

Japan's Efforts toward Further Deepening Energy Efficiency

APERC Annual Conference

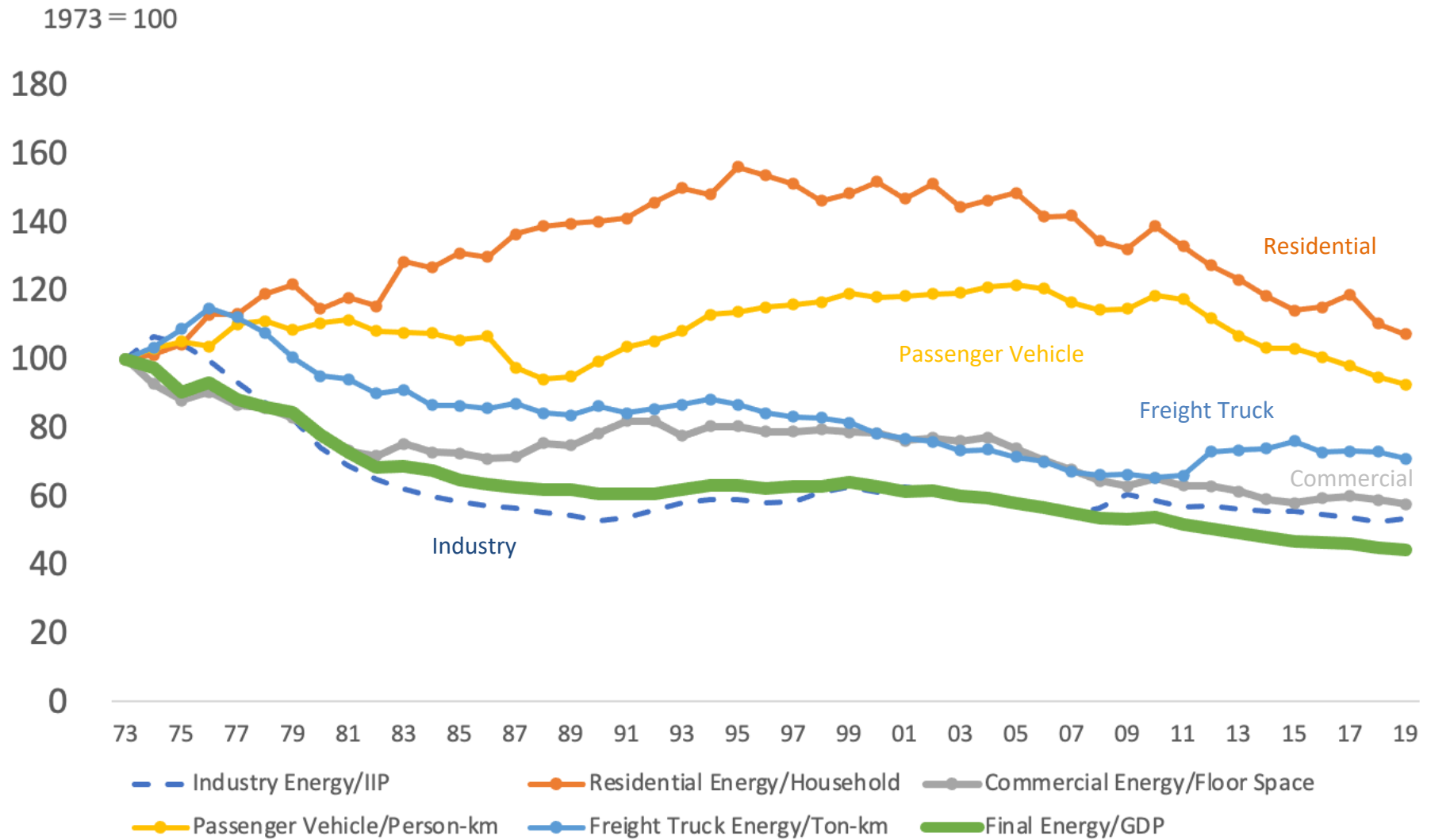
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Japan's Energy Intensity Trend

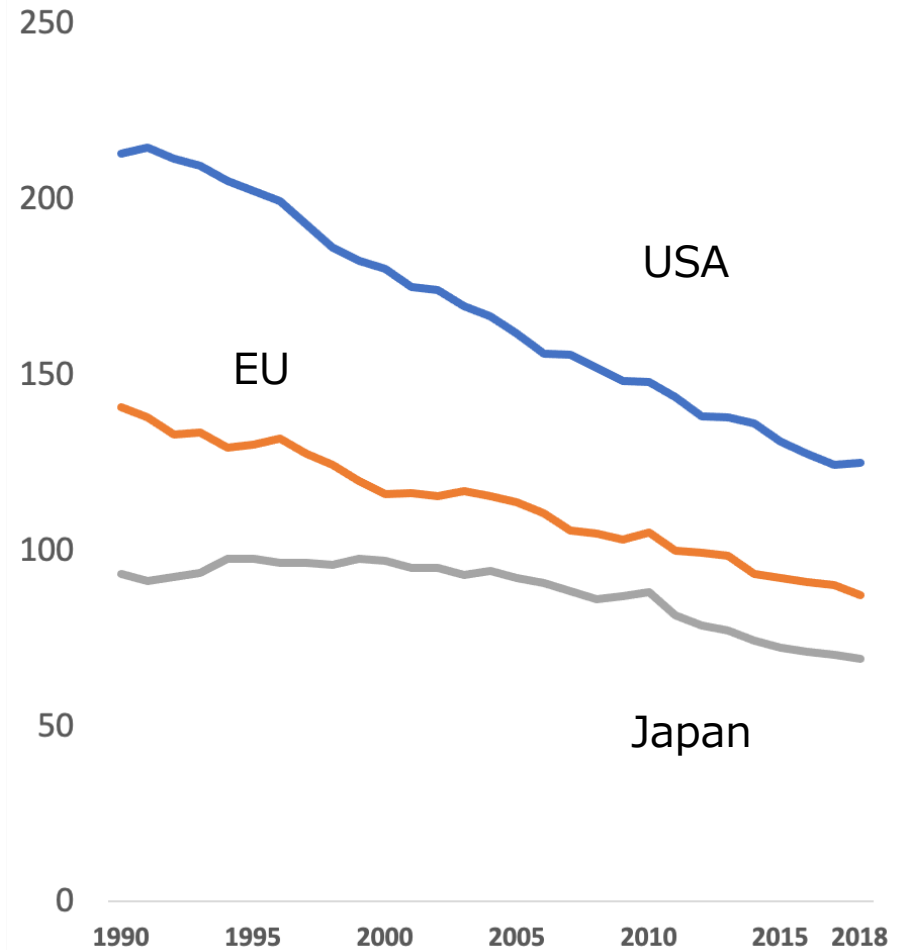
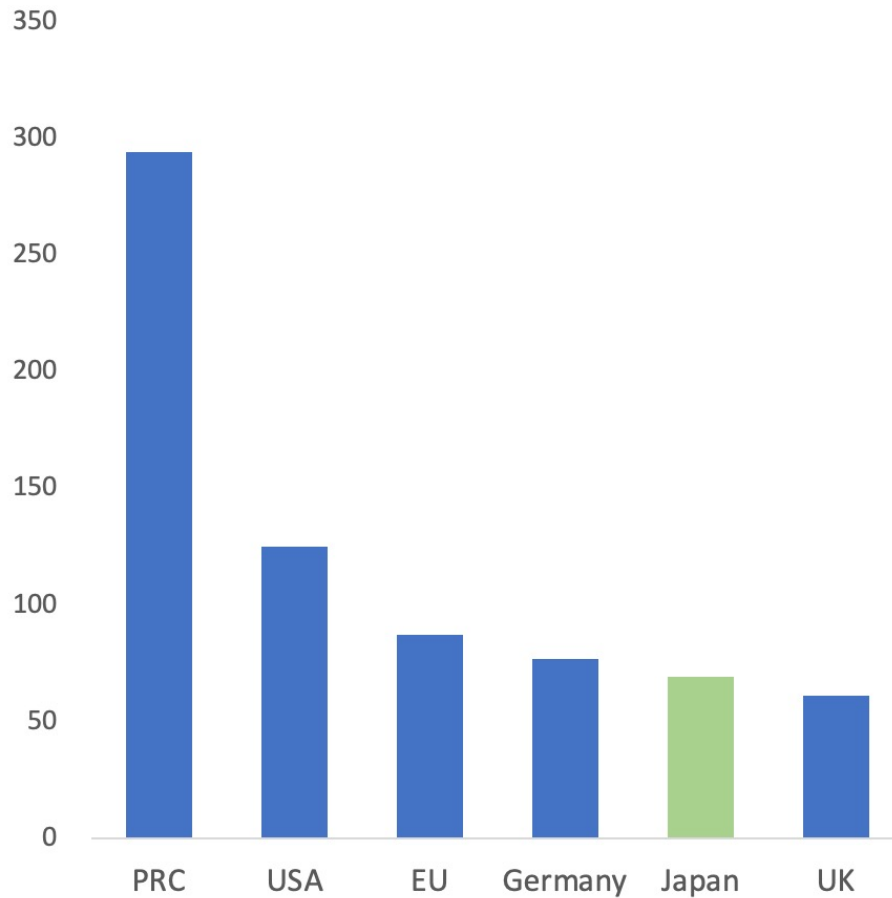


(Source) IEEJ • EDMC (2021) "Energy and Economic Indicators"

International Comparison of Energy Intensity Trend

International Comparison of Primary Energy Intensity

Mtoe/Million 2010 USD in 2018

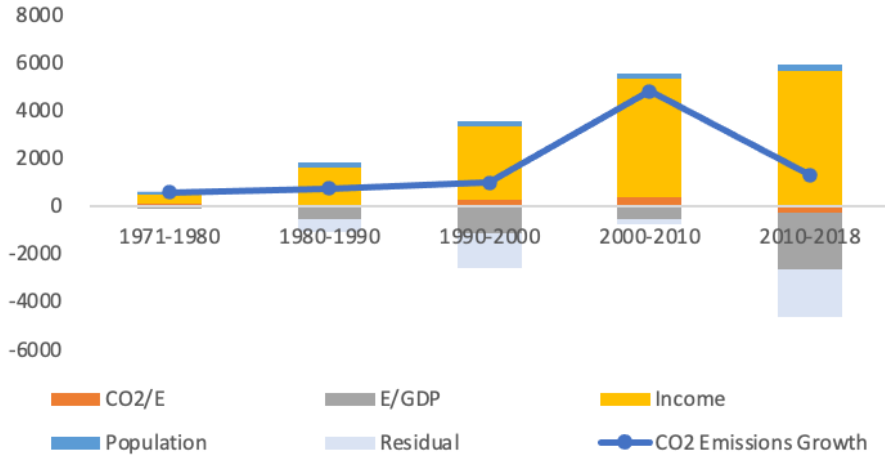


(Source) IEEJ • EDMC (2021) "Energy and Economic Indicators"

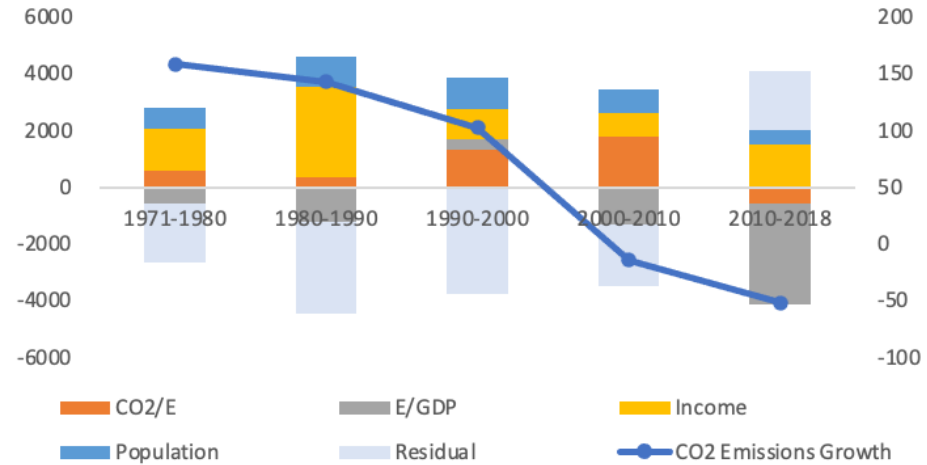
Decomposition Analysis: Factors Affecting CO2 Emissions Reduction

Growth in CO2 Emissions (M CO2 ton)

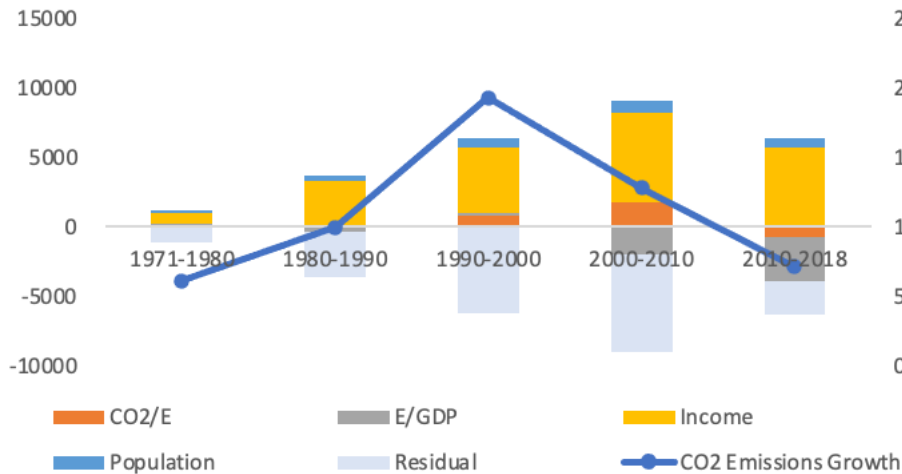
China



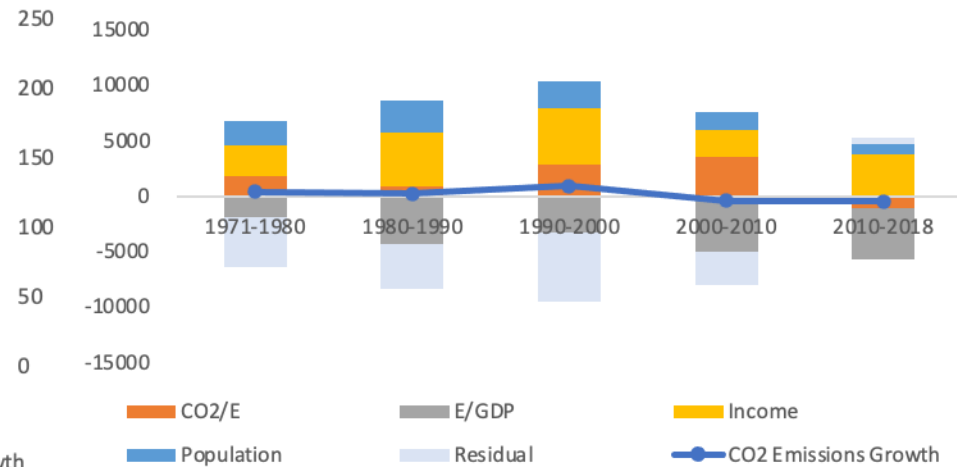
Japan



Korea



USA



Factors Affecting the Successful Implementation of Japan's Energy Efficiency

Policies Implementation – comprehensively cover across the sector

Stable Funding System

- It is possible to continue providing economic incentives to EE policy implementation and R&D.

Human Resources

- In-house energy managers serve as a vehicle to identify areas for energy efficiency improvement

Factors Affecting the Successful Implementation of Japan's Energy Efficiency – Package of Policies

Energy Management System

- EE&C improvement efforts by the **in-house experienced energy managers** being supported by government's **stable provision of economic incentives** and **know-how sharing platform**

Benchmark System

- Assist EE&C efforts by the factories/business entities with the **intra-industry comparison**

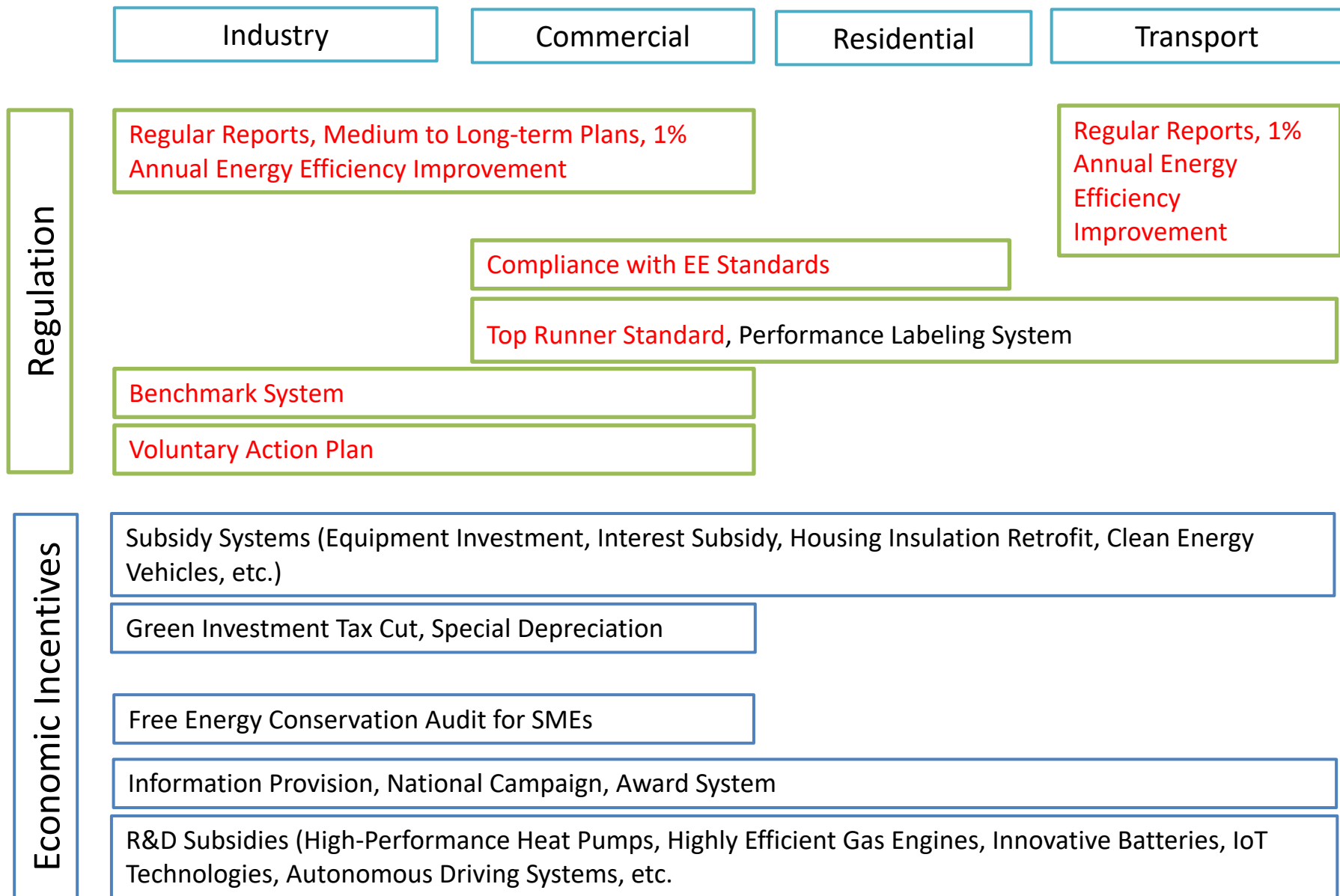
Voluntary Action Plan

- Facilitate **intra-industry sharing** and **deployment of best practices**

Top Runner Program

- **R&D efforts by the manufacturing industries** and **consumers' choice toward EE technologies** – supported by labeling and economic incentives

Energy Efficiency and Conservation Policy Framework



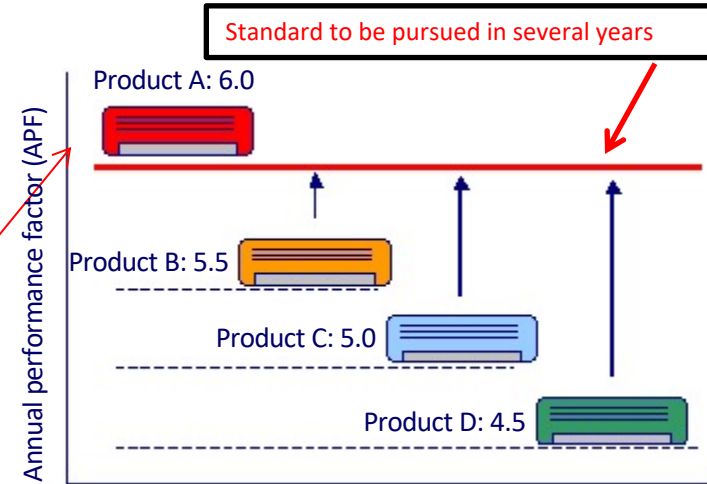
Historical Development of Energy Conservation Law

Industry	Residential and Commercial	Transport
1979 Establishment Designated Energy Management Factories Guidance for Buildings and Appliances		
1983 Amendment Licensed energy manager system		
1992 Amendment Periodical reporting		
1998 Amendment Expand coverage of factories	1998 Amendment Top Runner Program	
2005 Amendment Integration of Heat and Power Control	2002 Amendment Energy Management of Office Buildings	2005 Amendment Reporting System on Energy by Carriers
2008 Amendment Company base regulations, Joint Conservation, Sector Benchmark	2008 Amendment Energy Management of Large Buildings	
2013 Amendment Promotion of electricity demand load leveling (Summer and Winter)	2013 Amendment Introduction of building material Top Runner	
2015 SABC class evaluation	2015 Amendment New Building EC Act (April, 2017)	
2018 Evaluation for Joint Energy Conservation	(2nd Amended 2019)	2018 Redefinition of freight owner and Semi Freight Owner

Top Runner Program

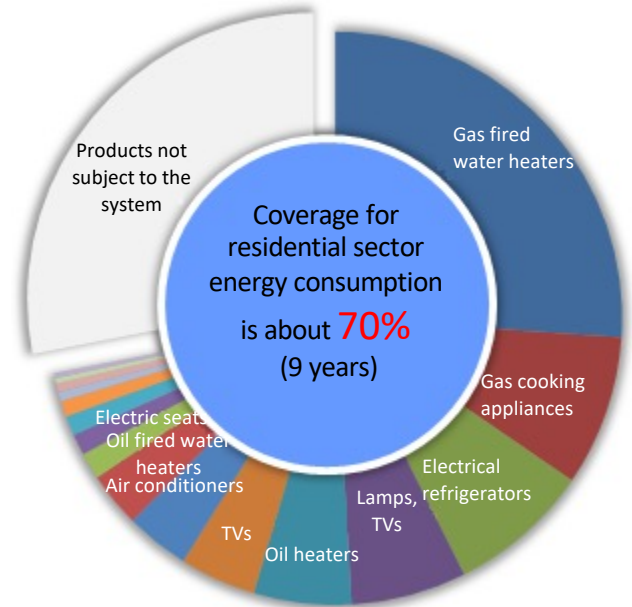
① Top Runner Program

- ✓ Purpose: Promoting technological innovation
- ✓ Set standards referring to top-level products in the current market, and future prospects for technology development
- ✓ Targets are required to be achieved in several years after published.
- ✓ A weighted average for each product category in the company is used to decide whether achieved or not.
- ✓ Exclude small and medium-sized enterprises (based on production volume) and special products
- ✓ Number of product categories subject to the system : 32



② Passenger Vehicles

- ✓ A weighted average for each company (not category) is used to decide whether achieved or not, inclusive of EV and PHEV from 2020.

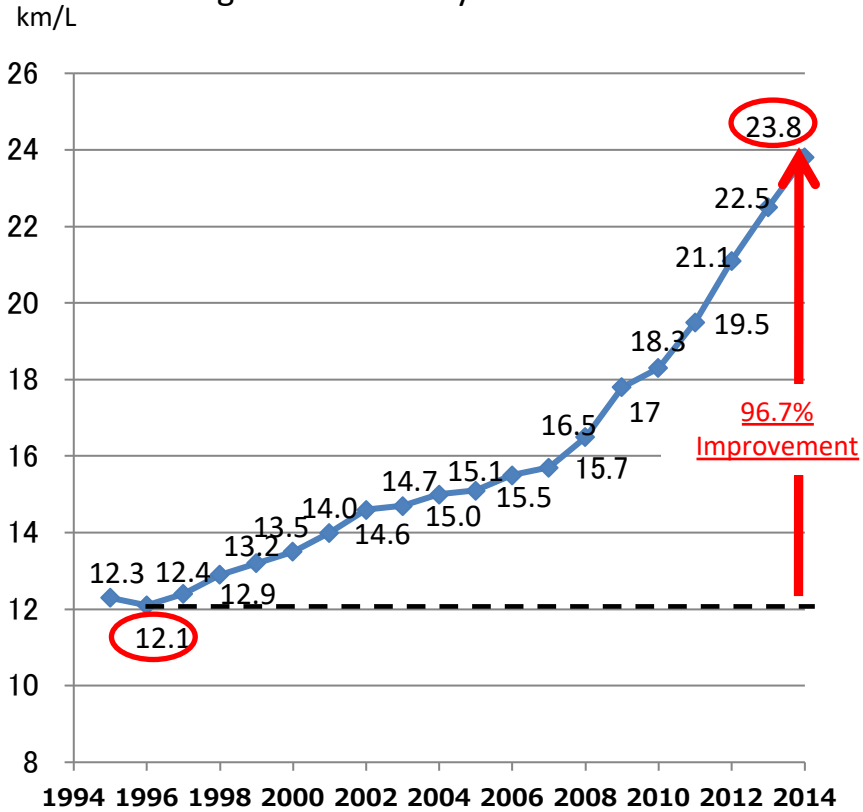


(Source) Institute of Energy Economics, Japan, "Fact-finding Survey on Buildings Sector Energy Consumption in FY2009"

Impacts of the Top Runner Program

Passenger vehicles

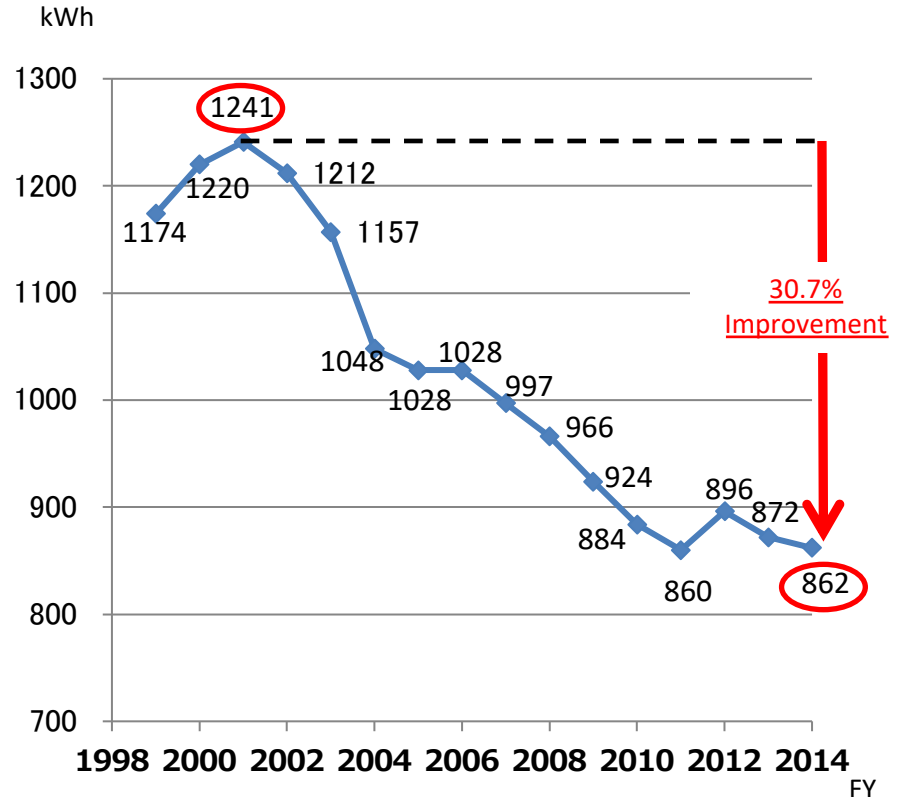
Average Fuel Economy of New Cars



○ Gasoline passenger vehicles fuel economy at 10/15 mode
 ○ Source : Ministry of Land and Transport

AC

Electricity Consumption



○ AC average energy consumption at cooling capacity of 2.8 kW
 ○ Electricity consumption data is sourced from JISC9612:2005
 ○ Source : Energy efficiency catalogue (Summer and Winter)

- Fuel economy of new passenger vehicles improved by 97% (1996→2014), while AC efficiency improved by 31% (2001→2014)

EE&C Challenges in Japan

Future challenges (short term)

The improvement rate of EE has slowed lately. Many measures have already been implemented. The efficiency of each technology has already improved significantly. The challenge is to **find room for additional improvements** in both operation and technology.

Future challenges (medium to long term)

Industry: Difficult to make additional investments due to the shrinking domestic market, especially in the energy-intensive industries.

Commercial: Further improvement of equipment efficiency, including the use of digital technology. Introduction of ventilation systems that minimize losses.

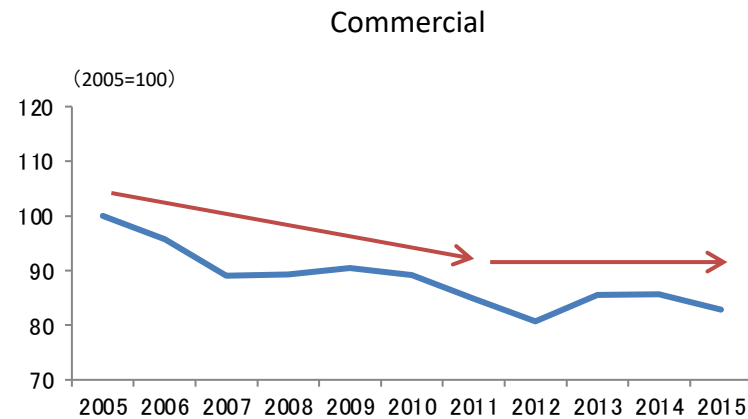
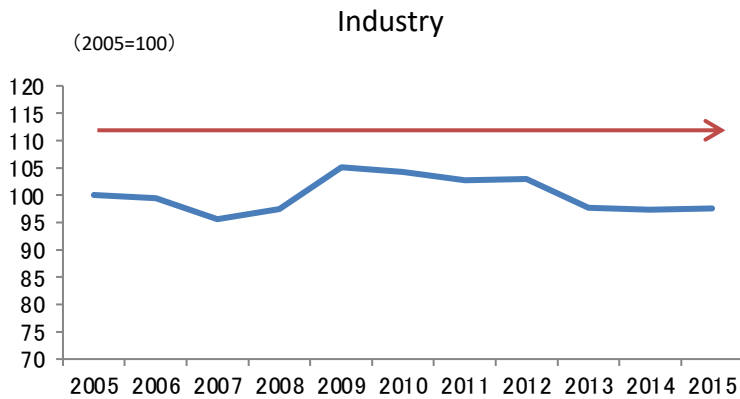
Residential: Taking care of increasing ownership rate of equipment. Control of equipment with digital technology. Strengthening the insulation of residential buildings.

Transport: Acceleration the spread of EV, PHEV and FCV. Making freight transport more efficient taking care of the spread of E-commerce.

Cross-cutting: Promotion of regional energy management by utilizing digital technology, electricity storage, and heat storage technology.

Challenges for the Industry & Commercial Sectors

Energy Intensity Improvement



Energy Intensity of Designated Business Entities

	Number of business entities	More than 1% improvement	0-1% improvement	Those did not improve
Industry	5,545	2,743 (49%)	759 (14%)	2,043 (37%)
Commercial	5,513	3,439 (62%)	777 (14%)	1,297 (24%)
Total	11,058	6,182 (56%)	1,536 (14%)	3,340 (30%)

Source : METI(2016). "Research study on factories and freight transport owners' energy conservation situation".

- Industry and commercial energy intensity had improved substantially, while the rate of improvement has been slowed recently. Nearly 30% of entities under the annual reporting obligation has shown energy intensity deterioration.
- It is important to encourage joint energy efficiency improvement among multiple business entities.

Plan toward Amendment of the Energy Conservation Law

- **Amendment on the definition of energy**

- Current energy conservation law regulates rational use of “fossil fuels”. The amendment will be made to include both non-fossil fuels, and fossil fuels.
- Saved “kWh” has been considered as the savings of fossil fuel generation. The amendment will be made that saved “kWh” is based on average mix of electricity generation including both fossil fuels and non fossil fuels.

- **Requirements for reporting/planning to expand the use of non-fossil fuels**

- Energy conservation law will require designated entities to report the usage of non-fossil fuels, and plan for the shift toward non-fossil fuels.

- **Optimal use of electricity**

- Under the energy conservation law, a mechanism will be introduced to promote demand response by setting hourly/monthly different the electricity conversion factor.