

About the Top Runner Program

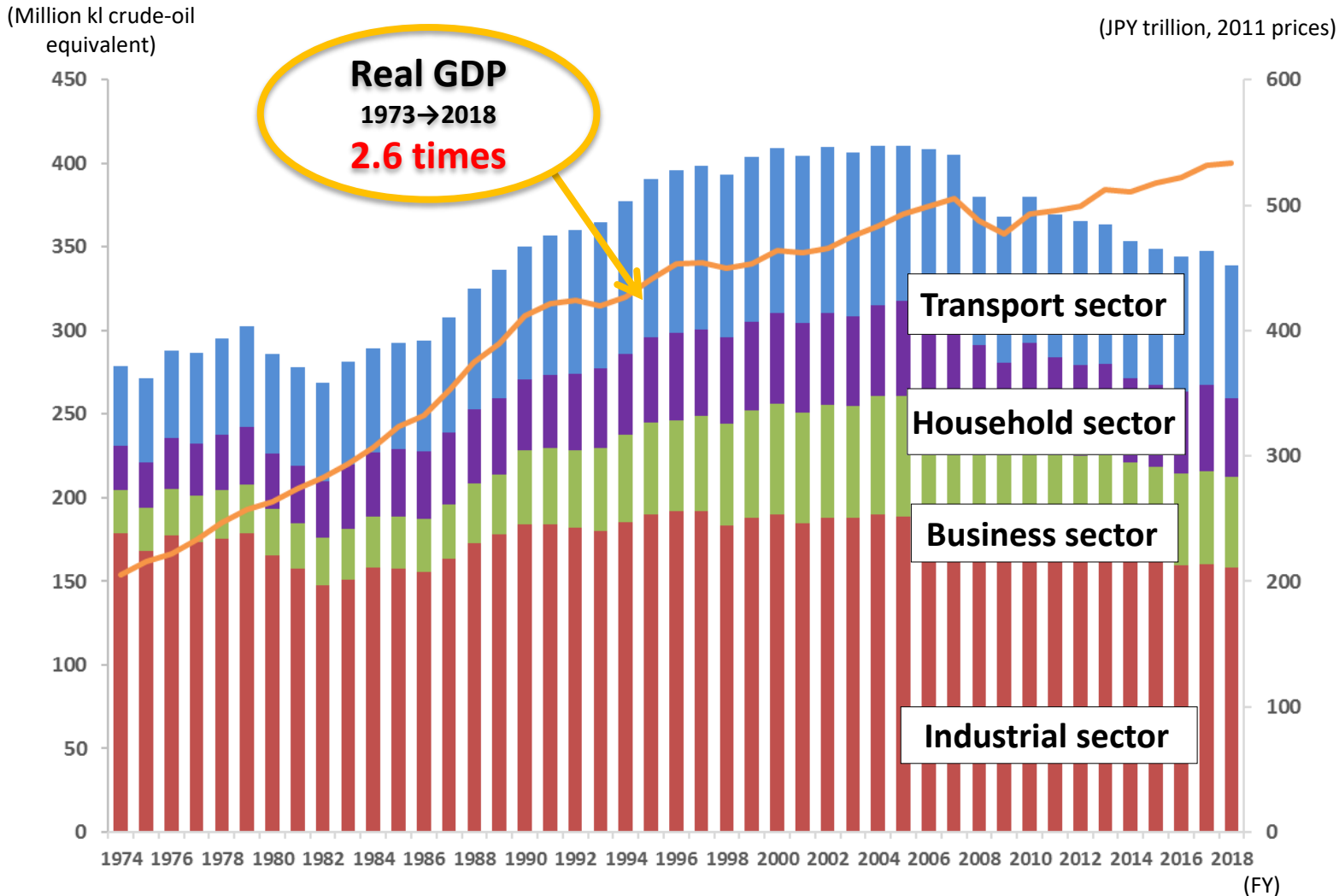
July 2021

Energy Efficiency Division, Agency for Natural
Resources and Energy

- 1. Current state of energy efficiency and outlook for the future**
2. Current energy efficiency measures
3. The Top Runner Program
4. Retail labeling program
5. Policy on consideration of setting new targets (TVs)

1-1 Trends in final energy consumption in Japan

Real GDP is up 2.6 times since the oil crisis. Final energy consumption is up 1.2 times.

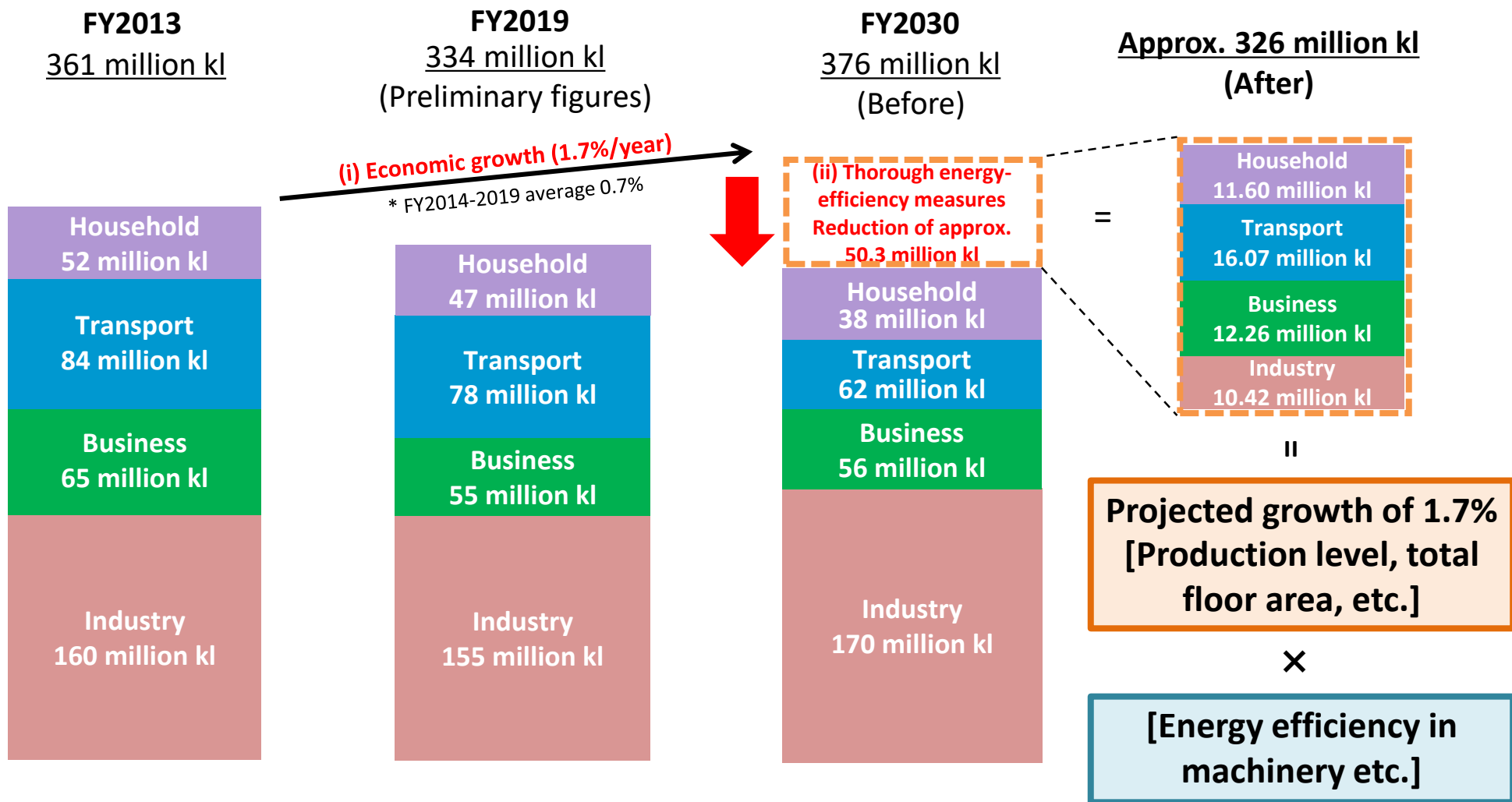


Final energy consumption	
Total	1973→2018 1.2 times
Transport	1973→2018 1.7 times
Household	1973→2018 1.9 times
Business	1973→2018 2.1 times
Industry	1973→2018 0.8 times

1-2 Energy-efficiency targets in long-term energy supply and demand projections (energy mix)

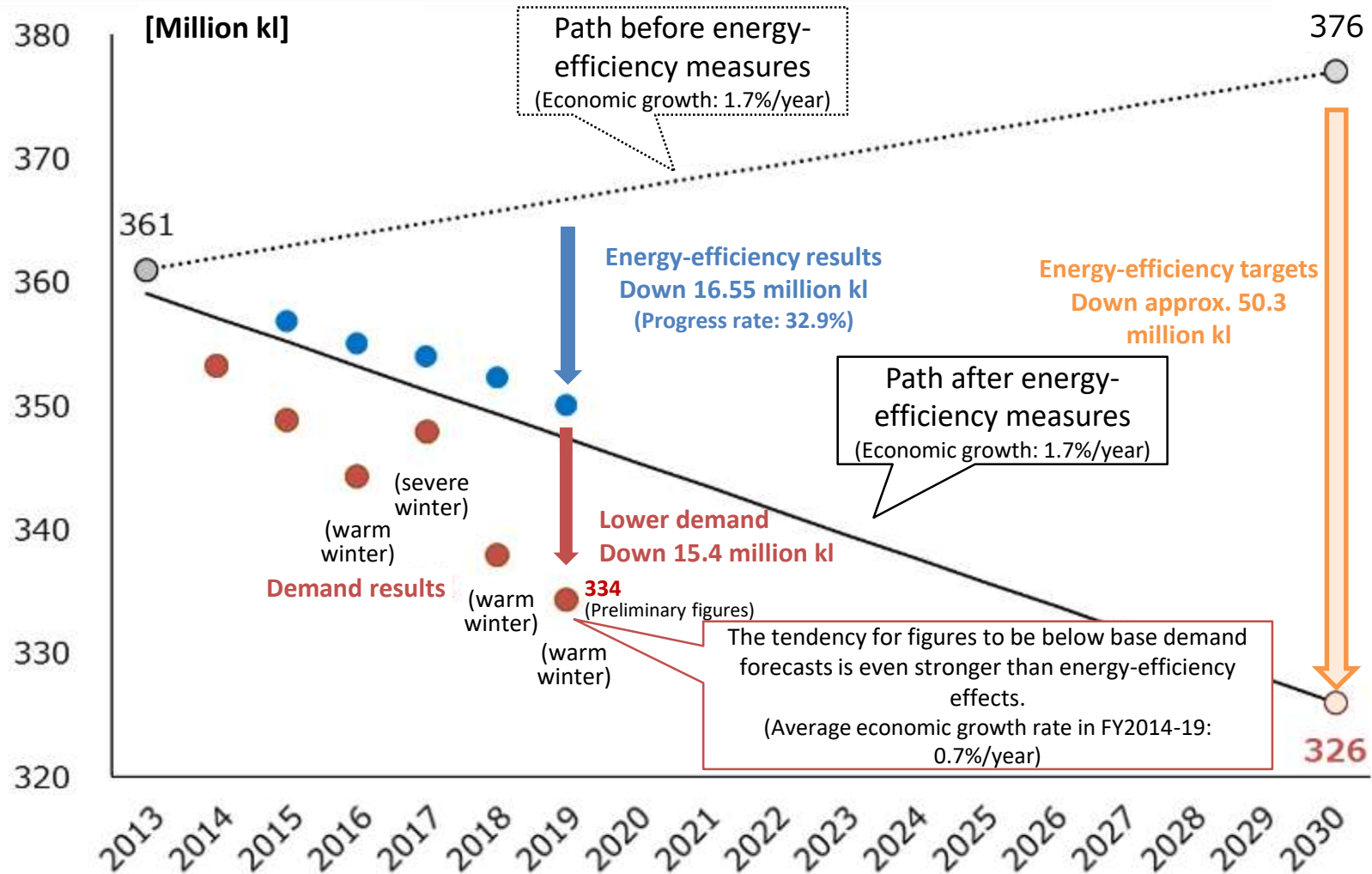
- A look at the energy mix shows that **reductions of about 50.3 million kl** are projected as a result of implementing thorough energy-efficiency measures targeting final energy demand in FY2030, assuming **economic growth of 1.7%**.

* This is equivalent to CO2 **reductions of 188 million t (down 15.2% vs. FY2013)**, while the total **reductions** under plans to combat global warming are **308 million t (down 25% vs. FY2013.)**



1-3 Projected demand and energy efficiency in the energy mix, and actual results

- Energy-mix demand projections assume **economic growth of 1.7% and energy-efficiency measures of roughly 50.3 million kl.**
- FY2019 results are **below the projected demand path** due to energy-efficiency measures and lower demand.



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2-1 Overview of energy-efficiency regulations and support measures (FY2021)

(Reducing energy consumption by 50.3 million kl in FY2030, assuming economic growth)

Industry	Business	Household	Transport	
			Passenger (passenger vehicles etc.)	Freight

Main issues

Stagnation in improving energy-consumption efficiency ⇒ Promoting investment in energy efficiency	⇒ EV・PHV/FCV vehicles
Limits in machinery efficiency improvements ⇒ Promoting use of IoT, AI, etc. and energy efficiency in homes and buildings	Shift toward smaller and more frequent freight shipments ⇒ Promoting cooperation between shippers and freight-handling firms

Regulations

Regulations targeting factories etc. ⇒ Promoting enhanced execution (classification and evaluation) and cooperation among businesses	Top Runner Program (energy-efficiency standards for machinery etc.) ⇒ Study of appropriate system design etc.
Act on Improvement of Energy Consumption Performance of Buildings ⇒ Implementing highly effective measures by scale and purpose to ensure conformity to energy-efficiency standards	Shipper regulations Freight/passenger business regulations ⇒ Study of energy-efficiency initiatives in the supply chain etc.

Budget

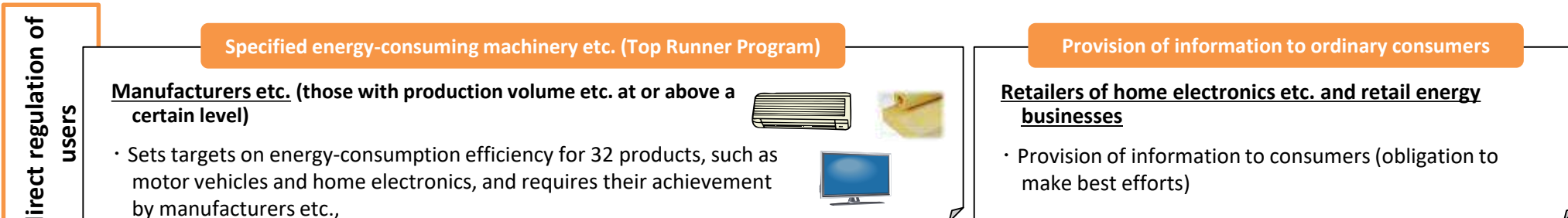
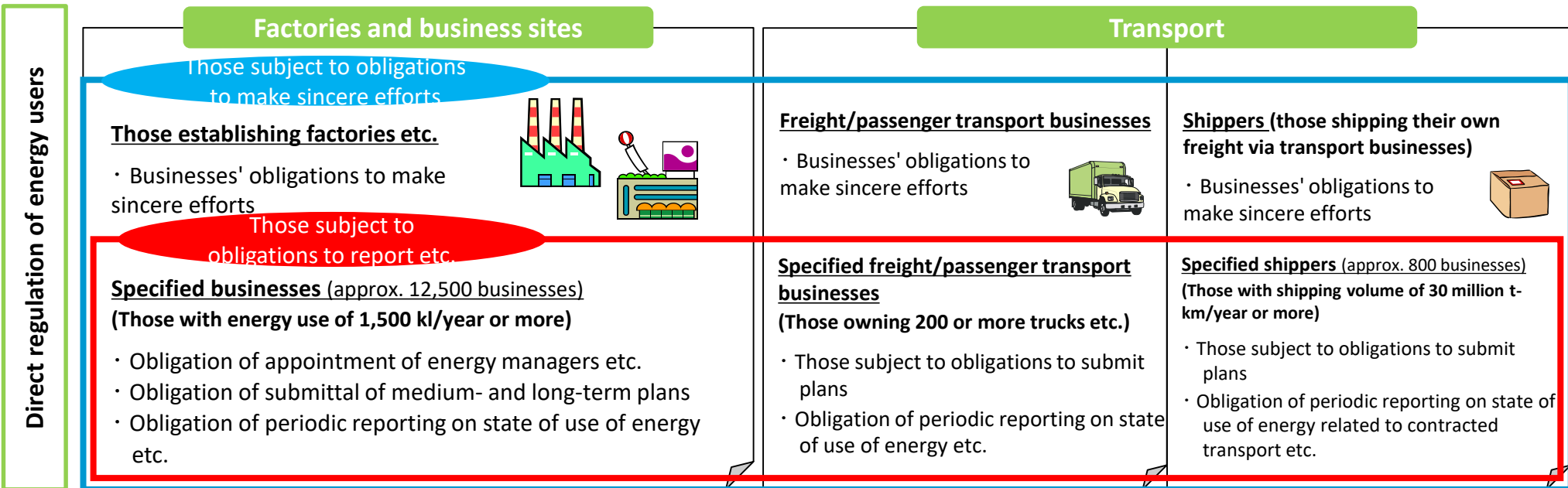
1 Advanced energy-efficiency subsidies JPY 32.5 billion yen (of JPY45.95 billion)	2 Programs to encourage investment in energy efficiency, such as integration of residential and building demand and supply JPY8.39 billion (of JPY45.95 billion) (i) ZEH (ii) ZEB (iii) Next-generation building materials	Subsidies for adoption of next-generation vehicles Infrastructure improvements		7 Transport efficiency improvements JPY6.2 billion (new)
3 R&D/Social Implementation Promotion Project for Energy-efficient Technologies to Realize a Low-carbon Society: JPY8 billion (JPY8 billion)				
4 Project to Promote Optimization of Energy Use by SMEs JPY820 million (new)				
5 Interest-assistance subsidy program 1.23 billion yen (1.27 billion yen)				
*6 Interest assistance for specified equipment etc.: JPY1 million (JPY1 million)				
8 Subcontracting costs of publicity projects to promote energy efficiency: JPY220 million (JPY260 million)				

Tax systems

Energy-efficiency-related tax systems for residences	Carbon-neutral tax system
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2-2 Overview of the Act on the Rationalization etc. of Energy Use

- Among other measures, this Act specifies judgment criteria for targets in implementing energy-efficiency initiatives (e.g., standards for equipment management and goals for improvements to the efficiency of energy consumption [1%/year]) for those establishing factories and other facilities, transport businesses, and shippers, requires businesses of a certain size or larger to report on the state of energy use and other matters, and provides for recommendation and guidance as well as instruction to prepare rationalization plans when initiatives are inadequate.
- For manufacturers* of specified energy-consuming machinery etc. (such as motor vehicles and home electronics), it requires achievement of specified targets on machinery energy consumption efficiency and provides for issue of recommendations etc. if efficiency improvements are inadequate. * Those whose production volume etc. are at or above certain levels



2-3 (Reference) History of amendments to the Act on the Rationalization etc. of Energy Use etc.

Factories

Business site

Transport

Homes and buildings

1947: Heat Management Act established (coal, heavy oil)

1979: Act on the Rationalization etc. of Energy Use established

- Specification of factories responsible for management of energy (heat, electricity)
- Establishment of judgment criteria for the home and building sectors and the tool and machinery sectors

Established in response to the oil crisis

1983: Act on the Rationalization etc. of Energy Use amended
 ● Adopted qualified energy manager examinations

1993: Act on the Rationalization etc. of Energy Use amended
 ● Formulation of basic policies
 ● **Adoption of periodic reporting system**

1998: Act on the Rationalization etc. of Energy Use amended
 ● Expansion of specified energy-management factories

2005: Act on the Rationalization etc. of Energy Use amended
 ● Adoption of integrated heat and electricity management

2008: Act on the Rationalization etc. of Energy Use amended
 ● **Adoption of business-based units**, adoption of a system for business chains (e.g., franchise chains)
 ● Adoption of a benchmark system for individual sectors

2013: Act on the Rationalization etc. of Energy Use amended
 ● Added normalization of electricity demand to the subjects ● Adoption of the Building Materials Top Runner Program

2018: **Act on the Rationalization etc. of Energy Use amended**
 ● System for certification of **cooperative energy-efficiency measures** (factories and business sites, shippers, transport businesses), system for certified integrated management businesses
 ● Definition of shipper revised, quasi-shippers identified

Target for best efforts: annual improvement of 1% or more on average in intensity

1998: Act on the Rationalization etc. of Energy Use amended
 ● Adoption of the Top Runner Program for products such as home electronics and motor vehicles

2002: Act on the Rationalization etc. of Energy Use amended
 ● **Adoption of periodic reporting system** (business sites)

2005: Act on the Rationalization etc. of Energy Use amended
 ● **Adoption of regulations on transport businesses and shippers**

1993: Act on the Rationalization etc. of Energy Use amended
 ● Added specified buildings (not including homes) to the subjects of instructions and publication related to new construction and remodeling

2002: Act on the Rationalization etc. of Energy Use amended
 ● Established obligation of notification of energy-efficiency measures for specified buildings (not including homes)

2005: Act on the Rationalization etc. of Energy Use amended
 ● Added homes to specified buildings
 ● Added large-scale repairs, etc.

2008: Act on the Rationalization etc. of Energy Use amended
 ● Enhanced regulations on specified buildings
* Type 1: addition of orders; Type 2: addition of recommendations
 ● Improvement of performance of residential business contractors
 Addition of obligations of best efforts

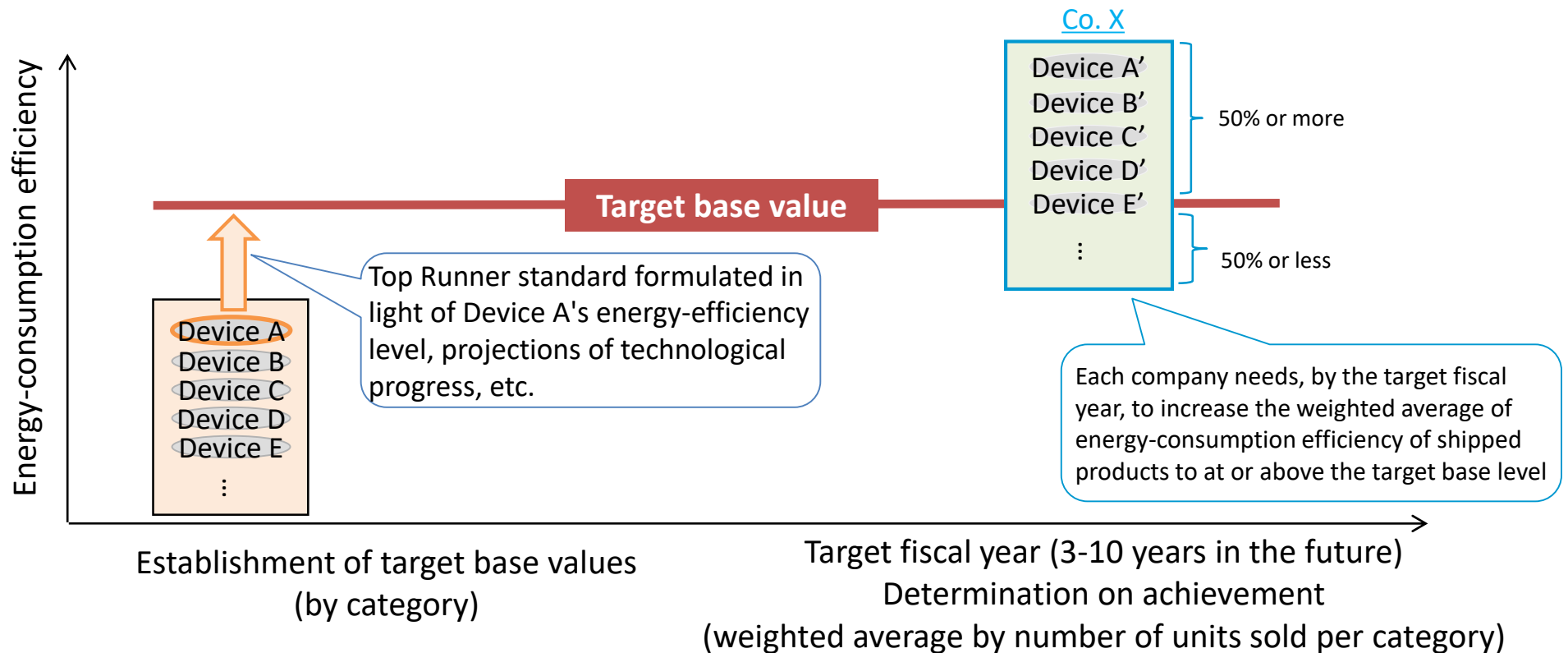
2015: **Act on Improvement of Energy Consumption Performance of Buildings established**
 ● Obligation established to make best efforts toward conformity with energy-efficiency standards (scope not residential buildings)

2019: Act on Improvement of Energy Consumption Performance of Buildings amended
 ● Scope of obligation to make best efforts toward conformity with energy-efficiency standards expanded
 ● Obligation to explain energy-efficiency performance to clients

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3-1 Overview of regulations under the Top Runner Program

- Based on the Act on the Rationalization etc. of Energy Use, businesses such as manufacturers and importers are required to achieve energy-consumption efficiency targets by the target fiscal years.
- Manufacturers and others who fail to achieve targets may be issued with recommendations that they need to make appropriate improvements in energy-consumption efficiency and be subject to public announcement, orders, and fines (up to 1 million yen).



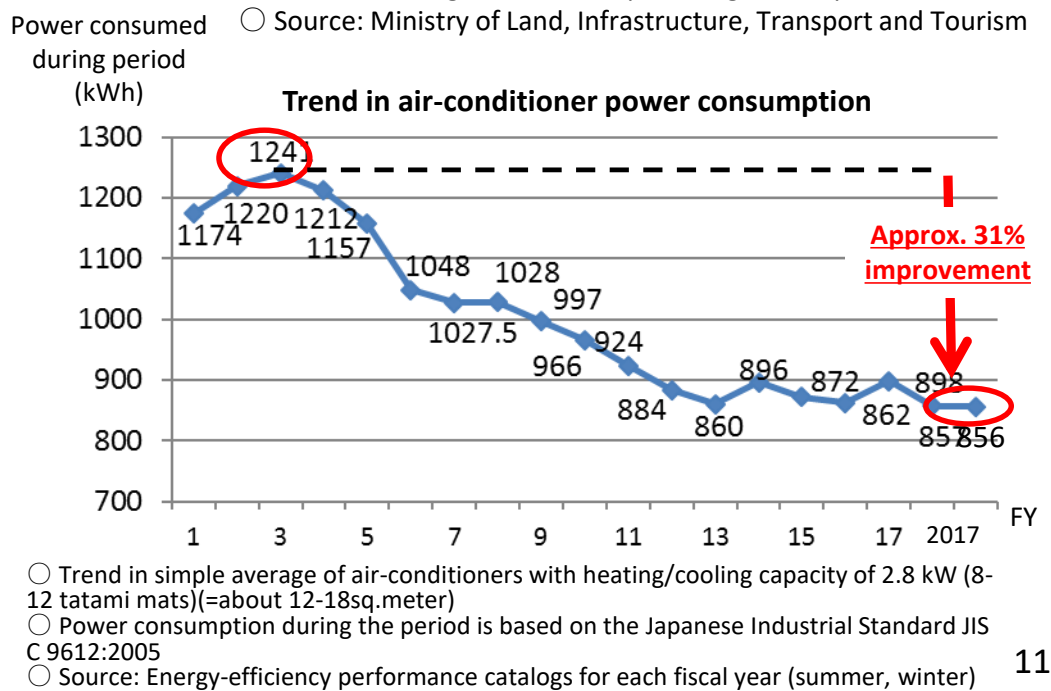
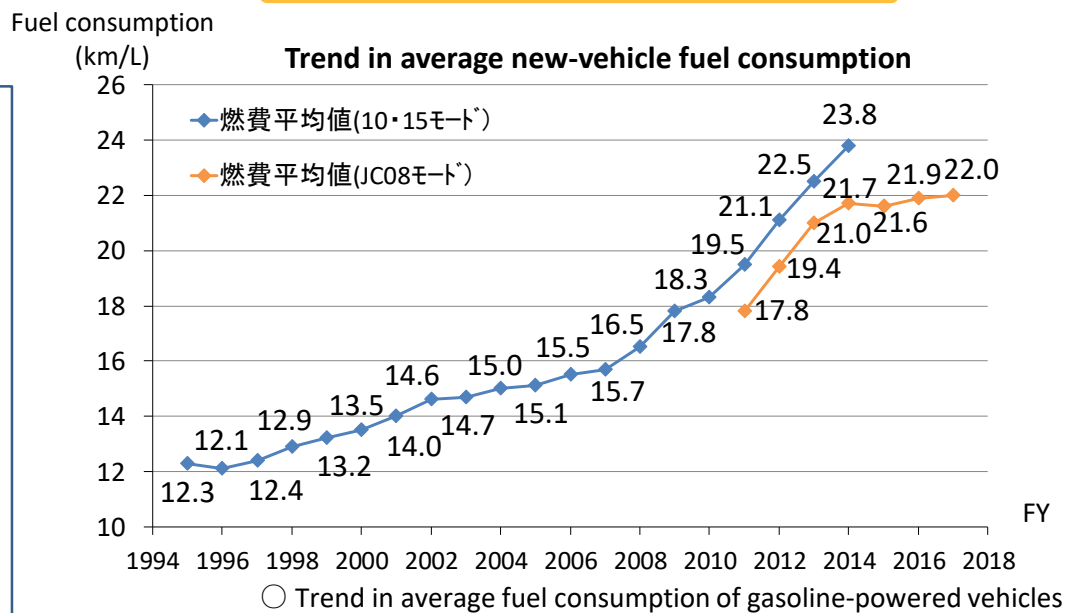
3-2 Subjects of the Machinery/Building Materials Top Runner Program, and efficiency improvements

Products subject to the Top Runner Program (32 products)

- | | |
|----------------------------|----------------------------------|
| 1. Passenger vehicles | 17. Vending machines |
| 2. Air conditioners | 18. Transformers |
| 3. Lighting | 19. Rice cookers |
| 4. Television sets | 20. Microwave ovens |
| 5. Copying machines | 21. DVD recorders |
| 6. Computers | 22. Routing devices |
| 7. Magnetic disk units | 23. Switching devices |
| 8. Freight vehicles | 24. Multifunction printers |
| 9. Videotape recorders | 25. Printers |
| 10. Electric refrigerators | 26. Heat-pump water heaters |
| 11. Electric freezers | 27. Three-phase induction motors |
| 12. Space heaters | 28. Light bulbs |
| 13. Gas stoves and ovens | 29. Showcases |
| 14. Gas water heaters | 30. Insulation materials |
| 15. Oil water heaters | 31. Window frames |
| 16. Electric toilet seats | 32. Multipaned glass |

* 30 to 32:
Products subject to the Building Materials Top Runner Program

Examples of efficiency improvements



3-3 Basic thinking on formation of standards under the Top Runner Program (i)

- Principle 1. The subject scope is established for general structures, purposes, and forms of use and does not include (i) Models used for specific purposes, (ii) models for which no technical measurement methods or assessment methods have been established, and thus for which it would be difficult to establish target standards themselves, and (iii) models for which rates of use in the market are extremely low.
- Principle 2. Specified machinery will be categorized based on certain indicators. These indicators (basic indicators) will be established with consideration for matters such as the standards that consumers use in choosing products, as indicators of physical properties, performance, etc. closely related to energy-consumption efficiency (typical of consumer needs).
- Principle 3. Target standard values will be established using a single figure or formula for each category of base standards for which it would be both feasible and appropriate to target the same energy consumption efficiency level.
- Principle 4. In principle, additional functions will be abstracted in setting categories. However, when setting a target base value for a product that lacks a certain function, a separate category may be used if there is a high probability that products having that function are not available in the market even though there can be considered to be a high level of market demand for such function because adding it would result in failure to satisfy the target base value.
- Principle 5. While categories may be subdivided for devices that are high priced and have high levels of energy-consumption efficiency because they employ advanced energy-efficiency technologies, it is preferable to employ the same categories as much as possible so that manufacturers and others can proactively sell products having outstanding energy-consumption efficiency.

* Principles from "Basic Thinking on Establishment and Revision of Judgment criteria for Manufacturers and Others Regarding Performance Improvements for Specified Devices" (Revised June 19, 2007 by the Energy-Efficiency Standards Subcommittee of the 10th Advisory Committee for Natural Resources and Energy)

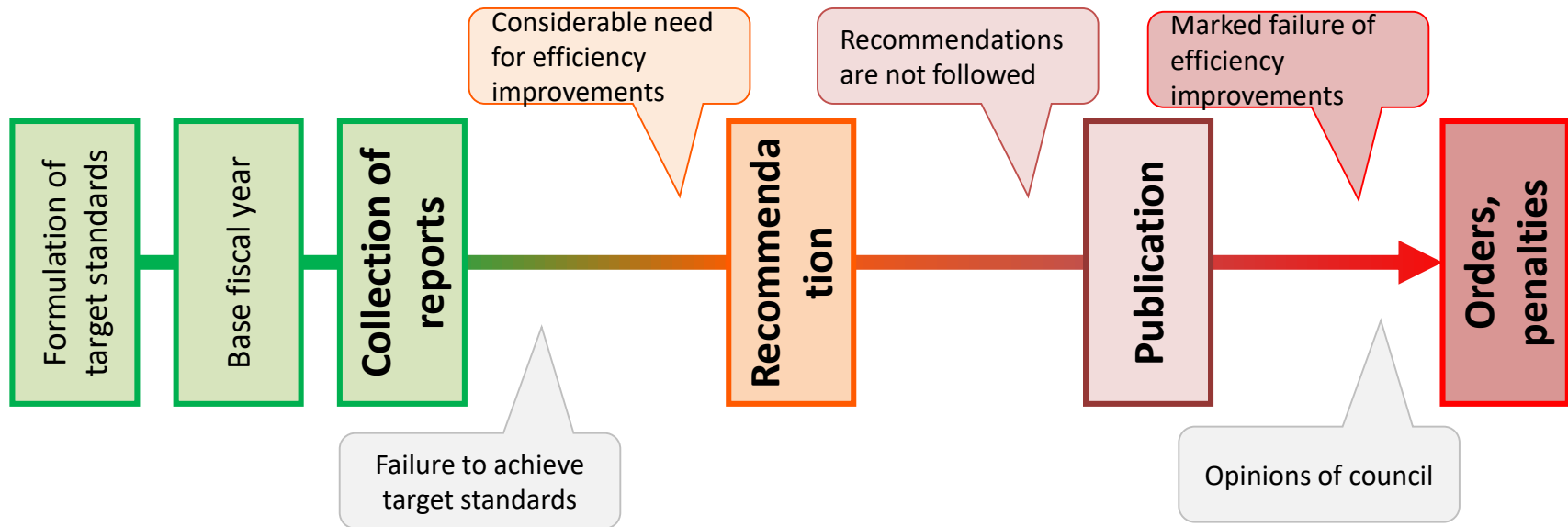
3-4 Basic thinking on formation of standards under the Top Runner Program (ii)

- Principle 6. Special products will be exempted when setting target base values for a single category. However, the feasibility of using technologies of exempted special products will be included in consideration of efficiency improvements through technological development and other means.
- Principle 7. Target standards for home electronics and office equipment will be set with consideration for reduction of standby power consumption.
- Principle 8. Target fiscal years will be set for individual devices within the range of 3-10 years, based on consideration of factors such as the product development periods and prospects for future technological progress of specific devices.
- Principle 9. Judgment of whether or not target base values are met in target fiscal years will be made using weighted averages by category for each manufacturer.
- Principle 10. Appropriate measurement methods are those that reflect consideration of domestic and international standards and conform as much as possible to existing standards. If no standards concerning measurement methods have been established, it would be appropriate to adopt specific, objective, and quantitative methods reflecting the actual state of use of the device.

* Principles from "Basic Thinking on Establishment and Revision of Judgment criteria for Manufacturers and Others Regarding Performance Improvements for Specified Devices" (Revised June 19, 2007 by the Energy-Efficiency Standards Subcommittee of the 10th Advisory Committee for Natural Resources and Energy)

3-5 Flow of Top Runner Program recommendations etc.

- The Top Runner Program requires that manufacturers etc. report on device efficiency and quantities shipped after the target fiscal year.
- Provisions call for measures such as recommendation, publication, issuing orders, and penalties for manufacturers etc. that have shipped at least a certain quantity of products not satisfying target standards if there is recognized to be a need for improvements in efficiency.



3-6 The Top Runner Program (operation of the recommendation system)

- Operation of the recommendation system

Provisions call for measures such as recommendation and publication for businesses recognized to need to make considerable improvements in light of the standards (Article 146 of the Act).

- (i) No external factors recognized such as regulations established after the standards were formulated or natural disasters
- (ii) Other businesses adequately achieving targets (e.g., average efficiency of the products subject to the standards exceeds the base values)
- (iii) Neglect of efforts toward efficiency improvements, such as the devices subject to standards having lower than Top Runner efficiency at the time of establishment of standards and unclear future prospects for improvements

Businesses will be advised to make improvements in efficiency.



Growing gaps among companies on achievement of targets as energy efficiency becomes increasingly difficult. Necessity of appropriate enforcement of the law against businesses not making progress, in order to encourage best efforts.

* **The lack of a plan for achievement within three years of the target fiscal year or failure to achieve by the fourth fiscal year** is judged to constitute "(iii) Neglect of efforts toward efficiency improvements, such as . . . unclear future prospects for improvements."



Prepared from results of collection of reports
 * Average number of years not satisfied: Sum of number of fiscal years since the target fiscal year for all non-satisfying businesses, divided by the number of non-satisfying businesses

(Reference) Text of the Act on the Rationalization etc. of Energy Use (i) Top Runner Program

■ Act on the Rationalization etc. of Energy Use (Act No. 49 of 1979) (excerpted)

(Efforts of Manufacturers of Energy-Consuming Equipment)

Article 144 (1) **Business operators engaged in manufacturing or importing energy consuming equipment, etc.** (meaning energy consuming equipment (meaning machinery and equipment that consumes energy; the same applies hereinafter) **or related equipment** (meaning machinery and equipment used as components of energy consuming equipment or used exclusively in combination with energy consuming equipment, which has an effect on the amount of energy consumed in the use of the energy consuming equipment; the same applies hereinafter); the same applies hereinafter) (the business operators are hereinafter referred to as "**manufacturers of energy consuming equipment, etc.**") **must endeavor to contribute to the rationalization of energy use related to energy consuming equipment, etc., by improving the energy consumption performance** (meaning the performance as evaluated on the basis of the amount of energy consumed in the use of energy consuming equipment under certain conditions; the same applies hereinafter) **or the energy consumption related performance** (meaning the performance of the related equipment affecting the energy-consumption performance of the energy consuming equipment involving the related equipment; the same applies hereinafter) of the energy consuming equipment, etc. that they manufacture or import, while giving due consideration to the provisions of the basic policy.

(Standards of Judgment for Manufacturers of Energy consuming Equipment)

Article 145 (1) **Among energy consuming machinery, etc., regarding automobiles** (limited to those specified by Cabinet Order as those particularly required to improve their energy consumption performance; the same applies hereinafter) **and other energy consuming machinery** used in quantity in Japan and **consuming a considerable amount of energy** in their use, and that are **specified by Cabinet Order** as that particularly required to improve its energy consumption performance (hereinafter referred to as "specified energy consuming equipment") **and related energy consuming machinery used in quantity in Japan and consuming a considerable amount of energy in their use**, and that are **specified by Cabinet Order** as that particularly required to improve its energy consumption related performance (hereinafter referred to as "specified related equipment"), the Minister of Economy, Trade and Industry (or the Minister of Economy, Trade and Industry and the Minister of Land, Infrastructure, Transport and Tourism for automobiles and specified related equipment thereto; hereinafter the same applies in this Chapter and Article 162, paragraph (10)) is to **decide and publicize standards of judgment** for manufacturers, etc. of energy consuming equipment, etc. concerning improvement of their energy consumption performance or energy consumption related performance (hereinafter referred to as "energy consumption performance, etc.") for each of specified energy consuming equipment and specified related equipment (hereinafter referred to as "specified energy consuming equipment, etc.").

(2) **The standards of judgment** prescribed in the preceding paragraph are to be **established by considering the highest level of energy-consumption performance, etc.** of the respective specified energy consuming equipment, etc., **future prospects for technological development related to the respective specified energy consuming equipment, etc. and other circumstances**, and are to be revised if necessary depending on any changes in these circumstances.

(Reference) Text of the Act on the Rationalization etc. of Energy Use (ii) Top Runner Program

■ Act on the Rationalization etc. of Energy Use (Act No. 49 of 1979) (excerpted)

(Recommendations and Orders Concerning Improvement of Performance)

Article 146 (1) If **the Minister of Economy, Trade and Industry finds it necessary**, in light of the standards of judgment prescribed in paragraph (1) of the preceding Article, **to improve the energy-consumption performance, etc. to a considerable extent** with respect to the specified energy consuming equipment, etc. manufactured or imported by a manufacturer of energy consuming equipment, etc. whose production or import volume of the specified energy consuming equipment, etc. manufactured or imported thereby satisfies the requirements specified by Cabinet Order, **the Minister may recommend that manufacturer of energy consuming equipment, etc.** to improve the energy-consumption performance, etc. of the specified energy consuming equipment, etc. manufactured or imported thereby, while showing the targets for the improvement.

(2) If a manufacturer of energy consuming equipment, etc. that has received recommendations prescribed in the preceding paragraph **does not follow the recommendations, the Minister of Economy, Trade and Industry may publicize to that effect.**

(3) If a manufacturer of energy consuming equipment, etc. that has received recommendations prescribed in paragraph (1) **does not take the measures as recommended without legitimate grounds** and the Minister of Economy, Trade and Industry finds that it significantly harms the rationalization of energy use for the specified energy consuming equipment, etc., **the Minister may, after hearing opinions from councils, etc. specified by Cabinet Order, order** the manufacturer of energy consuming equipment, etc. to take the measures pertaining to the recommendations.

(Reports and On-site Inspections)

Article 162

(10) To the extent necessary for enforcement of the provisions of Chapter VI, **the Minister of Economy, Trade and Industry may, pursuant to the provisions of Cabinet Order, have manufacturers of specified energy consuming equipment, etc. or manufacturers, etc. of specified building materials designed to prevent heat loss report the state of their business** pertaining to the specified energy consuming equipment, etc. or specified building materials designed to prevent heat loss, or have officials of the Ministry **enter offices, factories or warehouses of manufacturers, etc.** of specified energy consuming equipment, etc. or manufacturers, etc. of specified building materials designed to prevent heat loss **and inspect the specified energy consuming equipment, etc. or specified building materials designed to prevent heat loss, books, documents and other items.**

(Reference) Text of the Act on the Rationalization etc. of Energy Use (iii) Top Runner Program

■ Act on the Rationalization etc. of Energy Use (Act No. 49 of 1979) (excerpted)

Article 171 A person who falls under any of the following items is to be **punished by a fine of not more than 500,000 yen**:

(iii) a person who **has failed to make reports** under Article 16, paragraph (1) (including the cases where it is applied mutatis mutandis pursuant to Article 18, paragraph (1)), Article 27, paragraph (1) (including the cases where it is applied mutatis mutandis pursuant to Article 48, paragraph (2)), Article 38, paragraph (1) (including the cases where it is applied mutatis mutandis pursuant to Article 48, paragraph (3)), Article 49, Article 103, paragraph (1) (including the cases where it is applied mutatis mutandis pursuant to Article 136, paragraph (1)), Article 111, paragraph (1) (including the cases where it is applied mutatis mutandis pursuant to Article 119, paragraph (1)), Article 120, Article 127, paragraph (1) (including the cases where it is applied mutatis mutandis pursuant to Article 136, paragraph (2)), Article 132, paragraph (1) (including the cases where it is applied mutatis mutandis pursuant to Article 136, paragraph (3)), Article 137, Article 141, paragraphs (1) through (6) inclusive, or **Article 162**, paragraphs (1) through (3) inclusive or paragraphs (5) through **(10)** inclusive, **or made false reports, or has refused, obstructed or avoided an inspection** under paragraphs (1) through (3) inclusive or paragraphs (5) through (10) inclusive of the same Article

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4-1 Overview of the labeling system

- In addition to indicating and **encouraging achievement by manufacturers** of machinery, building materials, etc. of **targets for energy-consumption efficiency** for their products, the Act on the Rationalization etc. of Energy Use also establishes **an obligation for labeling of energy efficiency and other information**. Subject devices etc. have been expanded to 32 products. These cover about 70% of home energy consumption.
- Furthermore, **retailers and other vendors** of devices etc. are required to **provide information on device energy efficiency** (provisions establish an obligation of best effort).

■ Example of labeling obligations for manufacturers and importers

形名 (ご注文形名)	光源色	グローブ 種別(色)	定格 入力 電圧 (V)	定格 消費 電力 (W)*	定格 入力 電流 (A)	全光束 (lm) *	エネルギー 消費効率 (lm/W)	定格 寿命 (h)	区分名
	電球色	樹脂乳白	100	4.9	0.084				
	昼白色	樹脂乳白	100	4.4	0.075				

Labeling of model names, category names, power consumption, etc. in catalogs and other materials

Provisions call for recommendation, publication, orders, etc. if manufacturers and others fail to label products.
(Articles 147 and 148 of the Act on the Rationalization etc. of Energy Use)

Examples of the labeling system for retailers

Standardized energy efficiency label (electric refrigerators)

Grading

Products on the market graded in 41 levels from 5.0 (highest energy efficiency) to 1.0 (lowest). ★ Labeling corresponding to grading

Energy-efficiency label

Annual estimated power cost etc. is indicated to make it easy to understand energy efficiency.

Annual estimated power cost etc.

* Calculated based on estimated power charges of JPY27/kWh (tax incl.)

There are no provisions calling for recommendation, publication, orders, etc. if retailers fail to label products.
(Article 161 of the Act on the Rationalization etc. of Energy Use)

4-2 Overview of the retailer labeling system

- To encourage further energy efficiency in the household sector, it is essential to provide understandable information on the energy efficiency of devices to ordinary consumers.
- A system under which retailers of energy-consuming devices provide information to consumers on energy efficiency and other matters through their business activities (retailer labeling system) was implemented beginning in October 2006.

The diagram shows a green energy efficiency label with the following sections:

- 省エネ性能 (Energy Efficiency Performance):** Indicated by 5 stars (3 filled, 2 outlined) and a score of 2.7.
- 省エネ基準達成率 (Energy Efficiency Standard Achievement Rate):** 84%.
- 年間消費電力量 (Annual Energy Consumption):** 330 kWh/year.
- 目安電気料金 (Estimated Annual Energy Charge):** 8,910 yen.

Callouts explain the following components:

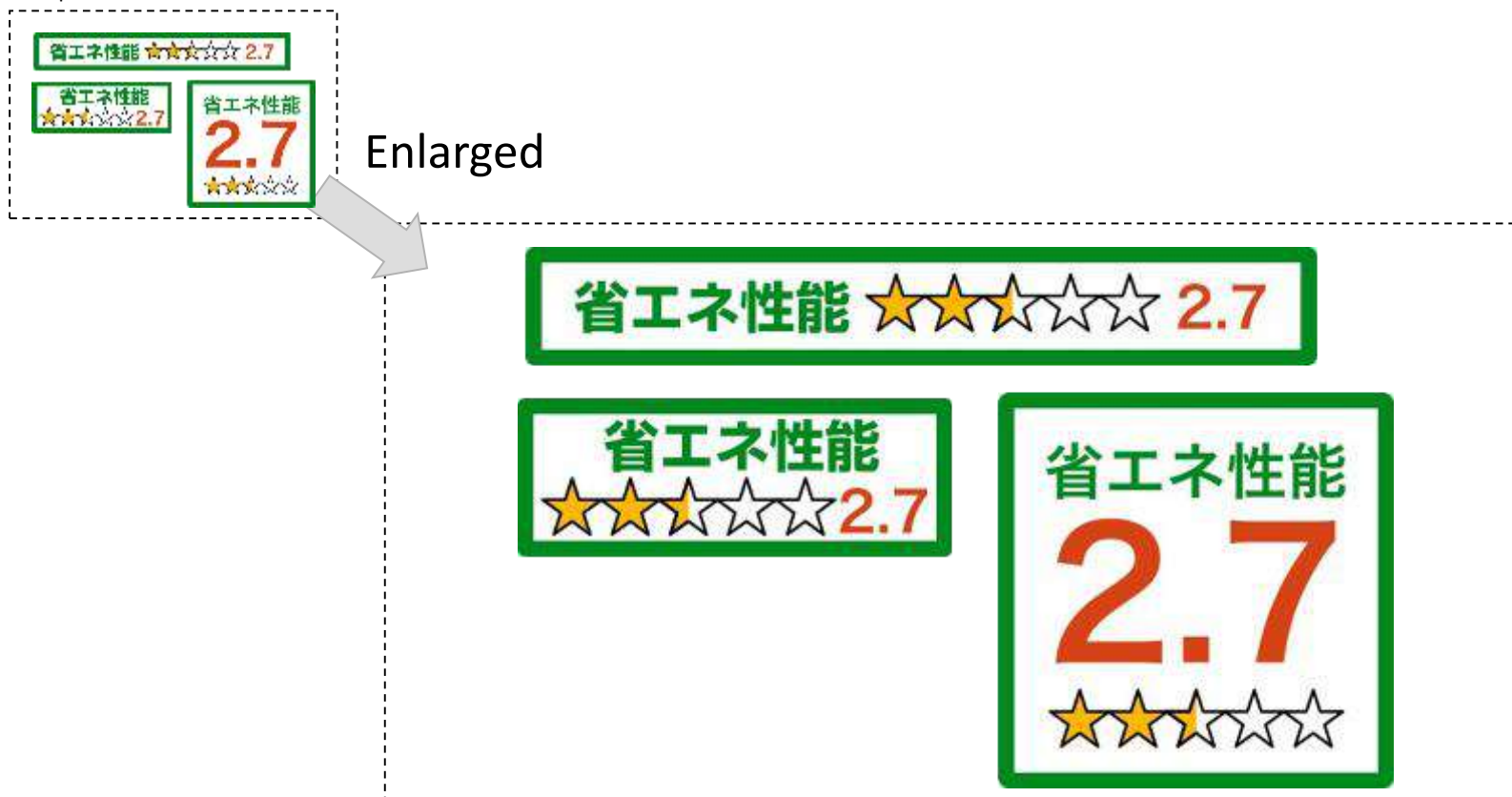
- (i) Grading:** Products on the market are graded in 41 levels from 5.0 (highest energy efficiency) to 1.0 (lowest), in increments of 0.1. These grades are indicated using 1-5 stars (including half-stars).
- (ii) Energy efficiency labels:** These labels were standardized under a JIS standard in 2000. This makes it possible to ascertain whether or not individual devices satisfy Top Runner standards. The labels show: (i) the energy efficiency logo, (ii) the energy efficiency standards achievement rate, (iii) energy-consumption efficiency, and (iv) the target fiscal year.
- (iii) Estimated annual energy charges etc.:** Estimated annual energy charges, fuel use, etc. are indicated to make it easy to understand differences in energy-consumption efficiency.

Additional text on the label includes: 目標年度2021年度 (Target fiscal year 2021), メーカー名 (Manufacturer name), 機種名 (Model name), and RFR-H290354.

4-3 Mini labels

- **New mini labels have been established to show only the results of grading**, in order to secure opportunities for provision of energy-efficiency information by making it possible to provide understandable information on energy efficiency even when spaces is limited due to factors such as product size or the needs of e-commerce.

Sample mini label



4-4 Devices subject to the retailer labeling system

- At present, the retailer labeling system applies to 20 device types. It consists of grading, energy-efficiency labeling, and estimated energy costs etc.

No	Device	Grading	Energy-efficiency label	Estimated annual energy charges etc.	No	Device	Grading	Energy-efficiency labels	Estimated annual energy charges etc.
1	Air conditioners	○	○	○	11	Gas water heaters	×	○	△ (fuel use)
2	Lighting	○	○	○	12	Oil water heaters	×	○	△ (fuel use)
3	Television sets	○	○	○	13	Electric water heaters	×	○	×
4	Computers	×	○	×	14	Electric toilet seats	○	○	○
5	Magnetic disks	×	○	×	15	Rice cookers	×	○	○
6	Videotape recorders	×	×	○	16	Microwave ovens	×	○	○
7	Electric refrigerators	○	○	○	17	DVD recorders	×	○	○
8	Electric freezers	○	○	○	18	Routing devices	×	○	×
9	Space heaters	×	○	×	19	Switching devices	×	○	×
10	Gas stoves and ovens	×	○	△ (fuel use)	20	Light bulbs	×	○	○
Number of subject devices							6	19	14

→ Under the retailer labeling system, a level showing all of the following information is called a standard energy label: grading, energy-efficiency labeling, and estimated annual energy costs etc.

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5-1 Formulation of new Top Runner standards for TV sets

- Since TV sets, for which the target fiscal year was FY2012, have undergone various developments including increases in size, advancement of added functions, and market acceptance of 4K and higher LCD displays and OLED displays since FY2008, the base year for setting the target base values, there is a need to set new target base values for them.
- The Television Working Group of the Advisory Committee for Natural Resources and Energy began deliberations on this subject in January 2019, summarized its findings in February 2021, and revised the relevant announcements in May. New standards were established.

5-2 Comparison of existing standards with the next generation of standards

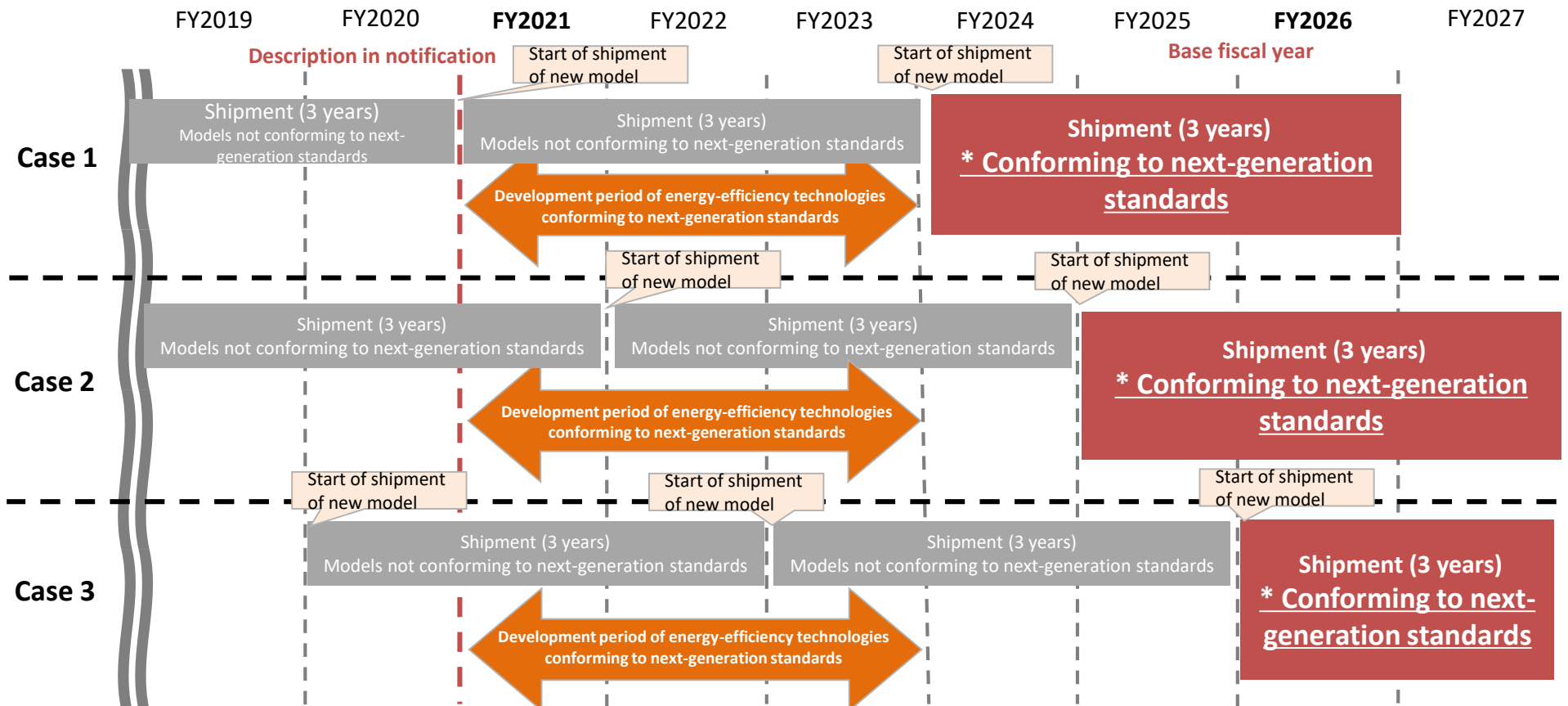
- The main differences between existing standards and the next generation of standards for TV sets are shown in the table below.
- Particularly important changes are a massive reduction in the number of categories (from 64 to four) and consideration of added functions as exceptional in judgment of achievement.

	Existing standards	Next-generation standards
Scope	CRT TVs, plasma TVs, LCD TVs,	LCD TVs, OLED TVs
Formula for calculating energy-consumption efficiency	<ul style="list-style-type: none"> ● Took into consideration only time spent viewing scheduled programming (4.5 h/day) 	<ul style="list-style-type: none"> ● In addition to time spent viewing scheduled programming also takes into consideration use for viewing recorded programming and Internet programming (0.6 h/day) (5.1 h/day) ● Two types of formulas have been established depending on whether or not a TV set has onboard video recording equipment.
Measurement conditions	-	New luminance conditions established for use when measuring energy-consumption efficiency
Base fiscal year	FY2012	FY2026
Categories	64 categories (screen size, resolution, video display speed, added functions) * CRT and plasma TVs are not included in the above 64 categories	Four categories (resolution, panel type)
Base-value variable	Screen size (V)	Screen area (sq. cm)
Form of base value	Quadratic function of protuberance beneath combined linear functions	Linear function
Handling of added functions	<ul style="list-style-type: none"> ● For added functions considered by category, base values are added to anticipated power consumption 	<ul style="list-style-type: none"> ● Base values are set at a level from which anticipated power consumption of added functions has been deducted ● Consideration of added functions as exceptional in judgment of achievement

(Reference) Target fiscal years

- Structures of TV sets are growing increasingly complex, and the **development period** for a TV set is **about three years**. In addition, since the development period is tending to grow longer the **period between model changes is also lengthening to three years**.
- In light of the above factors, the target fiscal year for TV sets has been set to **FY2026**, five years from the year of establishment of the standards, so that **there would be an opportunity for at least one model change subject to the next-generation standards before the target fiscal year**.

<Timing of development and shipment>



(Reference) Categories under existing standards

- The existing standards for LCD TVs under the Top Runner Program categorize TVs by the four factors of physical properties, functions, etc. strongly related to energy-consumption efficiency: screen size, resolution, video display speed, and number of additional functions. TVs are grouped into a total of 64 categories based on combinations of these factors.

Screen size *1

- (i) Less than 19V
- (ii) 19V or above but less than 32V
- (iii) 32V or above

Resolution *2

- (i) Less than FHD
- (ii) FHD or above

Video display speed *3

- (i) Normal
- (ii) Double
- (iii) Quad-speed LCD or plasma

Additional functions *4

- (i) Other than those below
- (ii) One additional function
- (iii) Two additional functions
- (iv) Three additional functions

*1 Screen size figures represent the size of the active display area in centimeters divided by 2.54 and rounded off to the nearest whole number

*2 FHD refers to a resolution of at least 1080 pixels measured vertically and at least 1920 pixels measured horizontally

*3 The video display speeds of normal, double, and quad-speed are defined below:

Normal: Displays 60 or more but less than 120 frames/second

Double: Displays 120 or more but less than 240 frames/second

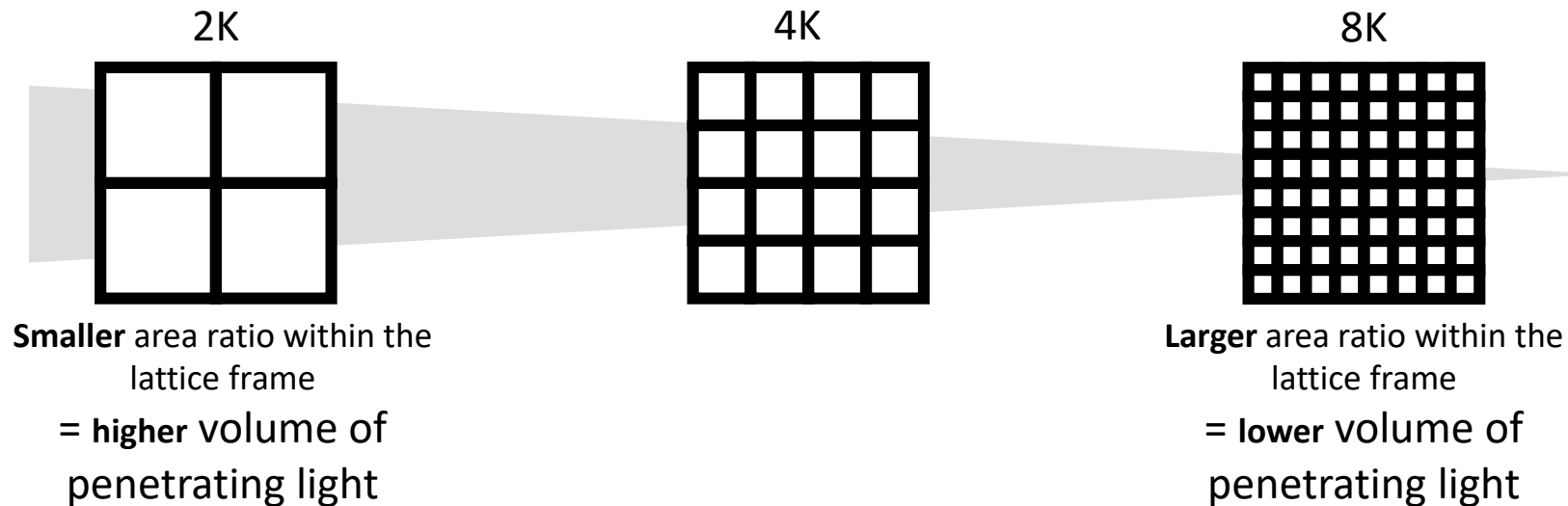
Quad-speed: Displays 240 or more frames/second

*4 Added functions refer to dual digital tuners, DVD drives (only those capable of recording), hard disks, and Blu-ray disk drives

(Reference) Factors considered as categories under the next-generation standards

- The power consumption of a TV set is affected strongly by the light generated by the display.
- For this reason, the **two factors of panel type and resolution**, which are strongly related to the amount of light generated by the display, **are considered in categorizing products**.
 - Panel type: The lighting principles themselves differ between an LCD display and an OLED.
 - Resolution: The higher the resolution, the higher the area ratio within the lattice frame and the lower the volume of penetrating light, requiring a stronger backlight luminescence.

Illustration of the relationship between resolution and power consumption



(Reference) Categories under next-generation standards

- The next-generation standards establish four categories based on consideration for the two factors of panel type and resolution.
 - Since 8K products have a small market share (FY2019: 0.16% [according to a JEITA survey]), they have been included in the same category as 4K products.
 - Since at present the only OLED products identified on the market have resolutions of 4K or above, they have been categorized without regard to resolution.
- CRT and plasma TVs, which are included in the scope of existing standards, have been excluded from the scope of the next-generation standards because currently there are no shipments of such products.

Category name	Panel type	Resolution
a	LCD	Less than 2K
b		2K or above but less than 4K
c		4K or above
d	OLED	-

* The number of categories has been streamlined from the current 64 to just four.

(Reference) Categories under existing standards

- The existing standards establish the following 64 categories.

Resolution	Receiver type Size	Video display	Added functions	Category name	
FHD or above (2K or above)	Less than 19V	LCD Normal	Other than those below	DA	
			With one added function	DA1	
			With two added functions	DA2	
		LCD Double	With three added functions	DA3	
			Other than those below	DB	
			With one added function	DB1	
		LCD Double	With two added functions	DB2	
			With three added functions	DB3	
			LCD Normal	Other than those below	DC
	With one added function	DC1			
	With two added functions	DC2			
	With three added functions	DC3			
	19V or above Less than 32V	LCD Double	Other than those below	DD	
			With one added function	DD1	
			With two added functions	DD2	
		LCD Double	With three added functions	DD3	
			Quad-speed LCD or plasma	Other than those below	DE
				With one added function	DE1
		With two added functions		DE2	
		With three added functions		DE3	
		32V or above	LCD Normal	Other than those below	DF
	With one added function			DF1	
	With two added functions			DF2	
	With three added functions			DF3	
	LCD Double		Other than those below	DG	
			With one added function	DG1	
			With two added functions	DG2	
	LCD Double		With three added functions	DG3	
			Quad-speed LCD or plasma	Other than those below	DH
				With one added function	DH1
	With two added functions			DH2	
	With three added functions			DH3	

Resolution	Receiver type Size	Video display	Added functions	Category name	
Other	Less than 19V	LCD Normal	Other than those below	DI	
			With one added function	DI1	
			With two added functions	DI2	
		LCD Double	With three added functions	DI3	
			Other than those below	DJ	
			With one added function	DJ1	
		LCD Double	With two added functions	DJ2	
			With three added functions	DJ3	
			LCD Normal	Other than those below	DK
	With one added function	DK1			
	With two added functions	DK2			
	With three added functions	DK3			
	19V or above Less than 32V	LCD Double	Other than those below	DL	
			With one added function	DL1	
			With two added functions	DL2	
		LCD Double	With three added functions	DL3	
			Quad-speed LCD or plasma	Other than those below	DM
				With one added function	DM1
		With two added functions		DM2	
		With three added functions		DM3	
		32V or above	LCD Normal	Other than those below	DN
	With one added function			DN1	
	With two added functions			DN2	
	With three added functions			DN3	
	LCD Double		Other than those below	DO	
			With one added function	DO1	
			With two added functions	DO2	
	LCD Double		With three added functions	DO3	
			Quad-speed LCD or plasma	Other than those below	DP
				With one added function	DP1
	With two added functions			DP2	
	With three added functions			DP3	

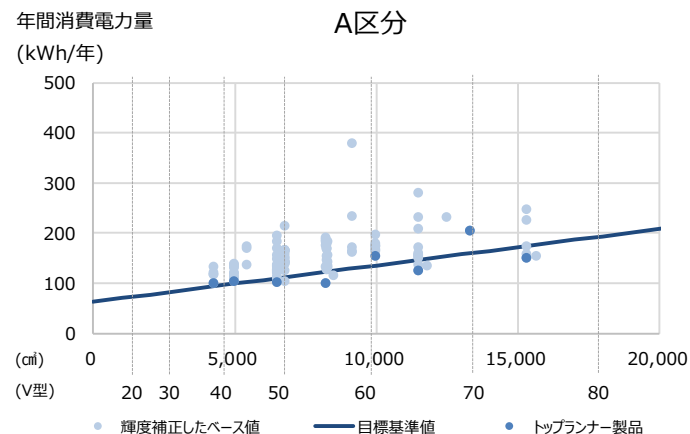
(Reference) Policy on formulation of target base values: Method of setting target base values

- Under the Act on the Rationalization etc. of Energy Use, target base values are set with consideration for future prospects for technical development of Top Runner products.
- For TV sets, **multiple Top Runner products will be identified in four categories (LCD, less than 2K; LCD, 2K or above but less than 4K; LCD, 4K or above; and OLED) along the horizontal axis of screen size and the vertical axis of annual power consumption, using shipment data collected from manufacturers*, and target base values will be set using a linear function.**

* Shipment data is for models included in the scope of judgment criteria included among the TV sets shipped to consumers in Japan in 2018. The valid sample size was 230.

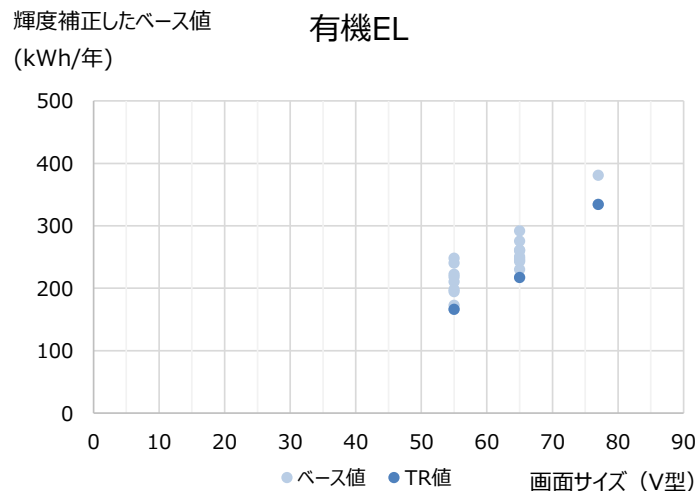
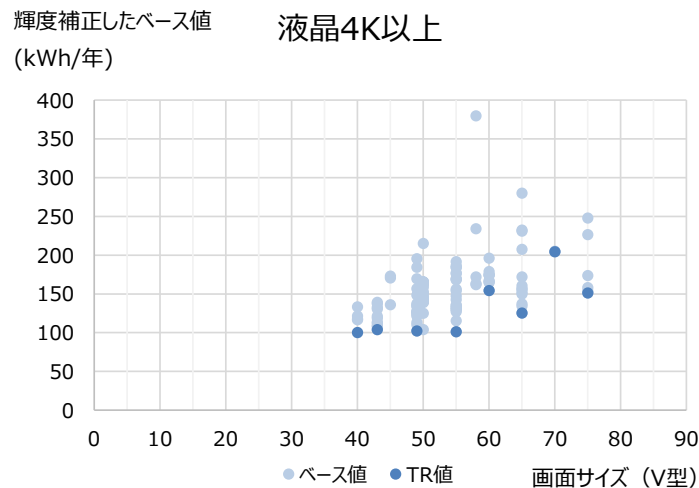
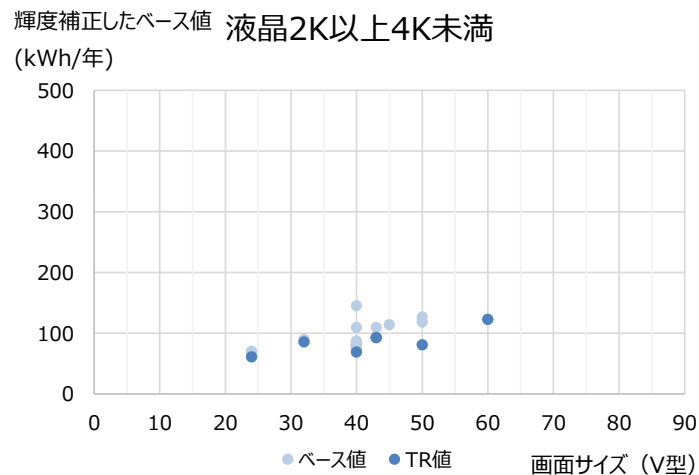
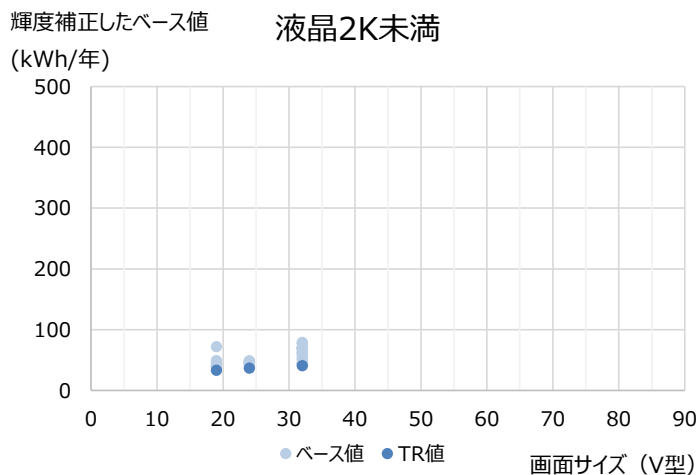
- In light of factors such as the fact that adoption of technologies such as LED backlights that result in considerable energy savings had not been anticipated at the time of establishing the existing standards and the objective of maintaining current levels through energy efficiency despite numerous factors leading to increased energy consumption (such as the spread of TVs with Internet functions and audio enhancements, future prospects for technological development are not considered in setting target base values.

Outline of setting target base values



(Reference) Identification of Top Runner products

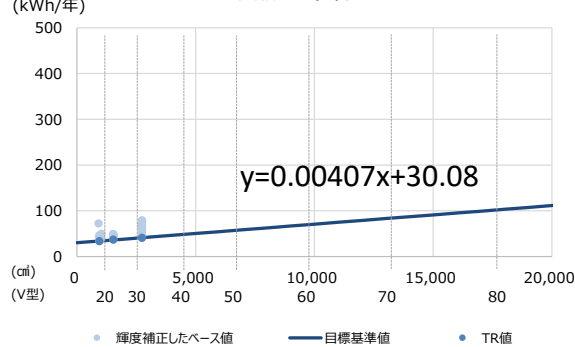
- Since TV power consumption is largely proportional to screen size, segments were set in 5V increments ($n < \text{○} \leq n + 5$) and the product with the lowest annual power consumption (base value adjusted for luminance) in each segment was identified as the Top Runner product.



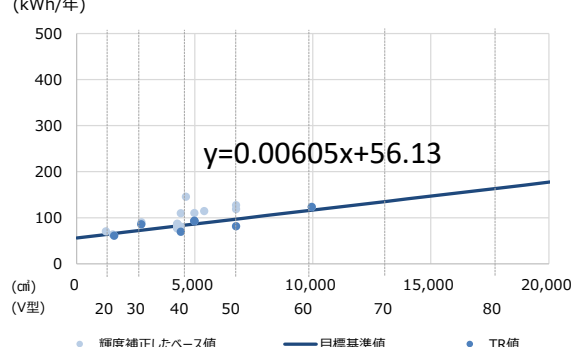
(Reference) Setting target base values

- Target base values are set as a simple regression equation of annual power consumption (base value adjusted for luminance) of Top Runner products.
 - Since for OLED TVs the intercept of the simple regression equation will be negative when the product's screen area is less than 4258 sq. cm (39V equivalent), a uniform target base value of 75 kWh/year is set for such products. (4258 sq. cm is the minimum screen area of a product of 4K LCD or higher. 75 kWh/year is the target base value for an OLED TV with a screen area of 4258 sq. cm.)
- Since screen area (sq. cm) was used as the variable, a plot of Top Runner products generally results in a straight line.

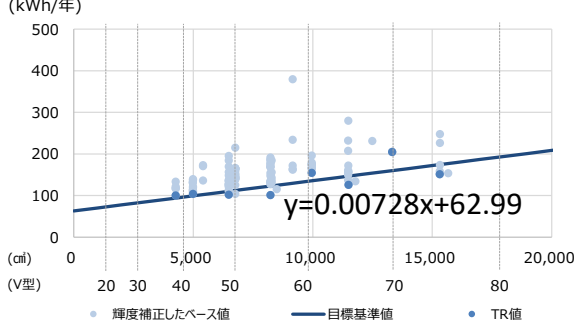
輝度補正したベース値
(kWh/年) 液晶2K未満



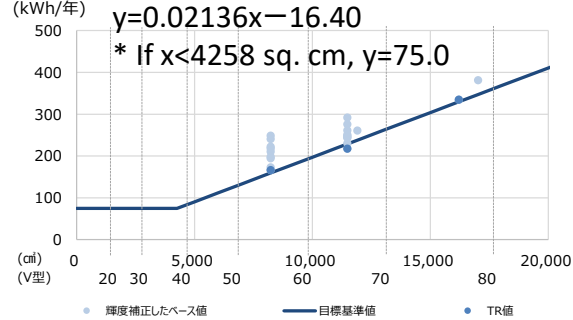
輝度補正したベース値
(kWh/年) 液晶2K以上4K未満



輝度補正したベース値
(kWh/年) 液晶4K以上



輝度補正したベース値
(kWh/年) 有機EL



Screen area (cm ²)	Target base value (kWh/year)
1,103 (20V)	35
2,481 (30V)	40
4,411 (40V)	48

Screen area (cm ²)	Target base value (kWh/year)
2,481 (30V)	71
4,411 (40V)	83
6,892 (50V)	98

Screen area (cm ²)	Target base value (kWh/year)
4,411 (40V)	95
6,892 (50V)	113
9,924 (60V)	135

Screen area (cm ²)	Target base value (kWh/year)
8,339 (55V)	162
11,647 (65V)	232
15,507 (75V)	315