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Deepening Japan's Energy Efficiency Efforts

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Deepening Japan's Energy Efficiency Efforts

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The Institute of Energy Economics, Japan (IEEJ)

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3. Challenges and Changing Market Environment for Japan's Energy Efficiency and Conservation
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5. Toward Deepening Japan's Energy Efficiency Efforts – Overview of New or Enhancing Energy Efficiency

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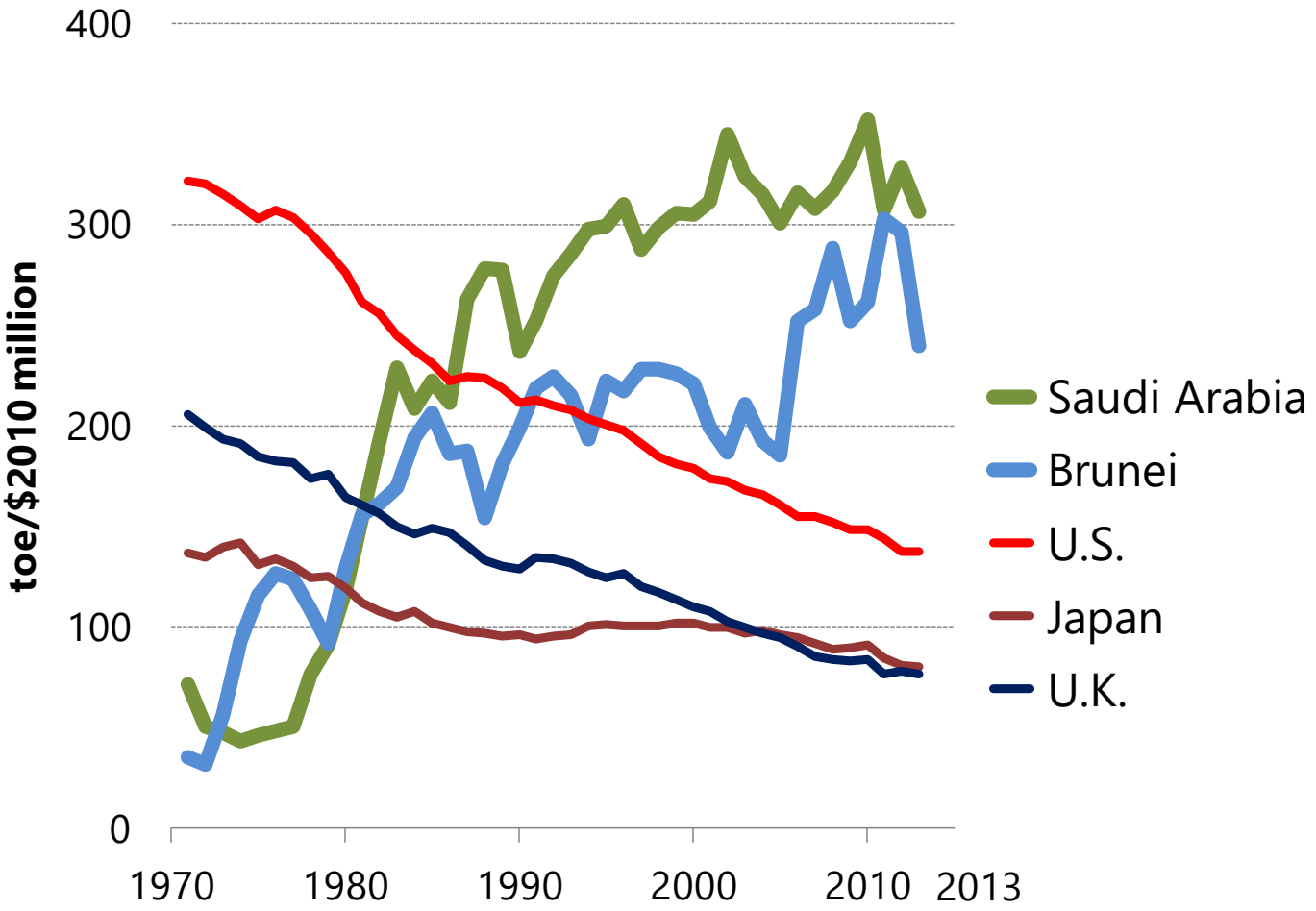
1. International Comparison of Total Primary Energy Consumption per GDP



(Source) IEEJ "Handbook of Energy & Economic Statistics in Japan"

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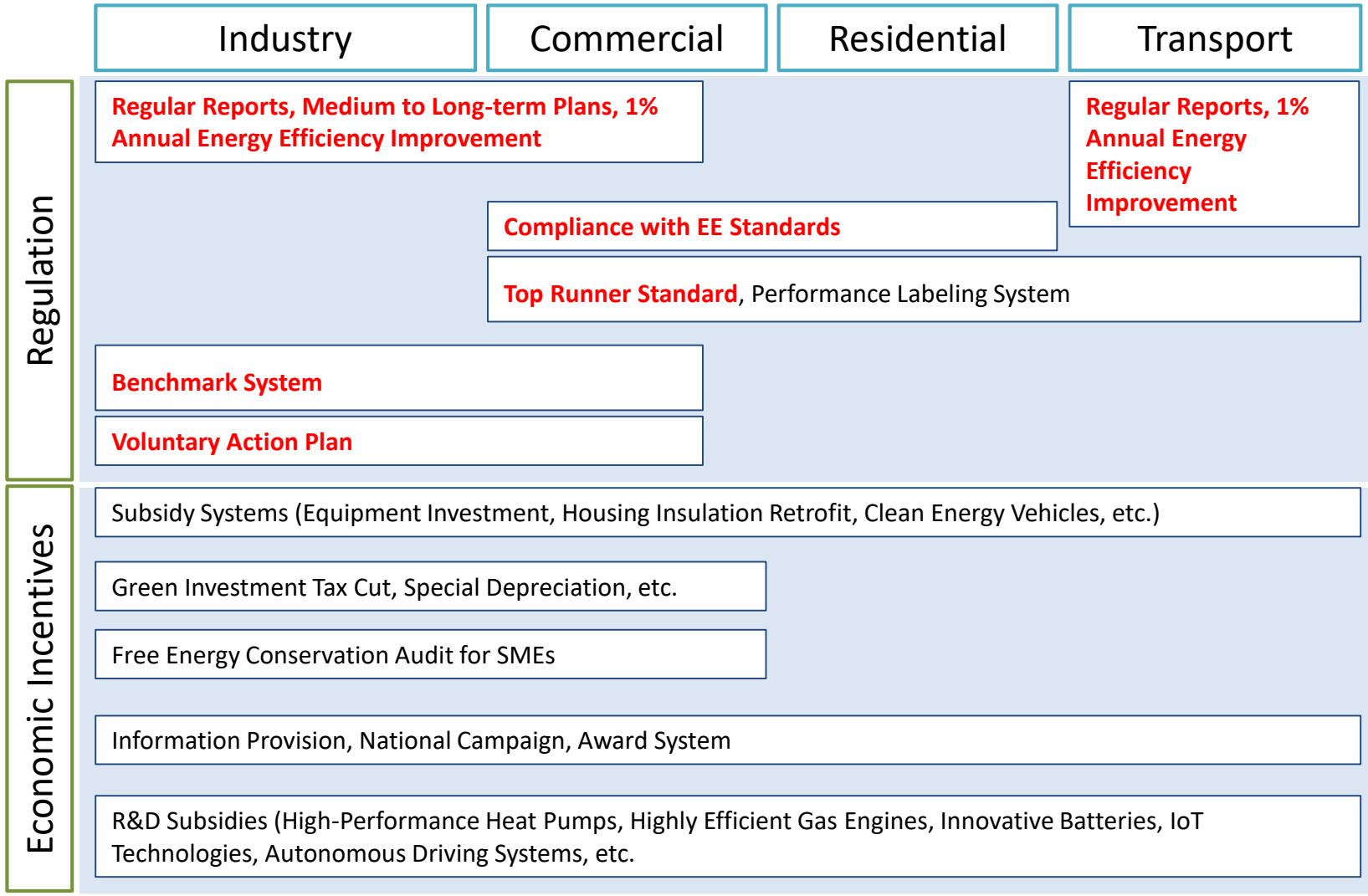
2-1. Energy Efficiency and Conservation Policy Framework



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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

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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

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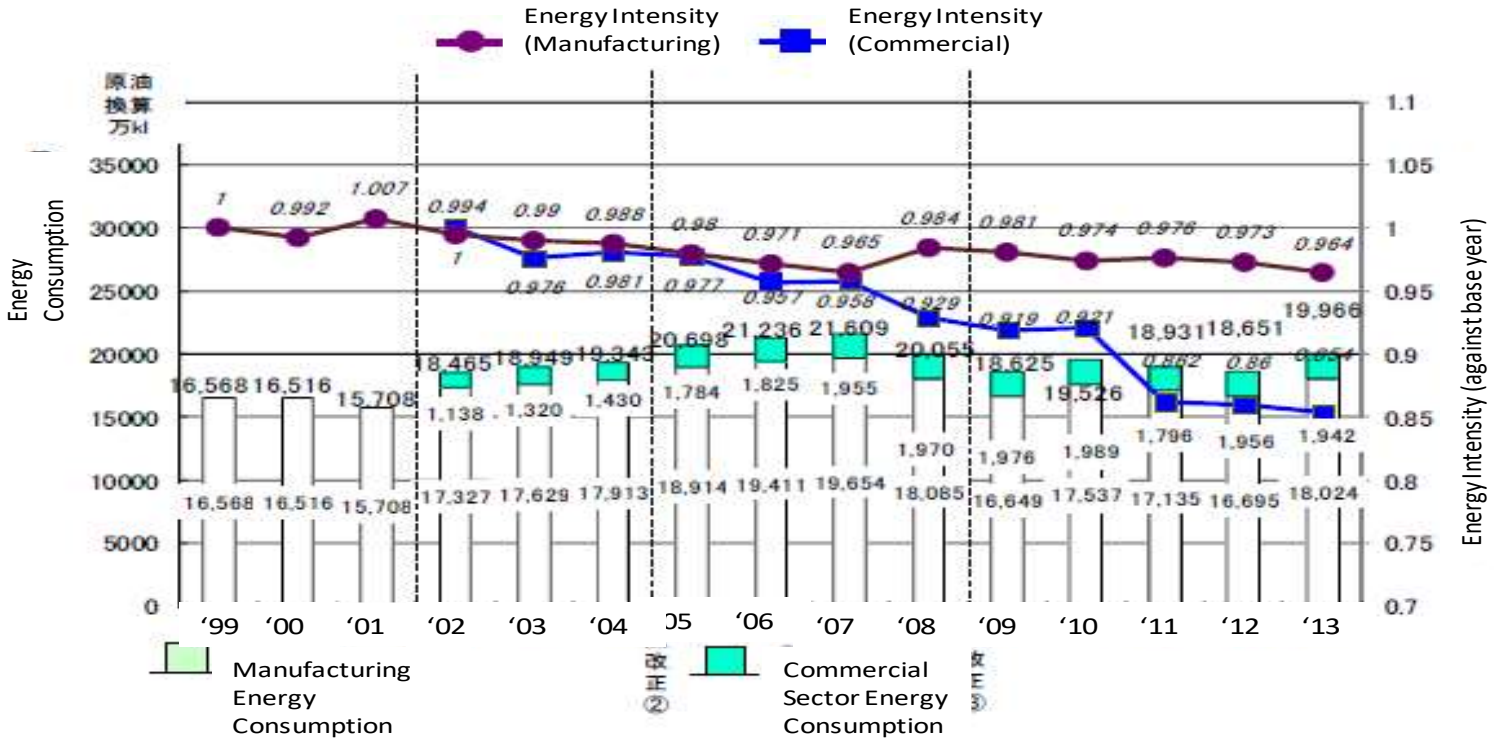
3-2. Japan's Large-Scale Energy Users' Energy Intensity Improvement

- 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



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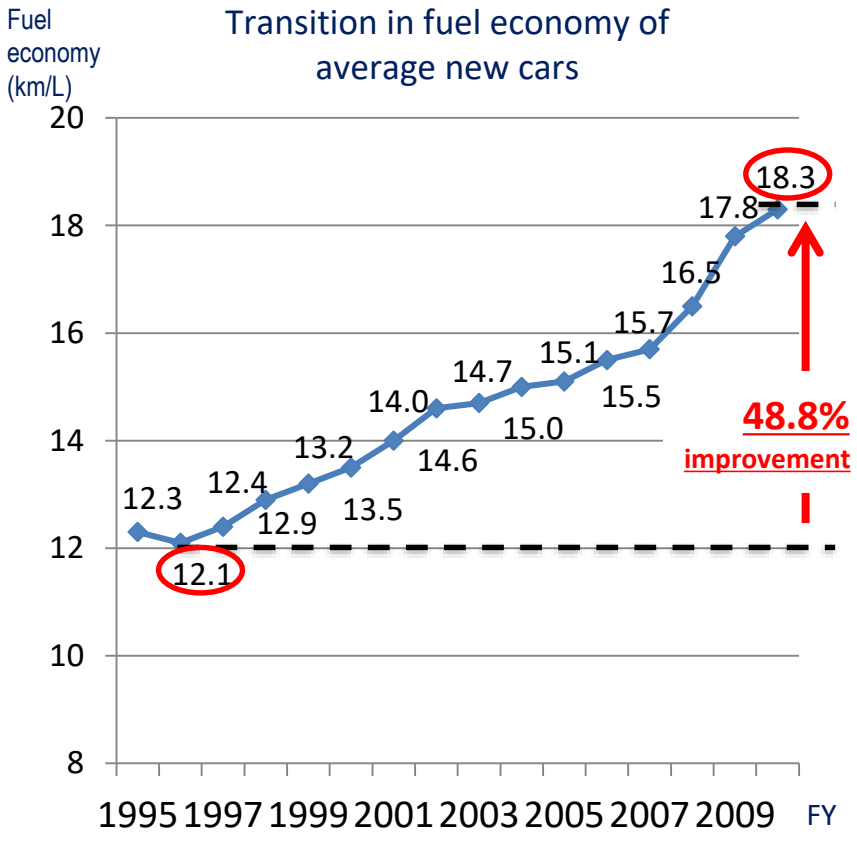
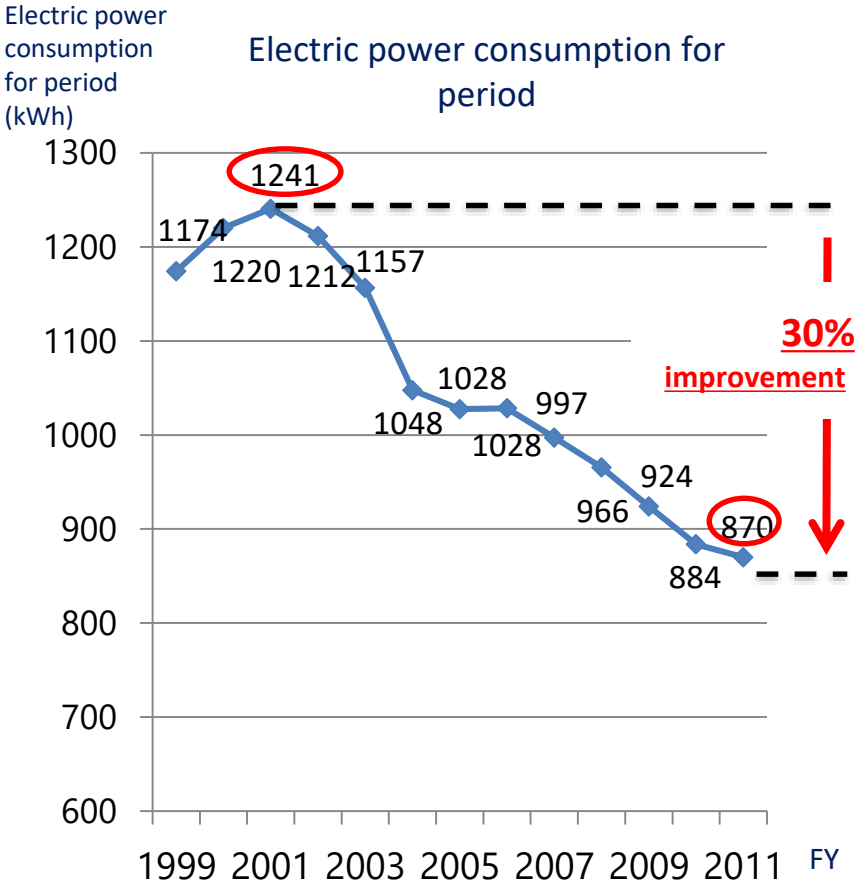
3-3. Improvements in Energy-Efficiency with Top Runner Program

[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.

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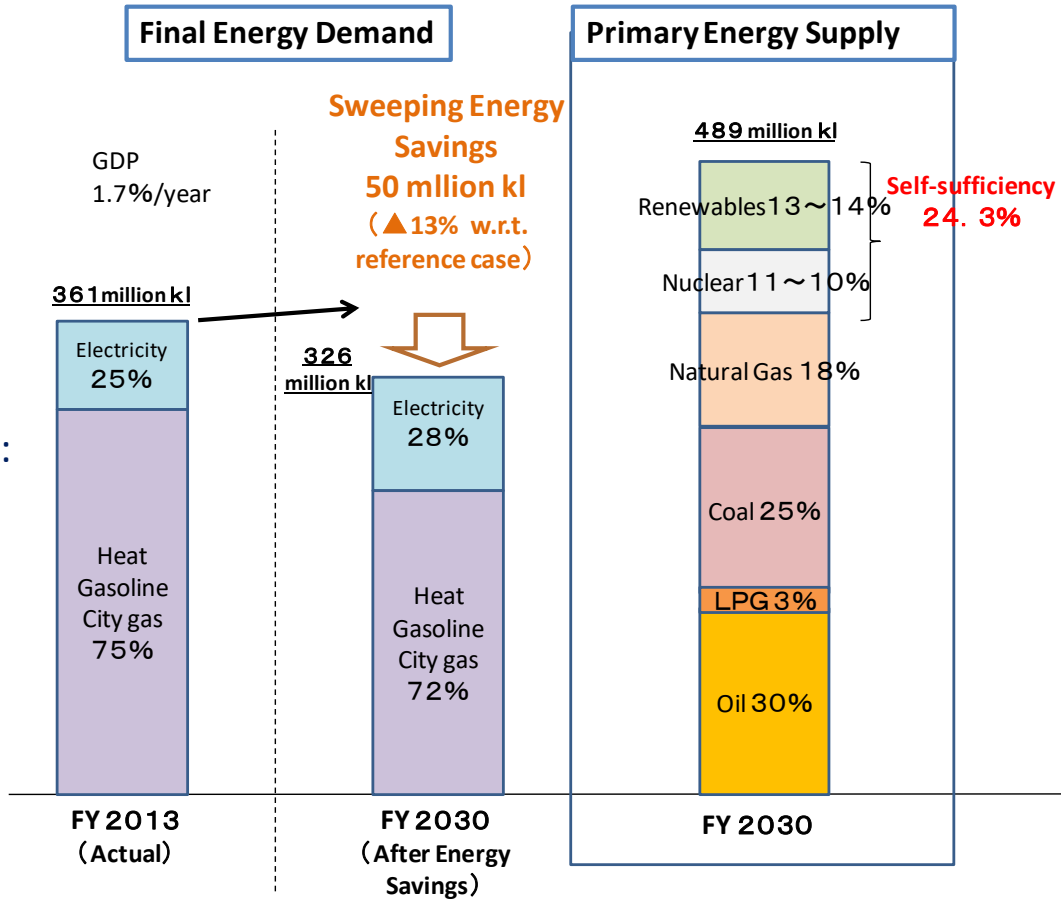
4-1. Energy Supply/Demand Structure toward CO_2 Emissions Reduction Target in 2030

○ 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 CO_2 emissions reduction target** (**26% CO_2 emissions reduction** in 2030 compared with 2013 level)



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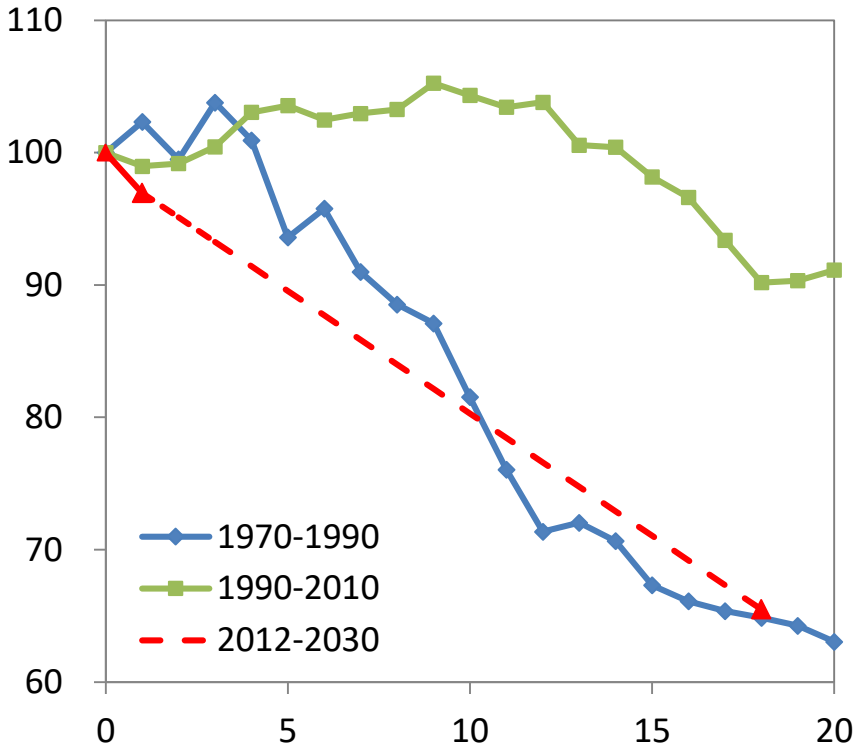
(Source) METI "Long-term Energy Supply/Demand Outlook" p.5 (July 16, 2015)

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.

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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	■ Strengthening Benchmark Standard ■ Strengthening Review System for Energy Management System ■ Energy Audit for Small and Medium Sized Entities ■ Promoting Joint EE&C Efforts by Multiple Entities
Commercial	Buildings・Stores：12.26 billion Liter	■ Strengthening Benchmark Standard ■ Strengthening Review System for Energy Management System ■ Energy Audit for Small and Medium Sized Entities ■ Top Runner Standard ■ Mandatory Compliance on Building EE Standard ■ Wider Diffusion of Zero Energy Building ■ **Provision of EE Information by Energy Suppliers and Potential for Energy Efficiency Obligation**
Residential	Appliances：6.03 billion Liter Housing：5.57 billion Liter	■ Top Runner Program ■ Mandatory Compliance on Housing EE Standard ■ Wider Diffusion of Zero Energy House ■ **Provision of EE Information by Energy Suppliers and Potential for Energy Efficiency Obligation**
Transport	Freight Truck：6.68billion Liter Vehicles：9.39 billion Liter	■ 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

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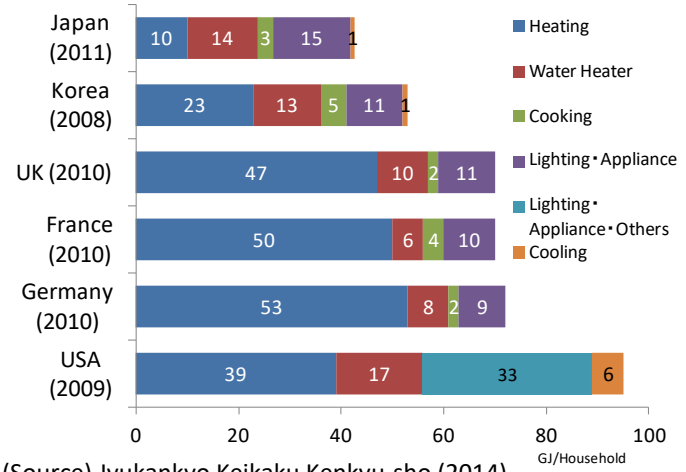
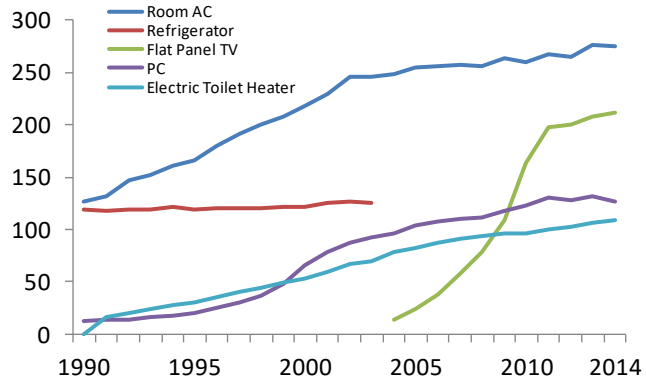
5-2. Some Issues for Deepening EE – Residential and Commercial Sectors

Residential Energy Consumption per Household (GJ/household)



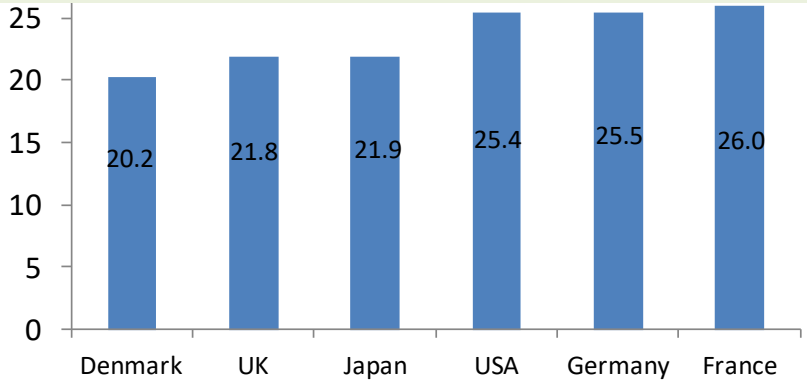
(Source) Jyukankyo Keikaku Kenkyu-sho (2014).

Japan's Household Appliances Diffusion (units/household)



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

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.

Issues for Deepening Middle/Small Sized Commercial EE

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

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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.**

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