

A light gray silhouette of a world map serves as the background for the title text. The map shows the outlines of all major continents and countries.

Deepening Japan's Energy Efficiency Efforts

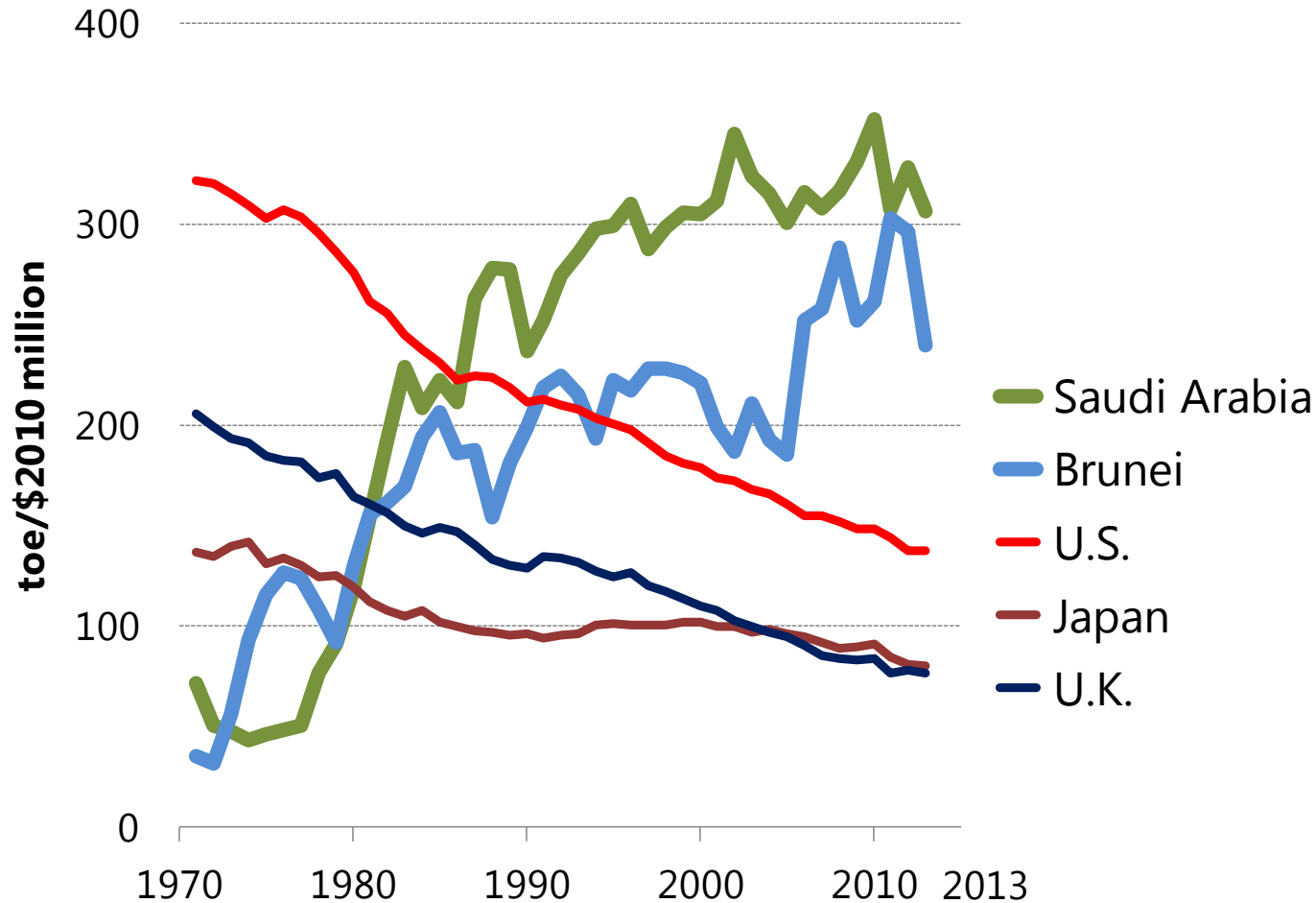
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The Institute of Energy Economics, Japan (IEEJ)

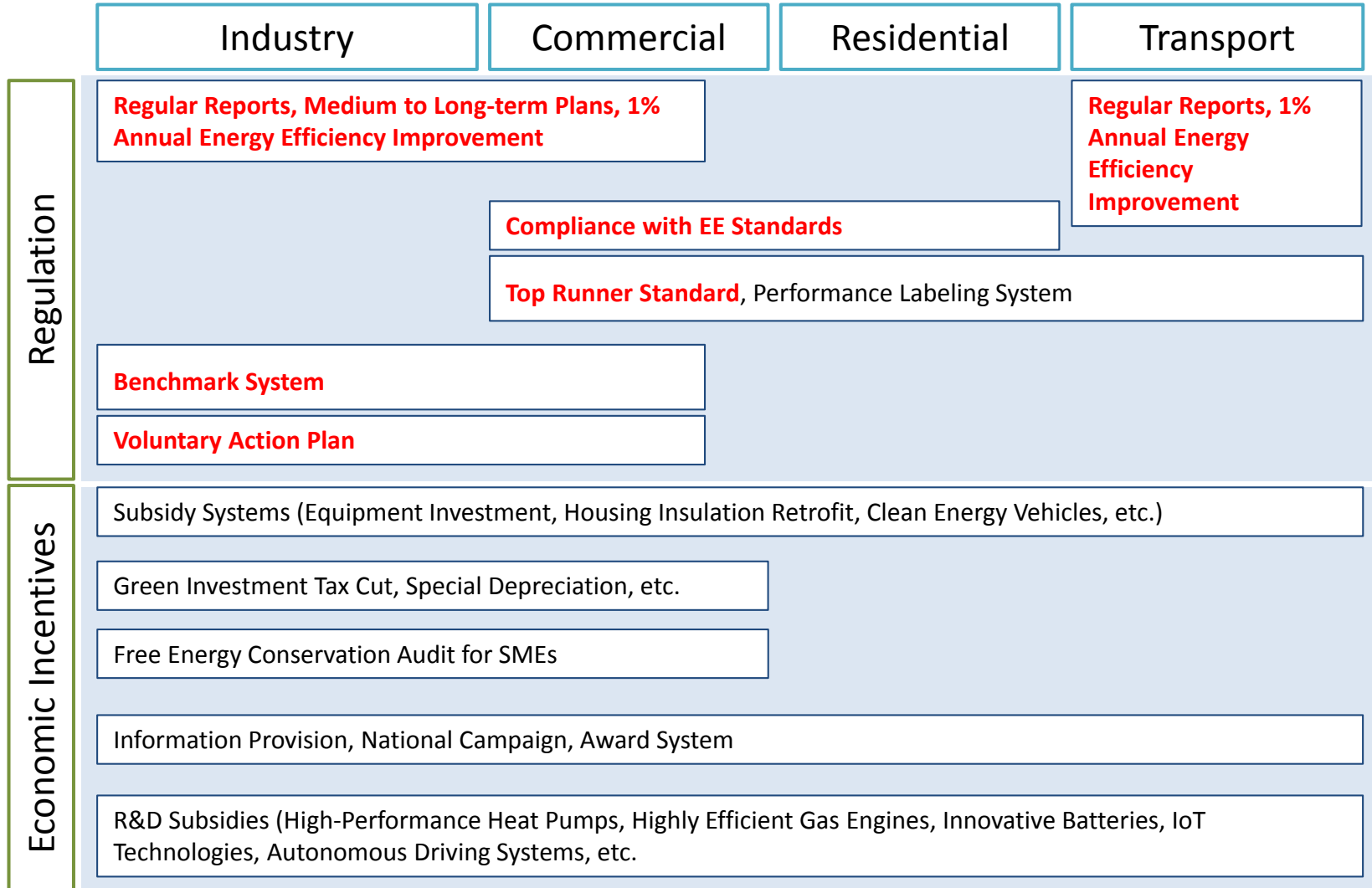
Outline

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1. International Comparison of Total Primary Energy Consumption per GDP



2-1. Energy Efficiency and Conservation Policy Framework



2-2. Factors Affecting the Successful Implementation of Key EE 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

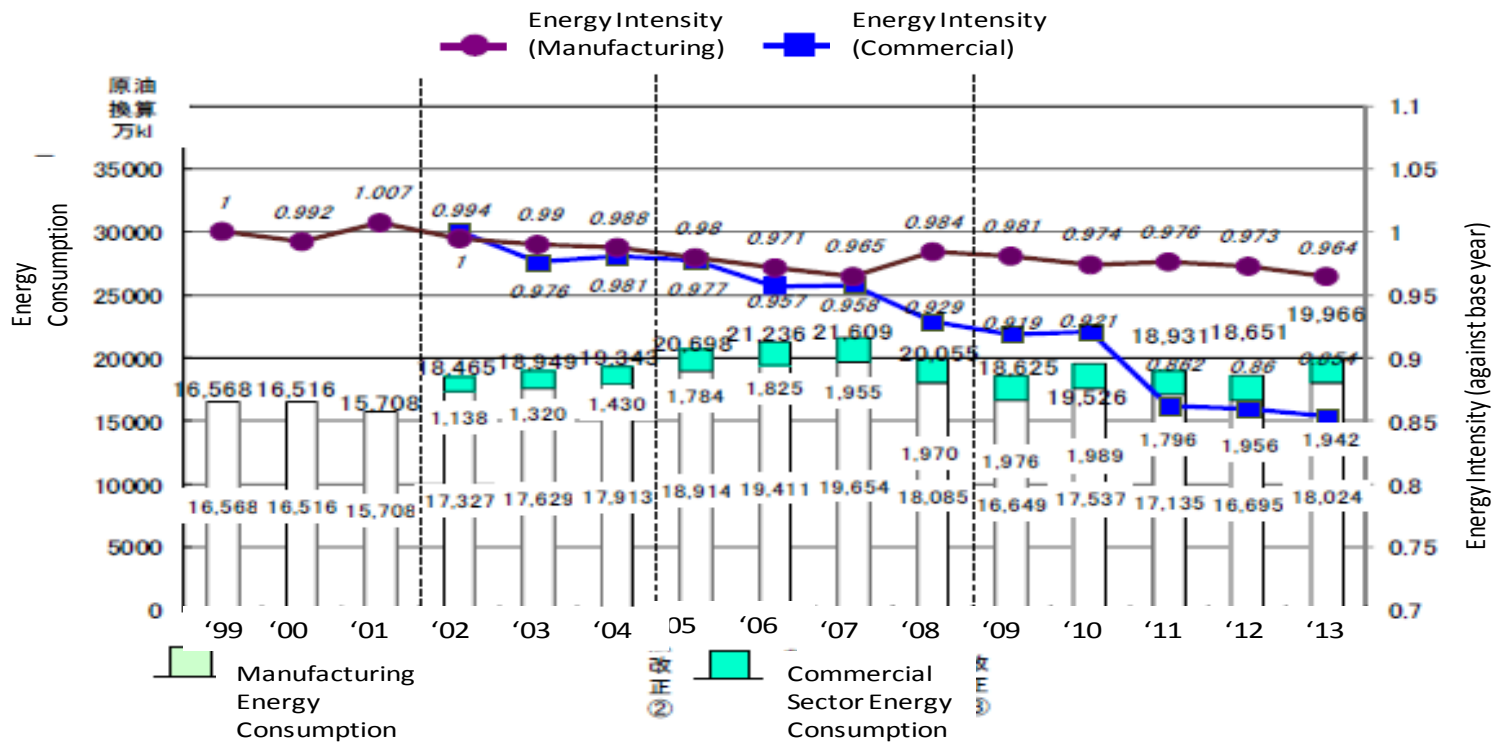
3-1. Challenges and Changing Market Environment for Japan's Energy Efficiency

- Japan faces challenges to continuously make progress on energy efficiency building on the conventional approach.
 - Energy Management System
 - Manufacturing industry's pace of energy intensity improvement represents slower compared with that of commercial sector.
 - Top Runner Program
 - Substantial achievement in technology energy efficiency has been made historically (AC: 30%, Passenger Vehicles: 48.8%). Manufactures may face challenges to find technological options for cost effective energy efficiency improvement.
- Consumers' energy consumption pattern may change under the deregulated energy market environment.
 - Electricity retail competition introduced in April 2016
 - Gas retail competition – to be introduced in April 2017

3-2. Japan's Large-Scale Energy Users' Energy Intensity Improvement

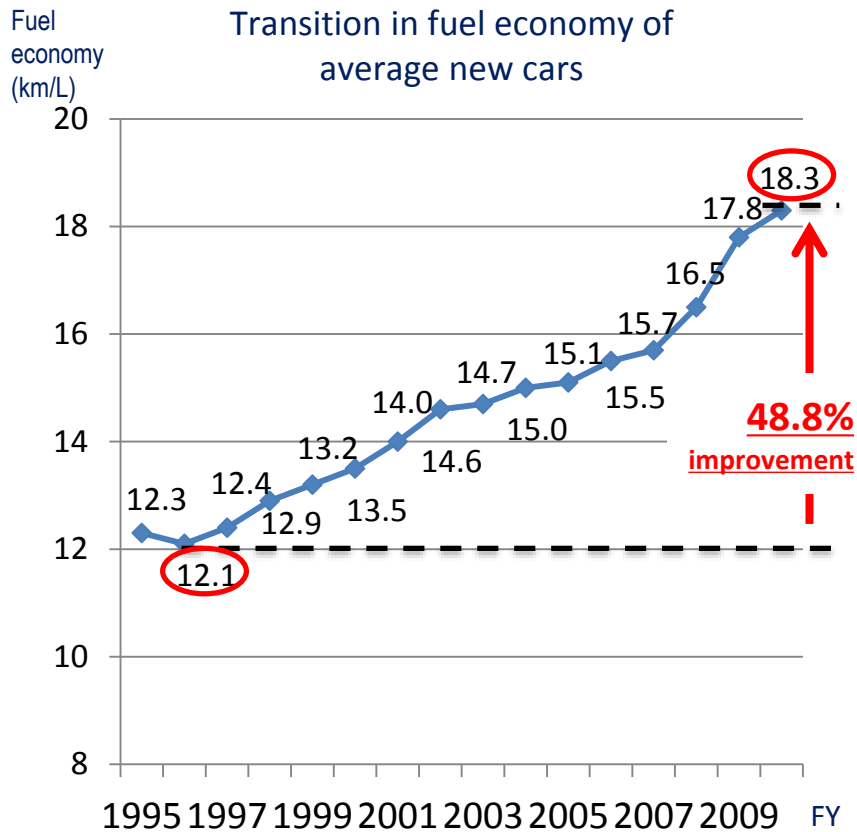
- Manufacturing industry's energy intensity level showed relative small improvement since 1999.
- By contrast, the commercial sector's energy intensity substantially improved since its start in 2002.

Trends in Energy Intensity: Manufacturing Industry and Commercial Sector



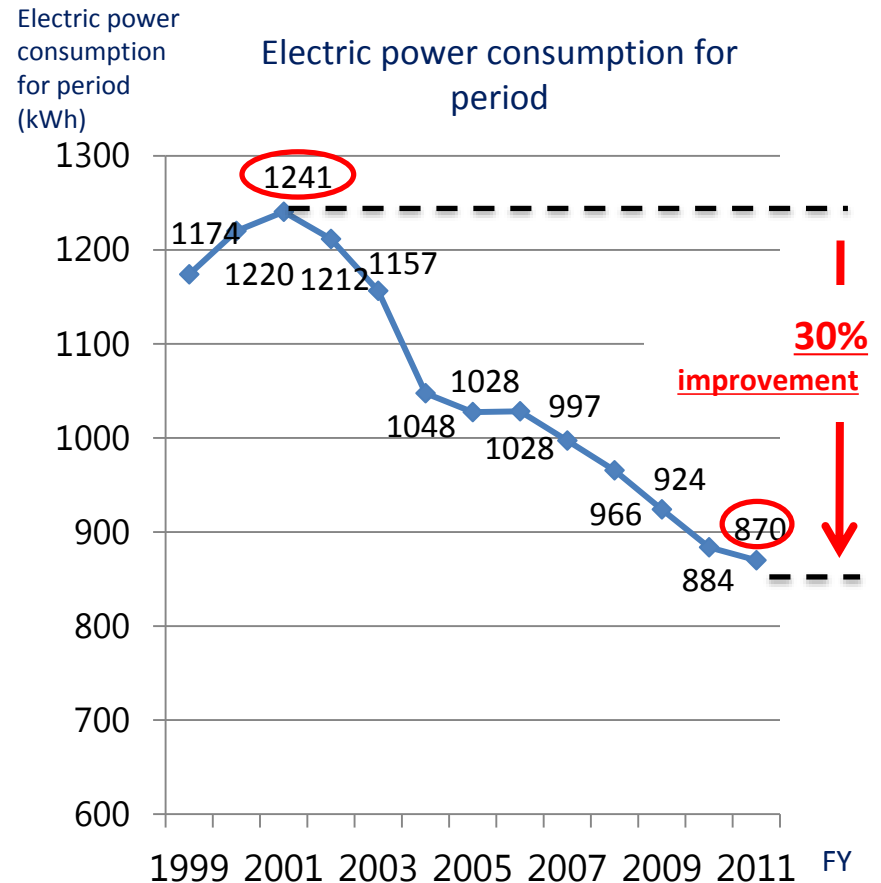
3-3. Improvements in Energy-Efficiency with Top Runner Program

[Passenger cars]



(Note) Fuel economy values for the 10-15 mode.

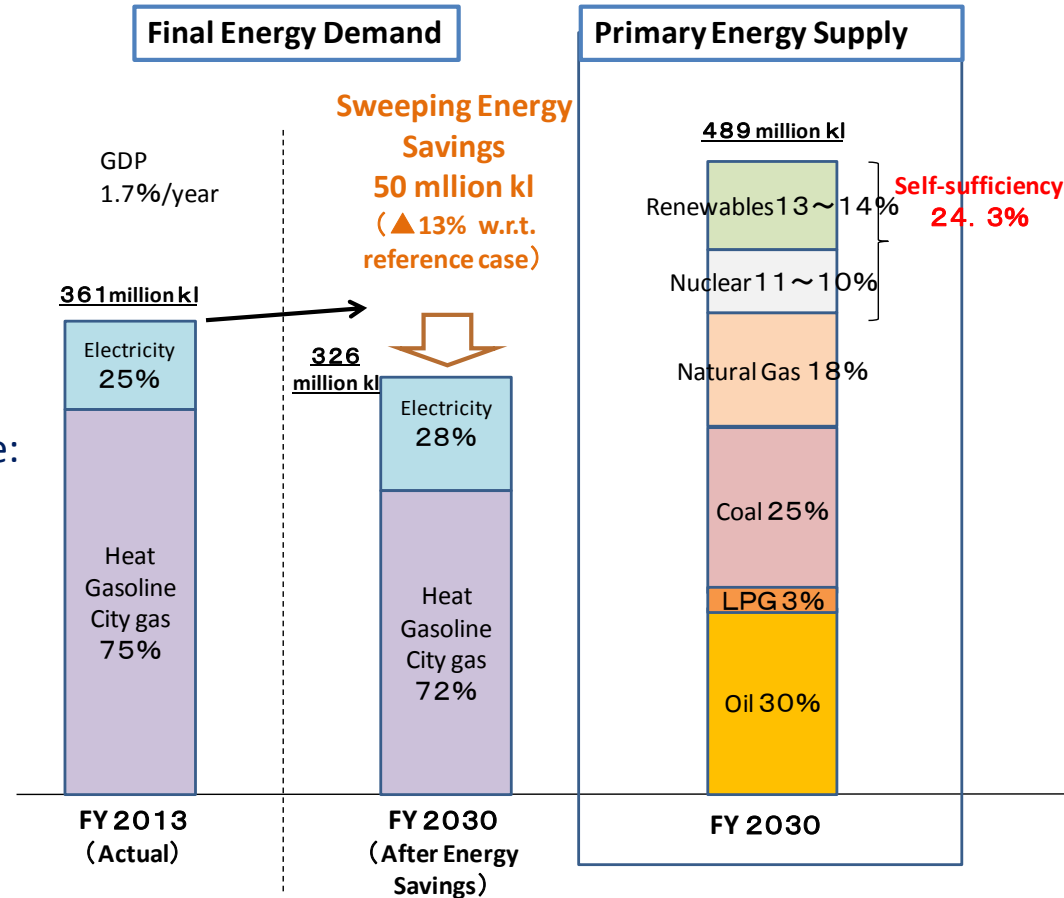
[Air conditioners]



(Note) Wall mounted cooling and heating units with cooling capacity of 2.8kW-class model; simple average values for a representative model of energy conserving-type products.

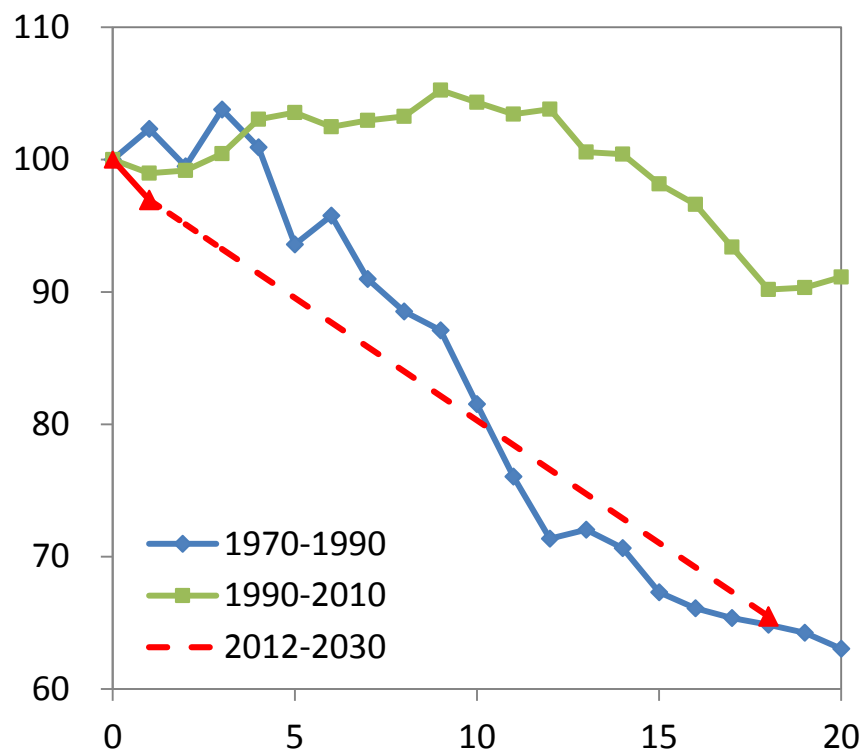
4-1. Energy Supply/Demand Structure toward CO₂ Emissions Reduction Target in 2030

- While energy demand growth is projected in line with economic growth (**an average 1.7%**), energy efficiency is expected to improve as much as after the oil crises thorough energy conservation (**35% in 20 years**).
- Energy supply/demand structure improvement (energy self-sufficiency rate: 6% in 2014 ⇒ **24.3%** in 2030)
- Japan's CO₂ emissions reduction target (**26% CO₂ emissions reduction** in 2030 compared with 2013 level)



4-2. Need for Further Improvement of Energy Efficiency

【Improvement in Energy Intensity】



- Thorough energy conservation measures could save final energy demand by 13% to 326 million kl.
- Energy conservation measures would be accumulated to improve energy efficiency as much as just after the oil crises.

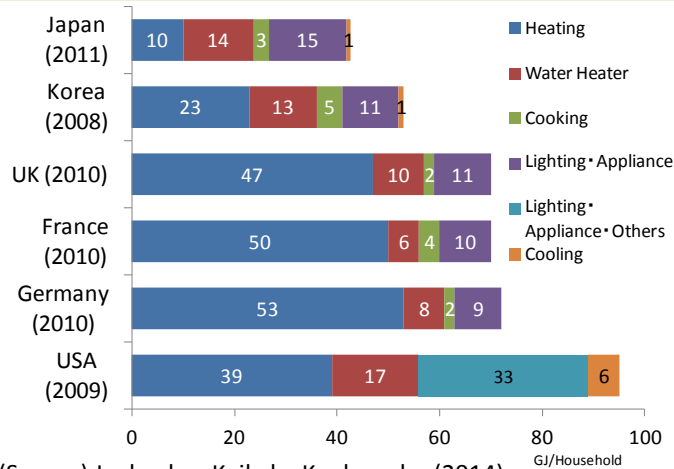
5-1. Toward Deepening Japan's Energy Efficiency – Overview of New or Enhancing EE Policies

Sector	Energy Savings in 2030	EE&C Policies to Realize the Estimated Energy Savings
Industry	Factories : 10.42 billion Liter	<ul style="list-style-type: none"> ■ Strengthening Benchmark Standard ■ <u>Strengthening Review System for Energy Management System</u> ■ Energy Audit for Small and Medium Sized Entities ■ <u>Promoting Joint EE&C Efforts by Multiple Entities</u>
Commercial	Buildings・Stores : 12.26 billion Liter	<ul style="list-style-type: none"> ■ Strengthening Benchmark Standard ■ Strengthening Review System for Energy Management System ■ Energy Audit for Small and Medium Sized Entities ■ Top Runner Standard ■ <u>Mandatory Compliance on Building EE Standard</u> ■ Wider Diffusion of Zero Energy Building <p style="border: 2px solid red; padding: 5px; color: red; font-weight: bold;">■ Provision of EE Information by Energy Suppliers and Potential for Energy Efficiency Obligation</p>
Residential	Appliances : 6.03 billion Liter Housing : 5.57 billion Liter	<ul style="list-style-type: none"> ■ Top Runner Program ■ Mandatory Compliance on Housing EE Standard ■ Wider Diffusion of Zero Energy House <p style="border: 2px solid red; padding: 5px; color: red; font-weight: bold;">■ Provision of EE Information by Energy Suppliers and Potential for Energy Efficiency Obligation</p>
Transport	Freight Truck : 6.68 billion Liter Vehicles : 9.39 billion Liter	<ul style="list-style-type: none"> ■ Traffic Demand Management・Eco-Driving ■ Improvement of Freight Delivery Service ■ Top Runner Program ■ Autonomous Car Driving

Amendment of Energy Conservation Law to mandate electric utilities to provide consumers with EE information in 2013

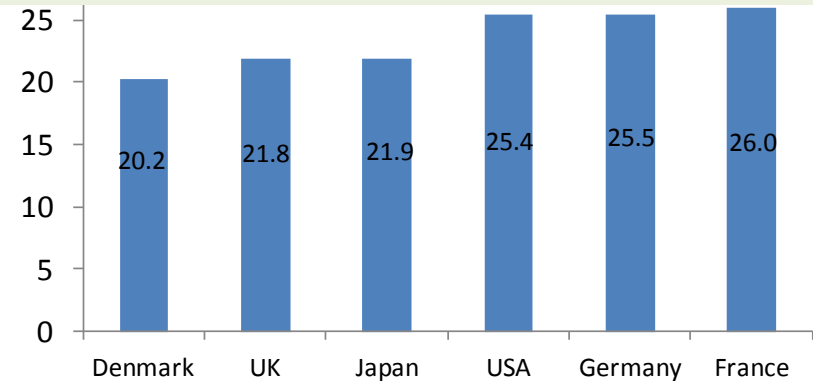
5-2. Some Issues for Deepening EE – Residential and Commercial Sectors

Residential Energy Consumption per Household (GJ/household)



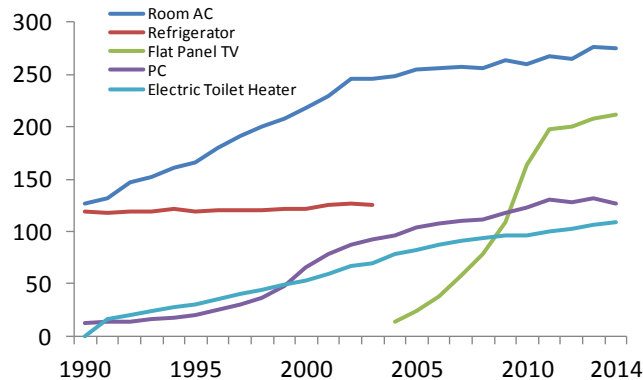
(Source) Jyukankyo Keikaku Kenkyu-sho (2014).

Commercial Energy Consumption per Floor Space (toe/m²)



(Source) Denmark · France · Germany · UK : IEA (2013) : Energy Balances of OECD Countries, BPIE (2011) .Europe's Buildings Under the Micro Scope. Japan : IEEJ (2014) : 「Energy Statistics」, USA : IEA (2013) : Energy Balances of OECD Countries, US EIA (2013).2012Commercial Buildings Energy Consumption Survey.

Japan's Household Appliances Diffusion (units/household)



(Source) IEEJ (2014) : 「Energy Statistics」.

Issues for Deepening Middle/Small Sized Commercial EE

- Information Gap
- Bounded Rationality
- Financial Constraint
- Short-term View
- Split Incentive

5-3. Toward Deepening Japan's EE Efforts

- Japan is the leader in EE efforts across the world with the use of **(1) regulation, (2) economic incentives and (3) human resources (energy managers)**.
- Toward deepening Japan's EE efforts, **strengthening existing policies and practices** is the key with the use of new technologies.
 - Strengthening Benchmark Standard, Energy Management System, Top Runner Program and Building EE Standard,
 - Energy Management System (FEMS, BEMS and HEMS), and
 - Zero Energy Building
- In view of the need to introduce new EE policy approach, Japan **strengthens provision of EE information** by energy suppliers to facilitate **consumers' behavior change**.