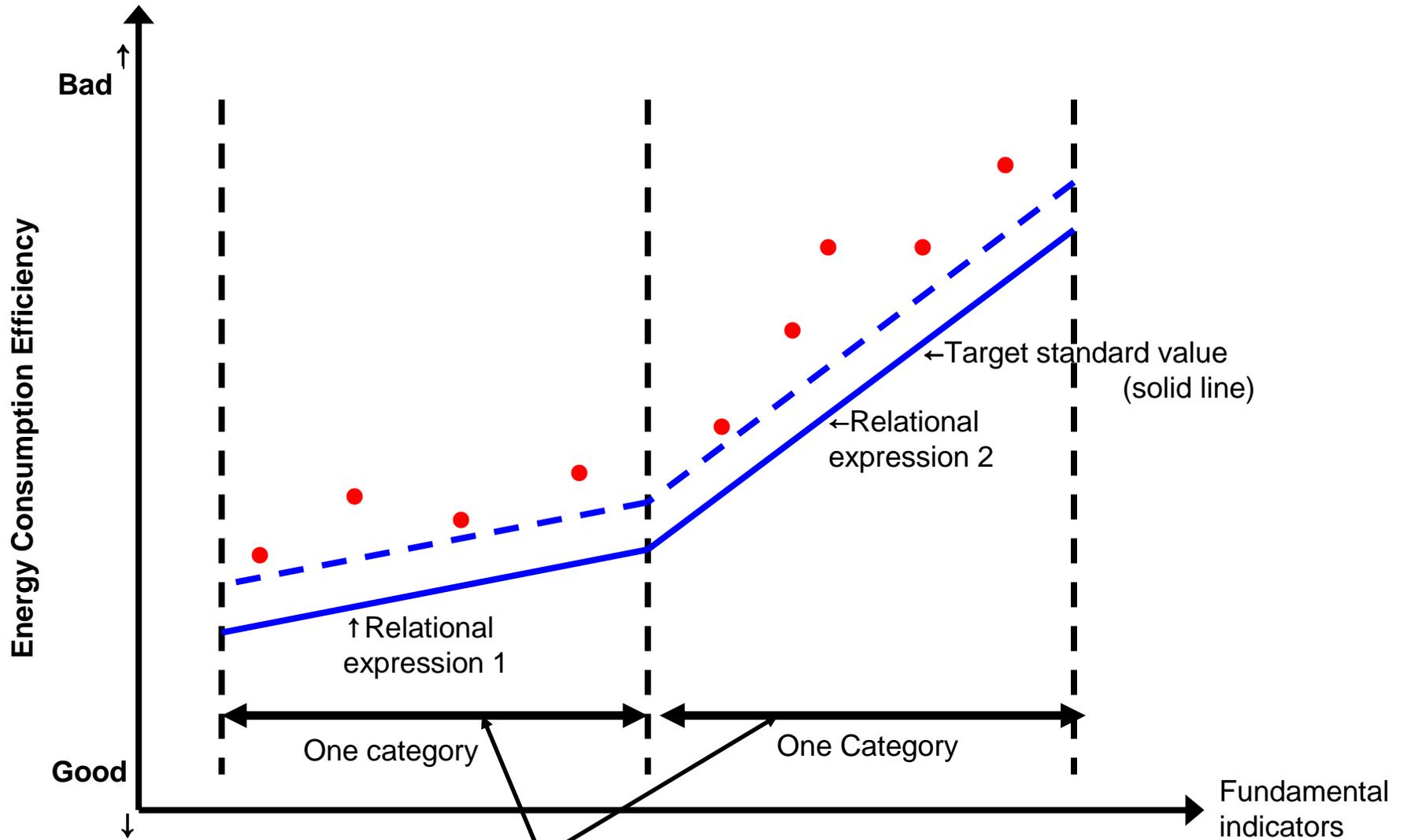
(5) Measurement method:

Measurement method which takes into account hours of use based on the actual status is adopted.

(6) Display:

Product's annual energy consumption is required to be displayed in catalogs, on product bodies, etc.

Concept of Setting Top Runner Standards

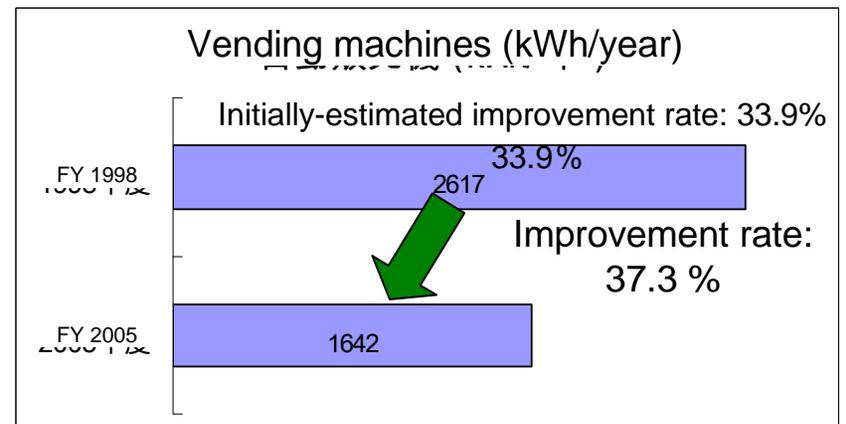
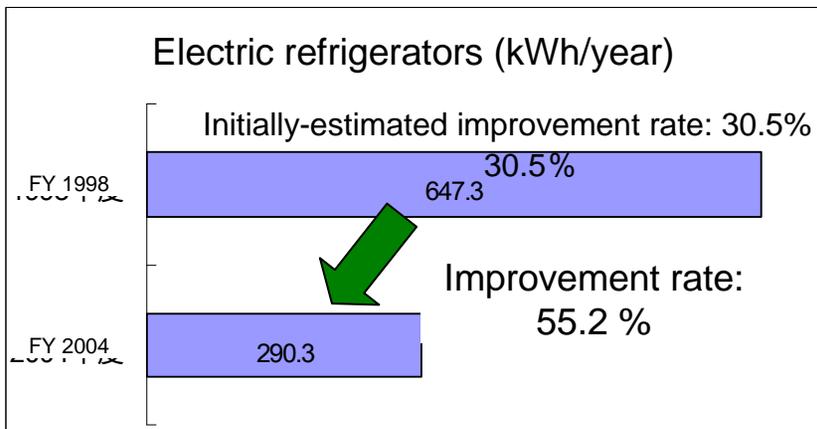
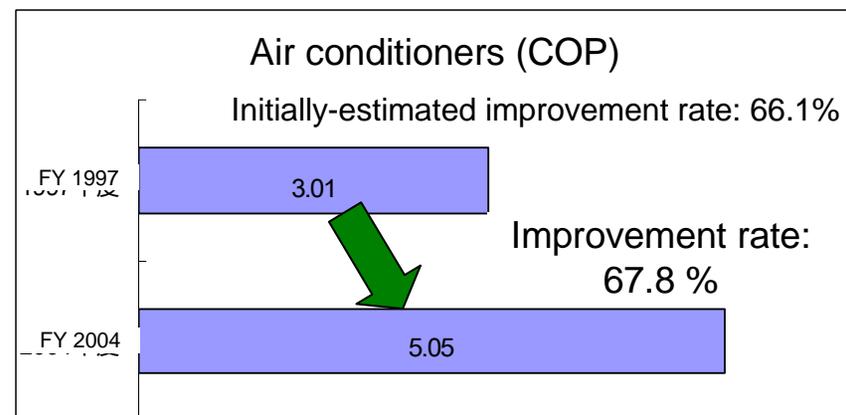
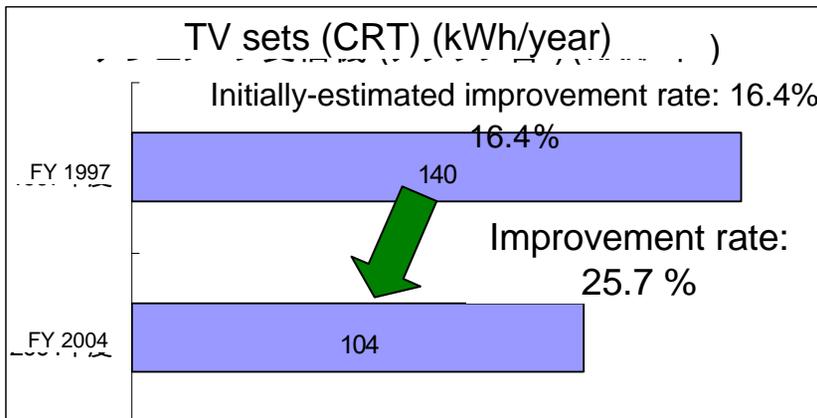


Range of fundamental indicators for setting relational expressions

• : Energy consumption efficiency of current products

Effect of Top Runner Program

- 6 years has passed since the introduction of Top Runner standards; and, TV sets, air conditioners (room AC), electric refrigerators, etc. reached their target fiscal years respectively.
- Due to the efforts made by manufacturers (vendors), products' efficiency has improved more than the legal standards, which means that efficiency improvement above the initial expectation was achieved.



Revision of Top Runner Standards

- For products which reach their target fiscal years, new target standard values are set. In addition, classification of products and measuring methods are also reviewed if necessary.

Air conditioners: for non-ducted and wall-mounted type, cooling capacity of 4.0 kW or below

- Evaluation of the target standard values in 2004 freezing year (2003 Oct through 2004 Sept)
 - Weighted average of COP : 3.01 ('97 freezing year) → 5.05 ('04 freezing year), improved by 67.8%
- Establishment of new target standard values for FY 2010
 - Revision of energy consumption efficiency and measuring methods
 - Average cooling/heating COP
 - APF (Annual Performance Factor), in which occurrence hours of outside air temperature during cooling/heating periods and evaluation of efficiency along with performance change of inverters are taken into consideration, and the measuring method based on APF (JIS C 9612:2005) are adopted.
 - Weighted average APF : 4.9 (FY'05 actual) → 6.0 (FY 2010 target), improved by 22.4% (estimation)

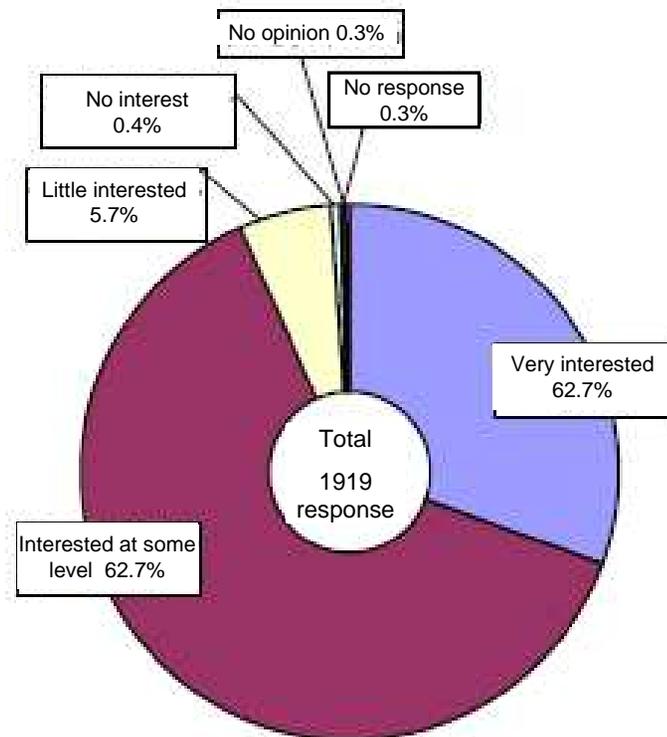
Electric refrigerators: for each category by direct cooling (natural convection) / indirect cooling (forced convection), capacity, and type of doors

- Evaluation of the target standard values in FY 2004
 - Weighted average of energy consumption efficiency :
 - 647.3 kWh/y ('98) → 290.3 kWh/y ('04), improved by 55.2 %
- Establishment of new target standard values for FY 2010
 - Revision of energy consumption efficiency and measuring methods
 - Measuring methods are revised so that ambient temperature, adjustment of inside temperature, installation condition, etc are set close to the actual status of use. JIS C 9801:2006 is adopted.
 - Weighted average of energy consumption efficiency :
 - 572 kWh/y (FY'05 actual) → 452 kWh/y (FY 2010 target), improved by 21 % (estimation)

3. Provision of Information by Retailers on Energy Saving

Importance of the Role played by Appliance Retailers

- Even though energy efficient products are manufactured, their energy saving effects will not be exercised, unless consumers purchase them.
- Increasing consumers' awareness about energy saving, popularization of energy efficient products by means of accurately providing needed information is required. (The ratio of consumers interested in energy saving is at high level such as 93.3%.)

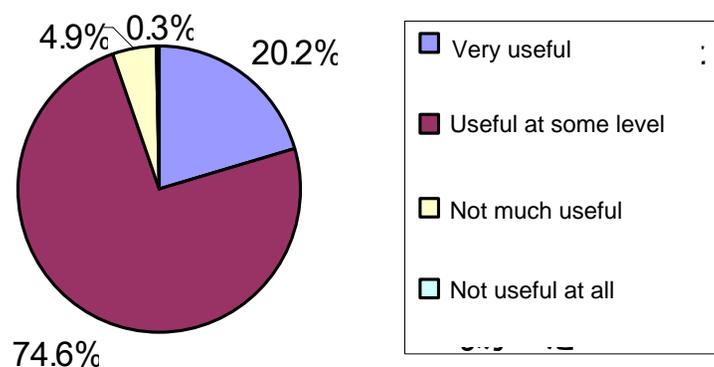


Source: National Livelihood Monitoring Research (FY 2005)

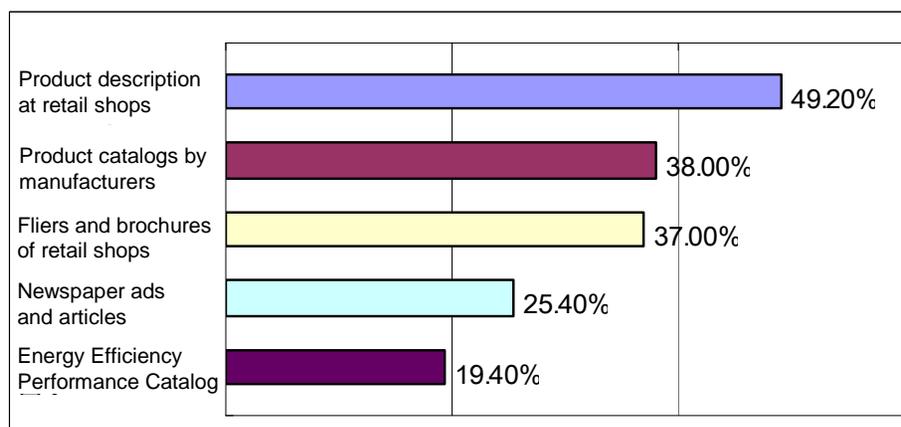
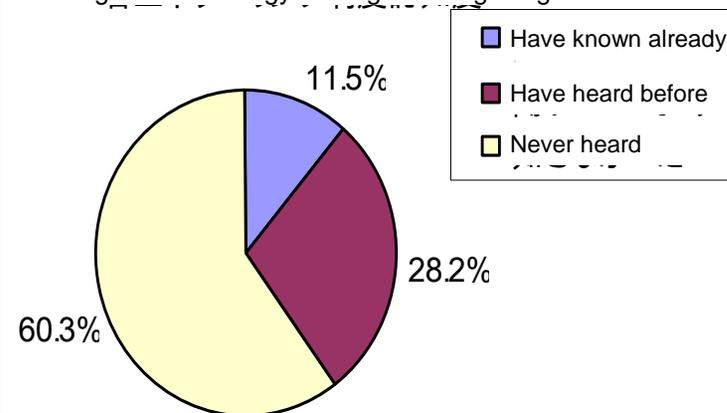
Importance of the Role played by Appliance Retailers

- 94.8% of people who recognize Energy-Saving Label replies that the label was useful.
- Recognition rate for Energy-Saving Label is 39.7%. Further promotion is needed.
- Among media for Energy-Saving Label being recognized, information from retailers is the highest. Therefore, provision of information by retailers, who have direct contact with consumers, is essential.

Effectiveness of Energy-Saving Label at the time of Product Selection



Recognition of Energy-Saving Labeling Program



Source:

Survey Report on Penetration of Energy-Saving Labeling Program (FY 2005)

Energy-Saving Labeling Program

- Energy-Saving Labeling Program was started in Year 2000. The purpose of this program is to promote popularization of highly energy efficient products, by means of providing information to consumers on their energy efficient performance.
- Although it is a voluntary program based on JIS standards, Energy-Saving Labels are actively utilized in product catalogs by manufacturers and point-of-purchase displays at retail stores.

Display Examples of Energy-Saving Labels

(Product catalog by manufacturers)

REC (録画) 1080 ALIS PANEL
XCodeHD ViXS 1080 ALIS PANEL
MasterHD

2系統2端子 HDMI

42V プラズマ

ハイビジョンHDDレコーダー内蔵、
U/V 地上・BS・110度CSデジタル
42V型デジタルハイビジョン
プラズマテレビ
W42P-HR9000
オープン価格 122、318 (税別)

●テレビ本体質量: 34.8kg
●テレビ本体寸法: 幅113.4×高さ64.8×奥行9.9
(下部最大奥行10.9)cm
*JIS C 61000-3-2 適合品
スィーベルスタンド別売
*テレビ単体では自立しません。

| Energy conservation standard achievement percentage | Annual energy consumption |
|---|------------------------------------|
| <p>省エネ基準達成率 108%</p> <p>目標年度 2006年度</p> | <p>年間消費電力量 175kWh/年</p> |
| Target fiscal year | |
| <p>省エネ基準達成率 91%</p> <p>目標年度 2006年度</p> | <p>年間消費電力量 206kWh/年</p> |

- As of April 2006, Energy-Saving Labeling Program has 13 target products: air conditioners, electric refrigerators, electric freezers, fluorescent lamps, TV sets, space heaters, gas cooking appliances, gas water heaters, oil water heaters, electric toilet seats, computers, magnetic disk units, and transformers.

Labeling Program for Appliance Retailers

- In order to promote further positive purchase of energy efficient products among consumers, a labeling program for retailers regarding an easily-understandable label on performance was introduced.
- In the revised Energy Conservation Law that went into effect in April 2006, obligation of retailers to make efforts for information provision was included. The program was officially launched in October 2006.

| Products | Energy-Saving Labeling Program | Expected annual electricity bill | Uniform Energy Saving Label (*) |
|------------------------|--------------------------------|----------------------------------|---------------------------------|
| Air conditioners | ○ | ○ | ○ |
| Electric refrigerators | ○ | ○ | ○ |
| Electric freezers | ○ | ○ | |
| Fluorescent lamps | ○ | ○ | |
| Electric toilet seats | ○ | ○ | |
| TV sets | ○ | ○ | ○ |
| Computers | ○ | | |
| Magnetic disk units | ○ | | |

| Products | Energy-Saving Labeling Program | Expected annual electricity bill | Uniform Energy Saving Label (*) |
|------------------------|--------------------------------|----------------------------------|---------------------------------|
| Space heaters | ○ | | |
| Gas cooking appliances | ○ | ○ (Fuel usage) | |
| Gas water heaters | ○ | ○ (Fuel usage) | |
| Oil water heaters | ○ | ○ (Fuel usage) | |
| Transformers | ○ | | |
| Electric rice cookers | Due to be applied | ○ | |
| Microwave ovens | Due to be applied | ○ | |
| VCR | | ○ | |
| DVD | Due to be applied | ○ | |

* Energy-Saving Label, electricity bill and energy saving information based on a multistage rating system are provided in a uniform fashion, as Uniform Energy Saving Label.

Uniform Energy Saving Label



Uniform Energy Saving Label

[Multistage rating system]

- Energy saving performance of a product is rated according to 5-level criteria. From the best performance to the worst, products in the market are expressed as from 5-star to 1-star.
- In order to clarify how many stars are given to products meeting Top Runner standards, arrows are displayed under the stars to show a borderline of 100% achievement of the standards.

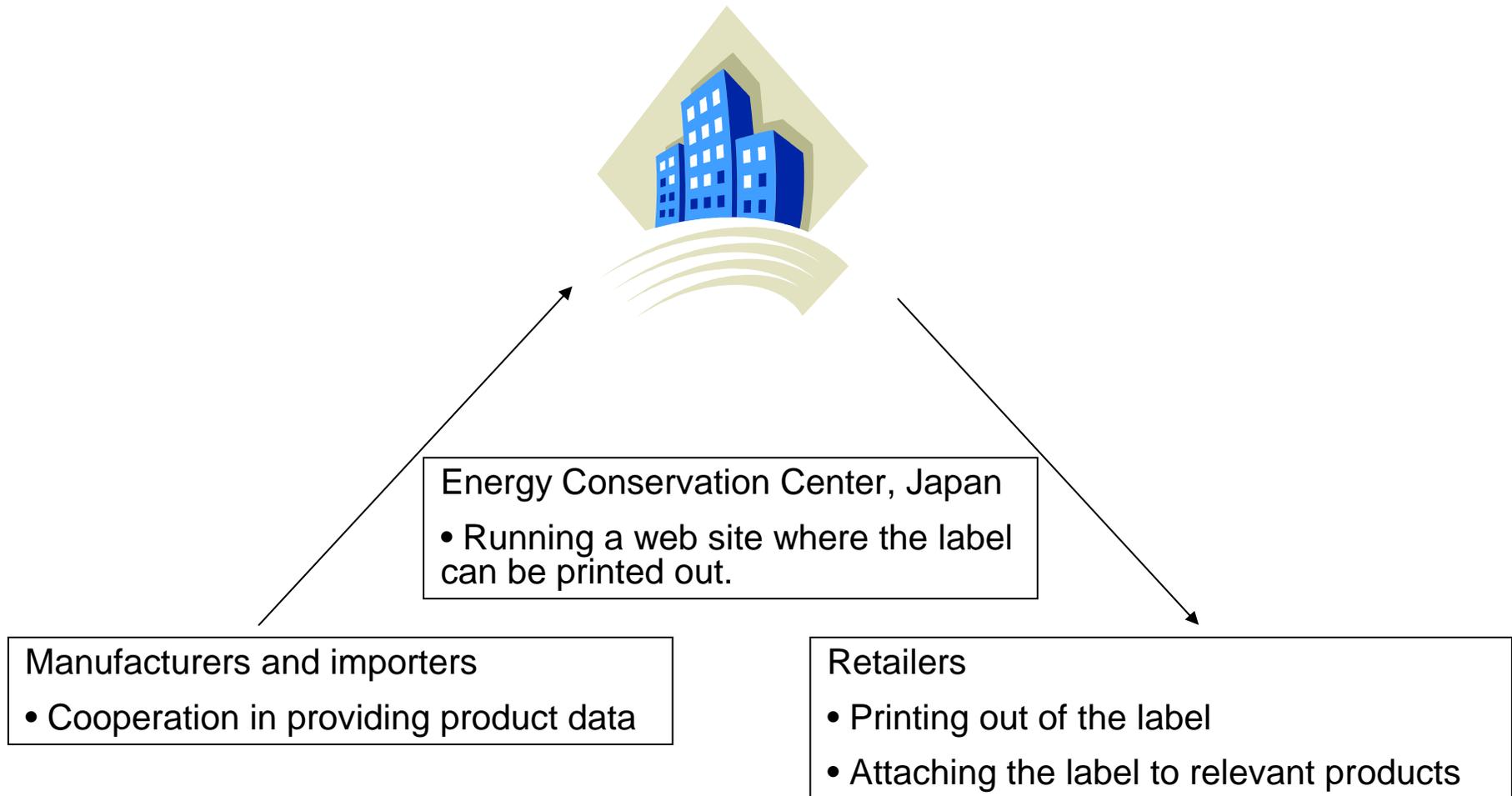
[Energy-Saving Labeling Program]

- Green symbol is for products meeting Top Runner standards, and orange symbol is for ones failing to meet the standards.
- Top Runner standard achievement percentage and energy consumption efficiency (e.g. annual energy consumption) are also displayed.

[Expected annual electricity bill]

- Expected annual electricity bill is included, in order to make energy consumption efficiency (e.g. annual energy consumption) easily understood.

Use of Uniform Energy Saving Label



Energy Efficient Products Information Website

- With the use of a database, products are listed in terms of energy saving performance. The lists are available for public review.
- Uniform Energy Saving Label for relevant products is also available at this website for print out.

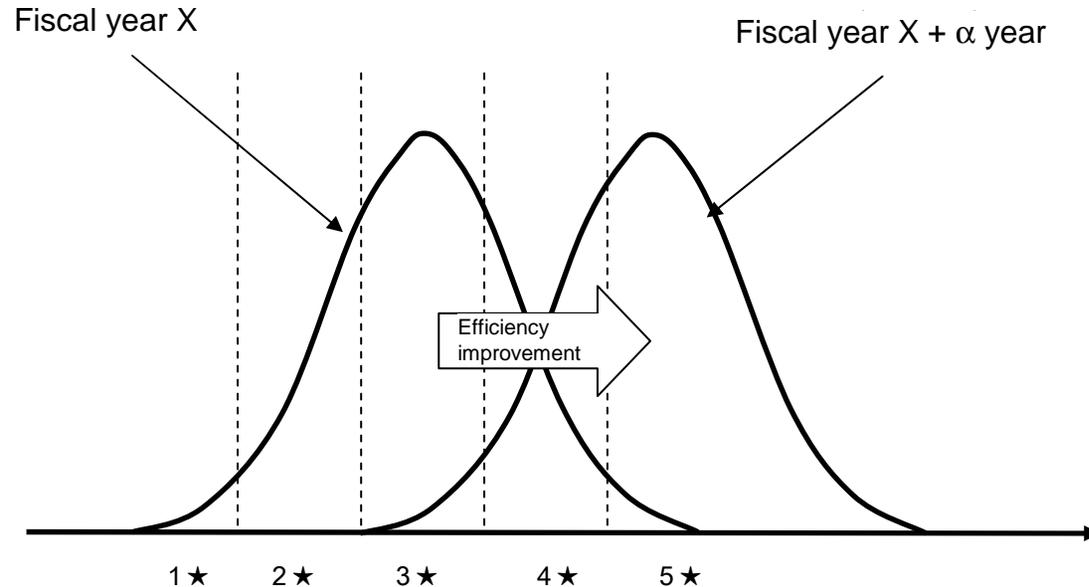


省エネ性能一覧 (イメージ)

| メーカー名 | 製品愛称 | 機種名 (型番) | 多段階評価 | 省エネラベリング制度 | | | | 期間消費 電力量 (kWh) | 期間 電気代 (円) |
|-------|-------|-------------|-------|------------|-------------|-------------------|------------------------------|----------------------|------------------|
| | | | | 目標 年度 | 省エネ性 マーク | 省エネ 基準 達成率% | 毎年 エネルギー 消費効率 (APF) | | |
| A開発 | エアコンA | zz12345zz | ★★★★★ | 2010 | | 100% | 6.0 | 1,336 | 29,400 |
| B開発 | エアコンB | yy67891yy | ★★★★★ | 2010 | | 100% | 6.0 | 1,336 | 29,400 |
| C開発 | エアコンC | xx23456xx | ★★★★★ | 2010 | | 100% | 6.0 | 1,336 | 29,400 |
| D開発 | エアコンD | ww34567ww | ★★★★ | 2010 | | 98% | 6.0 | 1,512 | 33,300 |
| E開発 | エアコンE | vv45678vv | ★★★★ | 2010 | | 95% | 5.8 | 1,541 | 33,900 |
| F開発 | エアコンF | uu56789uu | ★★★★ | 2010 | | 94% | 5.7 | 1,587 | 34,900 |
| G開発 | エアコンG | tt6789tt | ★★★★ | 2010 | | 94% | 5.7 | 1,587 | 34,900 |
| H開発 | エアコンH | ss78910ss | ★★★★ | 2010 | | 88% | 5.5 | 1,670 | 36,700 |
| I開発 | エアコンI | rr89101rr | ★★★★ | 2010 | | 86% | 5.3 | 1,781 | 39,200 |
| J開発 | エアコンJ | qq91011qq | ★★★★ | 2010 | | 83% | 5.1 | 1,768 | 38,900 |
| K開発 | エアコンK | oo101112oo | ★★★★ | 2010 | | 80% | 4.9 | 1,801 | 39,600 |
| L開発 | エアコンL | nn111213nn | ★★★ | 2010 | | 75% | 4.7 | 1,886 | 41,500 |

Revision of Multistage Rating Standards

- If the multistage rating standards are rigid, it is predicted that the whole distribution is biased toward the better, because of efficiency improvement resulting from model changes. For this reason, the standards shall be revised periodically.
- A research shall be conducted annually. If it finds that the ratio of products meeting Top Runner standards increases by 30 % or more compared to the status at the development of the standards, the multistage rating standards shall be revised.
- Revision of multistage rating standards shall take place on April 1st annually.



Expected Annual Electricity Bill and Expected Annual Fuel Use

- In the labeling program for retailers, expected annual electricity bill or expected annual fuel use shall be displayed for products, including target products of Uniform Energy Saving Label.
- When displaying the information, prerequisites for the calculation shall be described in brochures, posters, and/or orally described by store staff at retail shops.

<Examples of Prerequisites>

[Electric refrigerator]

Expected annual electricity bill is obtained by multiplying annual energy consumption (kWh/year) by 22 (yen/kWh). This annual energy consumption is calculated based on the average actual status of use (ambient temperature; 30 °C and 15 °C, opening/closing of doors: 35 times/day, etc.). The expected annual electricity bill may vary depending on your status of use, power company, etc.

[Gas water heater]

Expected annual fuel use is calculated assuming a family of 3 as a standard; therefore, it may vary depending on number of your family members, etc. Upon the calculation, it is assumed that feed-water temperature is annual average 15 °C, and supply-hot-water temperature is converted to 40 °C.

4. Promotion of Efforts by Retailers (E-Shop)

Program for Outlets that Excel at Promoting Energy-Efficient Products (Overview)

- For promotion of popularization of energy efficient products, measures for “retailers” who act as go-betweens for manufacturers and consumers are vital.
- This program acclaims retailers who actively promote sales of energy efficient products and who provide relevant information on energy saving.
- “Energy Efficiency Product Retailer Assessment Program” has been implemented since FY 2003.

Logo of Outlet that Excel at Promoting Energy-Efficient Products

2005年度



省工ネ型製品普及推進優良店

○Eligible outlets

Any appliance outlets, whose sales of appliances accounts for 50% or more of the total sales.

Expanded in FY
2005

- Large-scale (800 m² and over) mass sales appliance outlets, whose sales of appliances accounts for 50% or more of the total sales.

- “**Outlets that Excel at Promoting Energy-Efficient Products**” are selected every fiscal year and published along with a ranking list. Awards such as “Minister of Economy, Trade and Industry Award” and “Minister of Environment Award” were established in FY 2004.
- The excellent outlets are allowed to display the logo.

Program for Outlets that Excel at Promoting Energy-Efficient Products 7 March 2007 ECCJ (Number of approved excellent outlets)

- In FY 2006, 150 outlets were selected for “Outlets that Excel at Promoting Energy-Efficiency Products”.
- Over 400 outlets strive and apply for this program every year.

| | | |
|---------|------------------------|-------------|
| FY 2003 | Number of applications | 513 outlets |
| | Number of approvals | 40 outlets |
| FY 2004 | Number of applications | 452 outlets |
| | Number of approvals | 43 outlets |
| FY 2005 | Number of applications | 409 outlets |
| | Number of approvals | 106 outlets |
| FY 2006 | Number of applications | 469 outlets |
| | Number of approvals | 150 outlets |

Program for Outlets that Excel at Promoting Energy-Efficient Products (Efforts by approved outlets: example 1)

- Making use of the exclusive logo, “outlets that excel at promoting energy-efficient products” publicize themselves as outlets promoting energy saving.
- At the same time, these outlets produce their original explanatory materials and provide information to consumers on energy saving features of products.



Program for Outlets that Excel at Promoting Energy-Efficient Products (Efforts by approved outlets: example 2)

- Making use of the exclusive logo, “outlets that excel at promoting energy-efficient products” publicize themselves as outlets promoting energy saving.
- At the same time, these outlets produce their original explanatory materials and provide information to consumers on energy saving features of products.



4. Promotion of Popularization of Energy Efficient Products

Positive Growth Cycle in Popularization of Energy Efficient Products

- By providing relevant information to consumers, encourage them to select energy efficient products.
- Popularization of energy efficient products will act as incentives for development of further energy efficient products.

