

# Japanese Industrial Energy Efficiency Best Practices

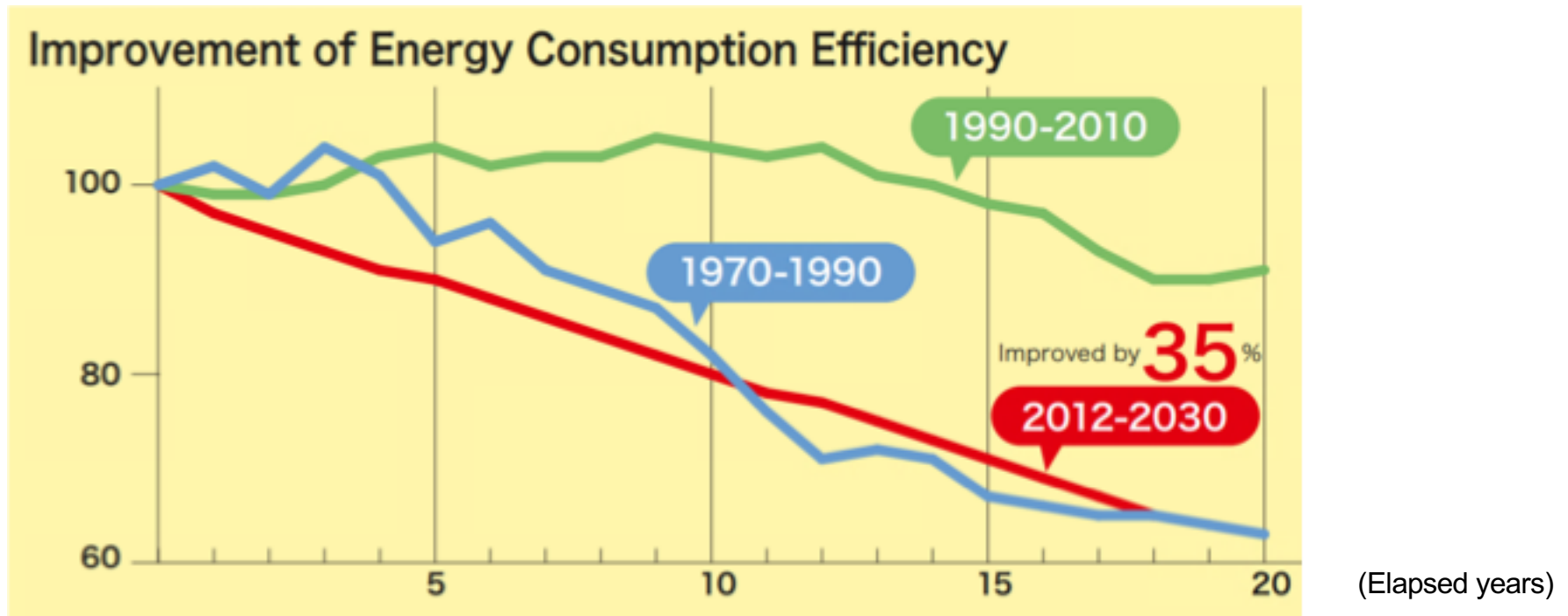
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Ministry of Economy, Trade and Industry

# How far have efforts for energy efficiency measures in Japan progressed?

- Japan has excellent energy consumption efficiency and advanced energy efficiency measures. Improvement of consumption efficiency has been sluggish in recent years, so it is required to further advance energy efficiency measures.
- From 1970 to 1990, Japan largely improved energy consumption efficiency. With 2030 as a goal, Japan is aiming to achieve an energy consumption efficiency improvement of 35%, the same level after the oil crisis.

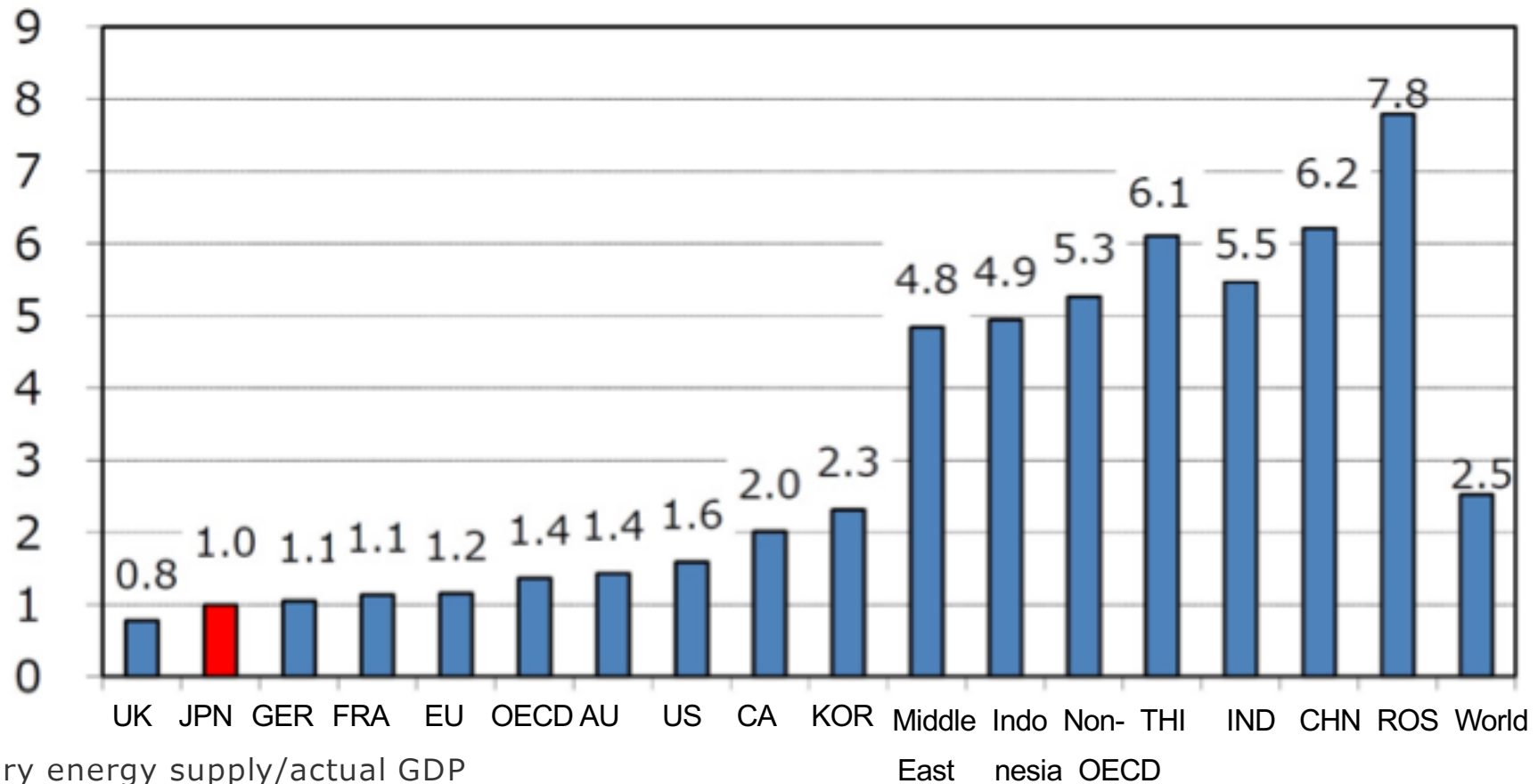


※Energy consumption efficiency: The final energy consumption amount/Real GDP

(Source)Japan's Energy 2017

[http://www.enecho.meti.go.jp/en/category/brochures/pdf/japan\\_energy\\_2017.pdf](http://www.enecho.meti.go.jp/en/category/brochures/pdf/japan_energy_2017.pdf)

# Comparison in Energy Efficiency (2013)

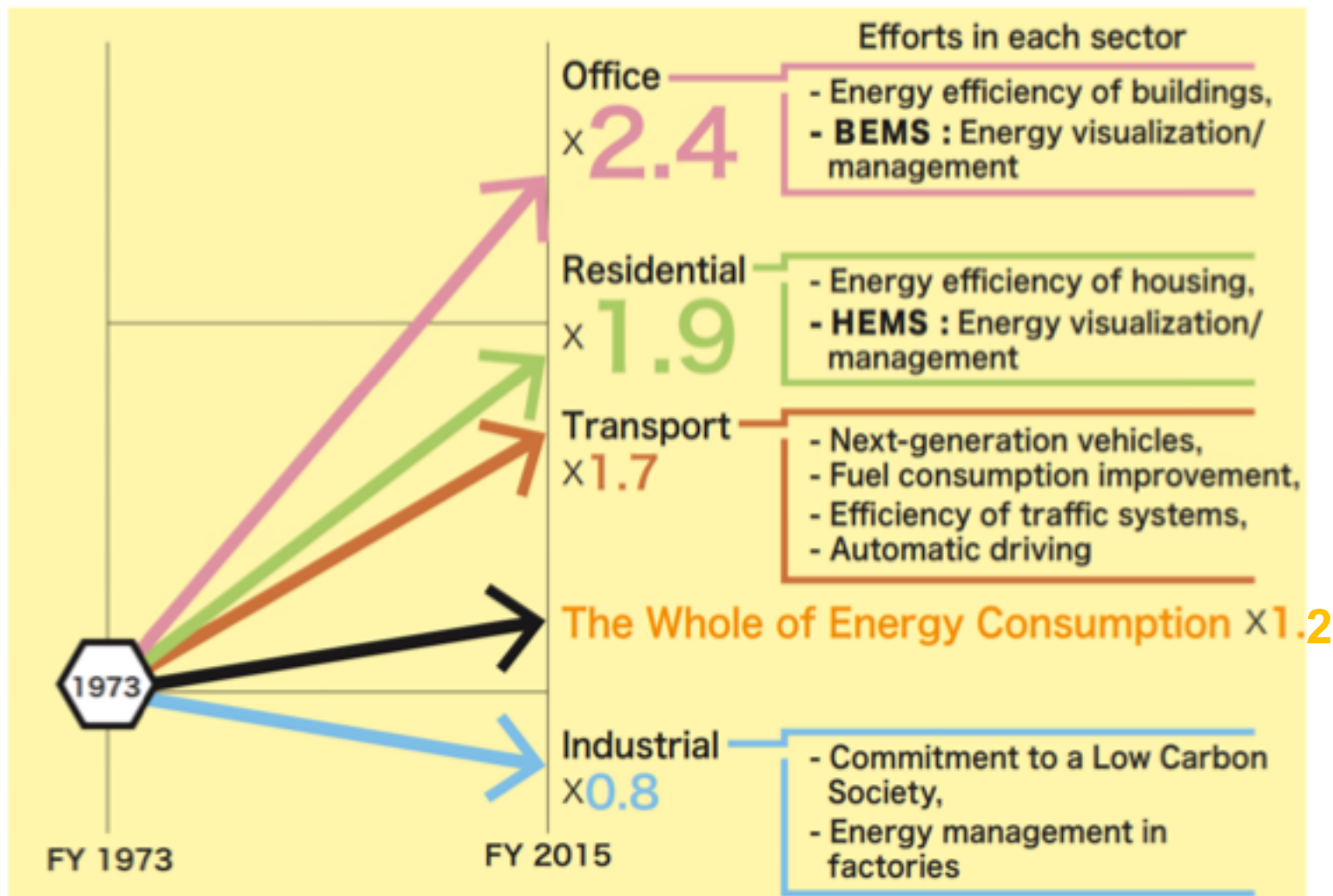


Primary energy supply/actual GDP  
(Comparison when Japan = 1 )

(Source) IEA "Energy Balances of OECD Countries 2014 Edition", "Energy Balances of Non-OECD Countries 2014", etc.  
<http://www.enecho.meti.go.jp/about/special/tokushu/ondankashoene/shoetaikoku.html>

# The Change Ratio of Final Energy Consumption Amount of Japan (Comparison by Sector)

- Compared to during the oil crisis, while the real GDP was increasing by 2.6 times, the increase in energy consumption remained at 1.2 times, which indicates that energy efficiency were promoted. However, the energy consumption amounts of the office sector and the residential sector are increasing, so it is required to promote energy efficiency measures..



# Law Concerning the Rational Use of Energy (Energy Conservation Law)

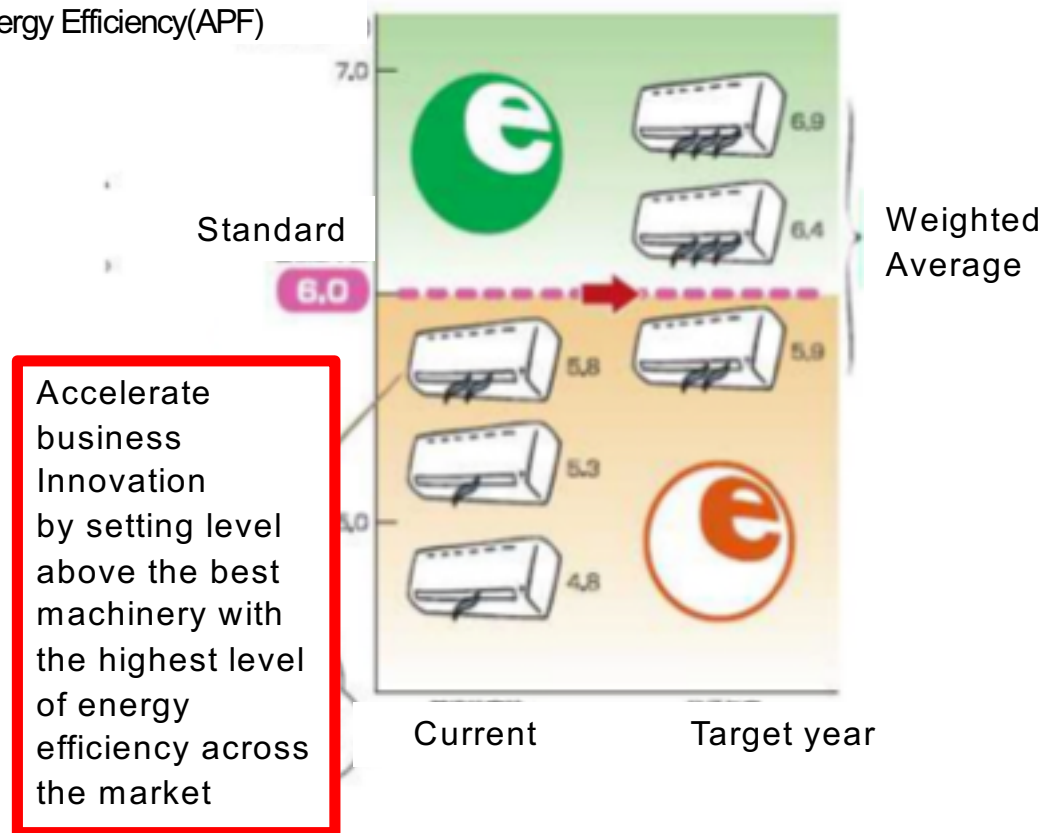
- Since 1979
- 7 times revision so far
- average 1% annual energy consumption reduction in factory and office(efforts target)

**-The Top Runner Program(32 items)**

**-Revised on June, 2018**

- ① certify energy consumption efficiency activity by multiple industries, not single
- ② apply e-commerce retailer to react increase activities in transportation sector by increasing personal delivery

Energy Efficiency(APF)



# Japan's Nationally Determined Contribution (approved by Global Warming Prevention HQ on July 17, 2015 and submitted to the UN)

	Compared to FY 2013 level (compared to FY 2005 level)
Energy-originated CO2	▲21.9% (▲20.9%)
Other GHG	▲1.5% (▲1.8%)
Carbon dioxide sink	▲2.6% (▲2.6%)
Reduction of GHG	▲26.0% (▲25.4%)

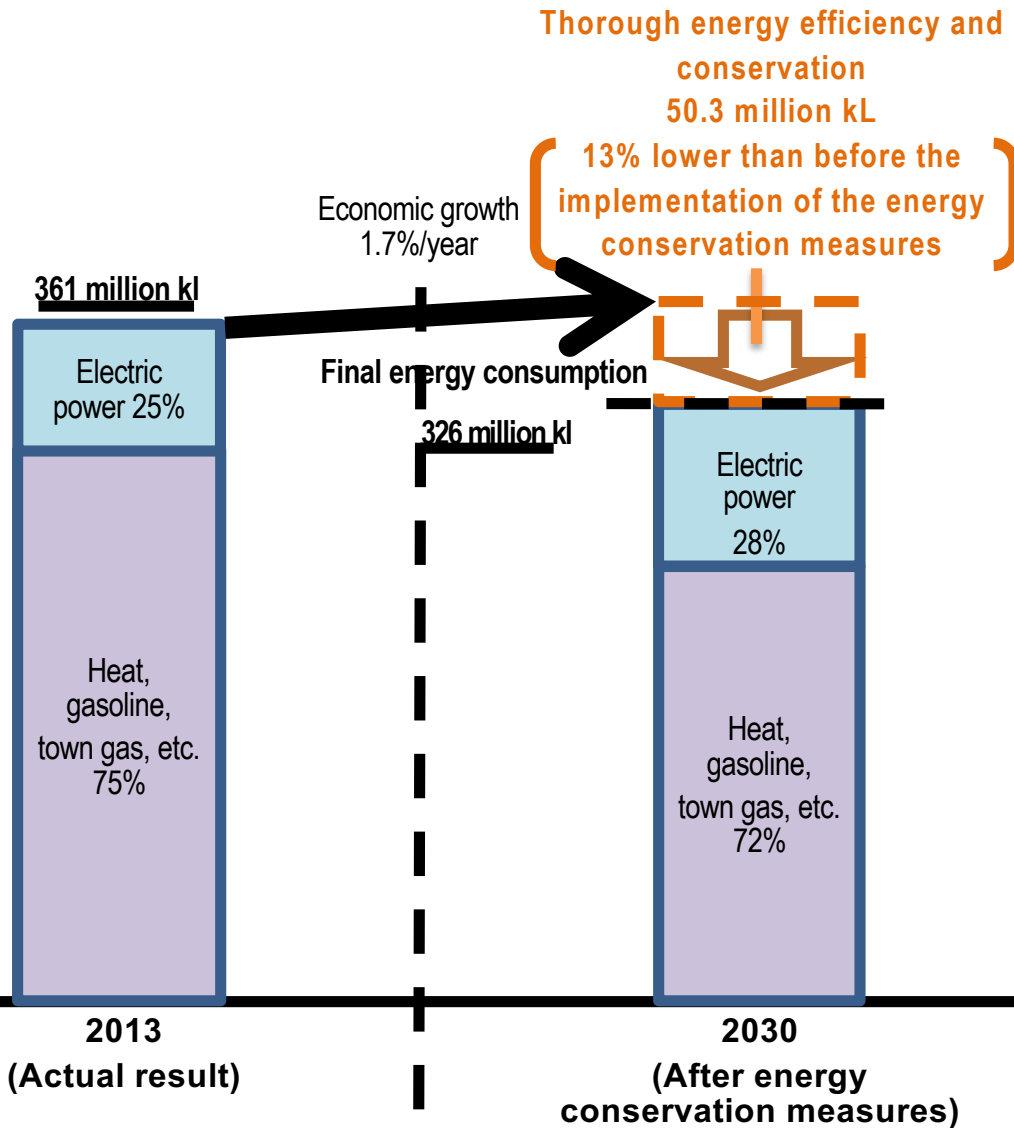
	Estimated Emissions of each sector in FY 2030	FY 2013 (FY 2005)
<b>Energy-originated CO2</b>	927	1,235 (1,219)
Industry	401	429 (457)
Commercial and other	168	279 (239)
Residential	122	201 (180)
Transport	163	225 (240)
Energy conversion	73	101 (104)

	Estimated Emissions of each gas in FY 2030	FY 2013 (FY 2005)
<b>Non-energy-originated CO2</b>	70.8	75.9 (85.4)
<b>Methane (CH<sub>4</sub>)</b>	31.6	36.0 (39.0)
<b>Dinitrogen monoxide (N<sub>2</sub>O)</b>	21.1	22.5 (25.5)

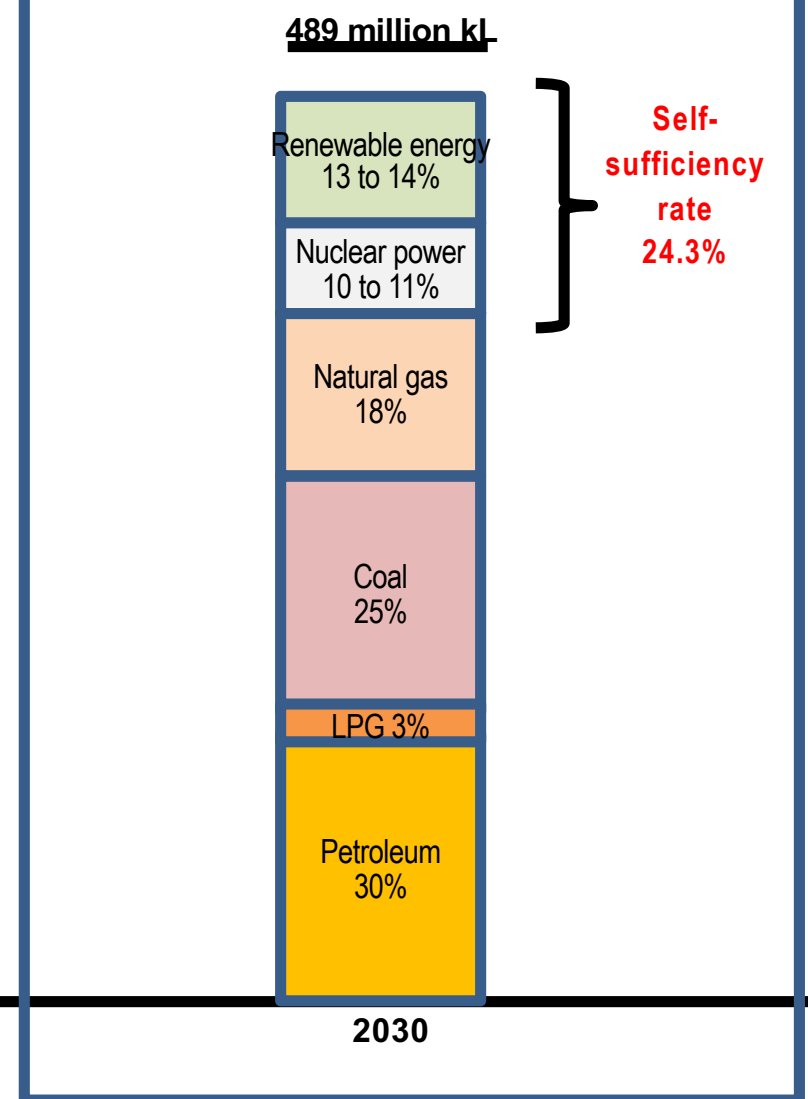
	Estimated Emissions in 2030	2013 (2005)
<b>4 Gasses, such as HFC</b>	28.9	38.6 (27.7)
HFCs	21.6	31.8 (12.7)
PFCs	4.2	3.3 (8.6)
SF <sub>6</sub>	2.7	2.2 (5.1)
NF <sub>3</sub>	0.5	1.4 (1.2)

# Energy demand and primary energy supply

## Energy demand

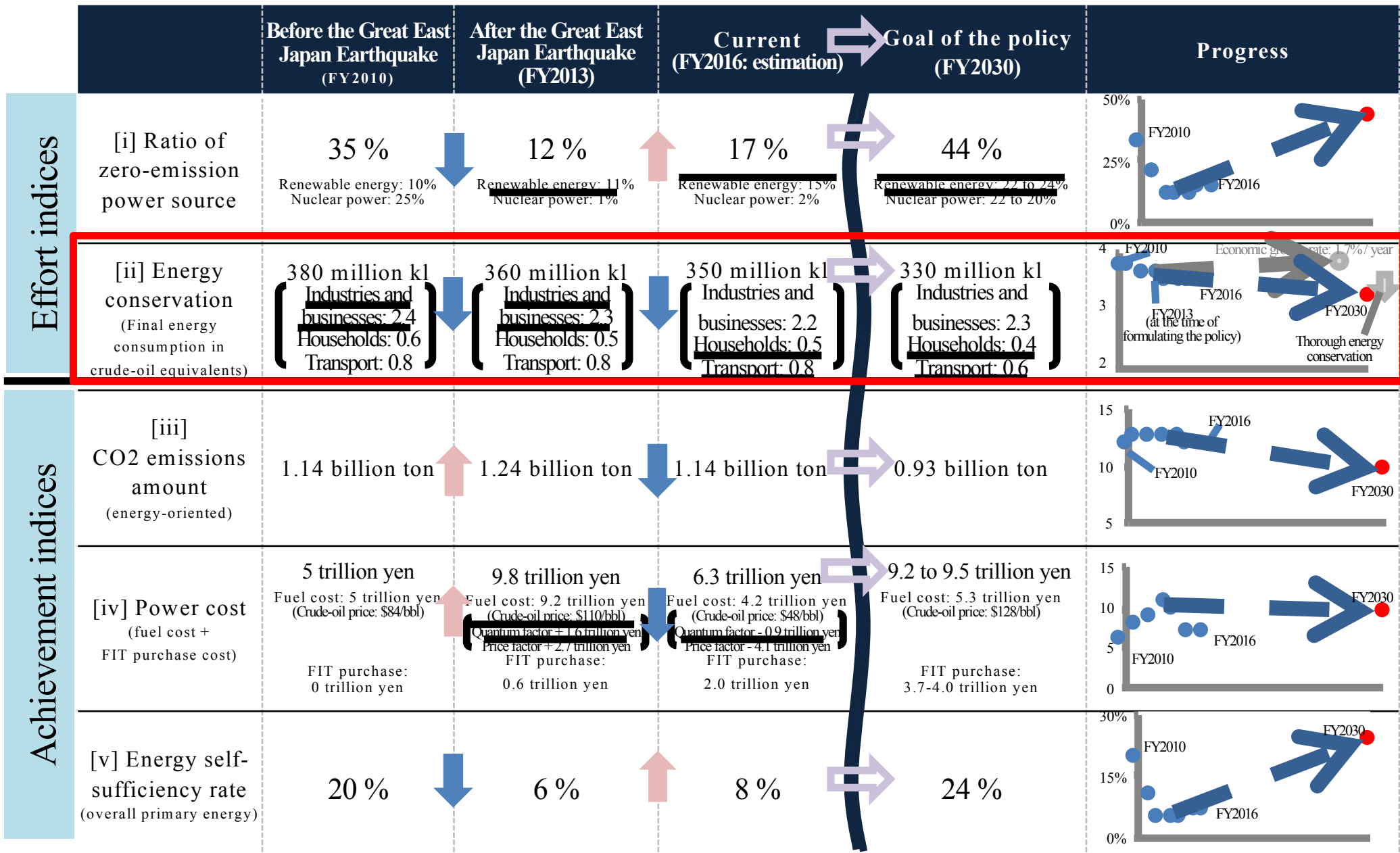


## Primary energy supply



\* Values are approximate.

# Progress in the Energy Mix Policy by FY2030 - Steady advancement seen while half way through -



\* Figures in FY2016 are the results estimated based on the data in the Energy Supply-Demand Outlook in Japan by FY2018 (prepared by the Institute of Energy Economics, Japan).

\* The power cost in FY2030 includes 0.1 trillion yen as a cost for stable power grids.



# Energy Efficiency Measures

- With all the energy efficiency measures in each sector, **approx. 50.3 million kL of energy would be saved.**

## <Major energy efficiency measures in each sector>

### Industrial Sector <approx. -10.42 million kL>

- Major 4 industries (steel, chemical, cement, and paper/pulp)
  - ⇒ Promotion of commitment to a low-carbon society
- Strengthened energy management in factories
  - ⇒ Improvement of energy efficiency by making production lines observable
- Development and introduction of innovative technology
  - ⇒ Introduction of environment-conscious iron manufacturing process (COURSE50)  
(CO2 reduction by approx. 30% by hydrogen reduction of iron ore and CO2 separation from blast furnace gas)  
Introduction of technologies to use CO2 as raw material etc.  
(CO2 and water are used with solar energy to produce major chemicals.)
- Introduction of highly efficient facilities across several types of industries
  - ⇒ Low-carbon industrial furnace, high-performance boiler, cogeneration, etc.

### Transportation Sector <approx. -16.07 million kL>

- Diffusion of next-generation automobiles and improvement of fuel efficiency.
  - ⇒ One out of two cars are to be next-generation cars.
  - ⇒ Fuel cell vehicle
- Traffic flow control

### Commercial Sector <approx. -12.26 million kL>

- Energy efficiency in buildings
  - ⇒ Mandating energy efficiency standards for newly constructed buildings
  - ⇒ Realization and Promotion of ZEB (Net Zero Energy Building)
- Introduction of High-efficiency Equipment
  - ⇒ Promotion of efficient light including LED etc.
- Making energy consumption visible by BEMS; Energy management
  - ⇒ Introduction to about half of the buildings
- Promotion of national movement

### Residential Sector <approx. -11.60 million kL>

- Energy efficiency in houses
  - ⇒ Mandating energy efficiency standards for newly constructed houses
  - ⇒ Promotion of ZEH (Net Zero Energy House)
- Introduction of High-efficiency Equipment
  - ⇒ Promotion of efficient light including LED etc.
- Making energy consumption visible by HEMS; Energy management
  - ⇒ Introduction to all houses
- Promotion of national movement

# A Model for efficient Use of Energy

- Under the assumption of a variety of typical forms of energy use, carried out the development/demonstration of advanced electricity demand-supply forecast, optimal control of equipment ( of solar panels, energy/thermal storage and energy conservation), and measures for demand response etc.

## For households sector

### Shared use of Ene-Farm at apartments

- Achieve high energy-saving effect and high energy self-sufficiency by means of the shared use of fuel-cell cogeneration systems for households.



【Source】 Tokyo Gas, JX

### Shared use of batteries by detached houses

- Utilization rate of solar PV power was increased through solar power interchange by such means as the shared use of storage batteries among houses within each town.

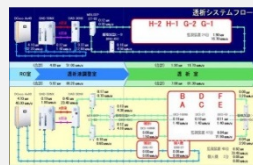


【Source】 Sekisui Chemical Co., Ltd.

## For commercial sector

### Energy management system at hospitals

- Achieve energy-saving through the introduction of BEMS which controls air-conditioning units automatically, and visualization of data of energy amount and temperature/humidity.



【Source】 NIPPON STEEL & SUMIKIN  
TEXENG. Co., Ltd, Fuji Electric Co., Ltd.

### Energy management system at hotels

- Carry out energy management for the guest rooms of hotels.
- Promote the reduction of energy consumption by visualizing electricity usage and hot water usage at each guest room.



【Source】 Fuji Electric Co., Ltd.

## For industrial sector

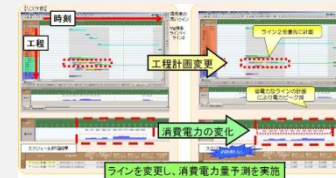
### Energy management system through change in production plans

- Verify how much adjustment can be made to actual production plans by means of shifting the production process itself and rearranging the production process etc. in response to the request for demand response.



【Source】 TOYODA GOSEI Co., Ltd, Toyota Industries Corp.

- Verify the peak shifting/peak cutting effect and CO2 reducing effect through the change in production plans.



【Source】 Yasukawa Electric Corp.

# Subsidy for promoting the investment to energy-saving equipment

## 640 Thousands USD as 2018fy

### Description

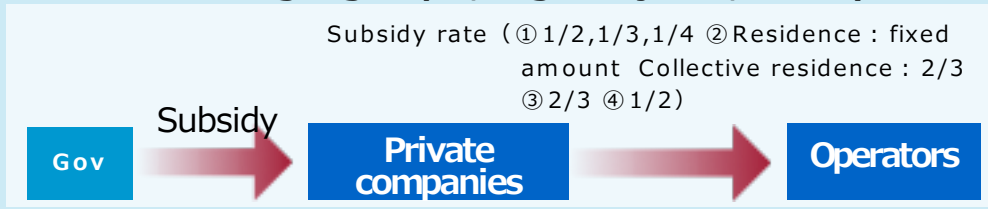
**Purpose: To promote the investment of energy saving equipment in factories, residences and buildings**

- ① Promotion of the installation of energy-saving equipment  
-No limitation of the types of the equipment
- ② Promotion of the installation and demonstration of ZEH
- ③ Promotion of the demonstration of ZEB  
-GL for disseminating ZAB  
-Support the demonstration of high energy-saving insulation panels and equipment for the architects, construction companies, owners
- ④ Promotion of the introduction of next-generation energy-saving building materials  
-Promotion of high-spec insulating materials and value-added energy saving building materials

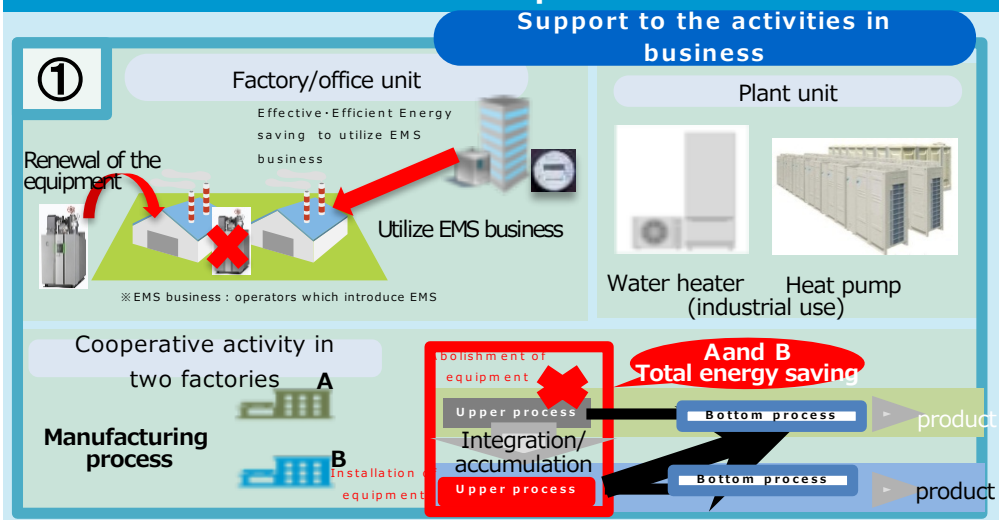
### Outcome

- Contribute to the total reduction 5,030,000kl (year 2030)
- Aiming for the realization of ZEH over the half of new residence and ZEB to the public buildings in addition to doubling the number of the renovation for energy-saving by 2030

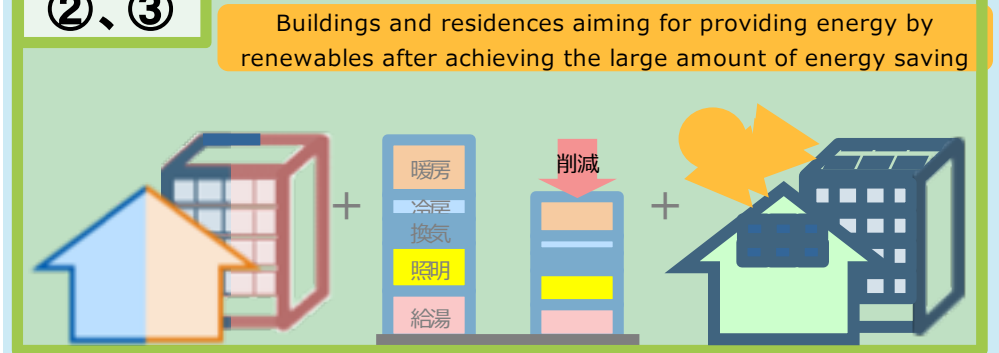
### Conditions (target groups ,target objects ,subsidy rate)



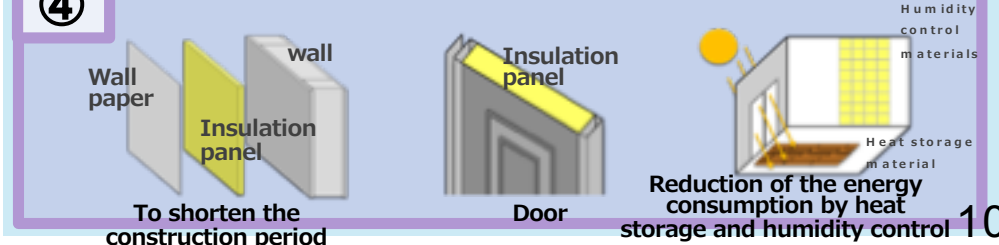
### Concept



### ZEH/ZEB



### Energy saving building materials



# Electric Power Supplier's Voluntary Framework

- Ensuring the effectiveness of the power industry's voluntary framework and transparency through collective implementation of political measures based on the Energy Saving Acts and the Act on Sophisticated Methods.

Achieving a target of 0.37kg-CO<sub>2</sub>/kWh

## ① Electric power supplier's voluntary framework

Setting a target of 0.37kg-CO<sub>2</sub>/kWh(2030) in accordance with the energy mix (covering over 99% of electric power sales)

### Creation of a new follow-up system

Establishment of "The Electric Power Council for a Low Carbon Society" -> The implementation status of an individual company is checked every year to review its plan if needed.

### ② [Support system] (Power generation phase)

- Development of regulations based on Law Concerning the Rational Use of Energy .
  - Requiring power generators to increase the efficiency of thermal power generation
    - Establishing the efficiency standards for every newly built plant (Coal: Equivalent to USC, LNG: Equivalent to GTCC)
    - Establishing the efficiency standards on a power generator basis including existing plants (Power generation efficiency in accordance with the energy mix)

### ③ [Support system] (Retail phase)

- Development of regulations based on the Sophisticated Methods of Energy Supply Structures.
  - Requiring retailers to procure low carbon
    - All retailers
    - Non-fossil power of 44% by 2030 (Equivalent to 0.37kg-CO<sub>2</sub>/kWh together with the Energy Saving Act)
    - CO<sub>2</sub> is included in the subject to reporting in addition to the ratio of non-fossil power
    - Achieving targets in collaboration

The METI Minister instructs, advises, recommends and orders based on actual achievement (Ensuring effectiveness and transparency)

### [Support system] (Market design)

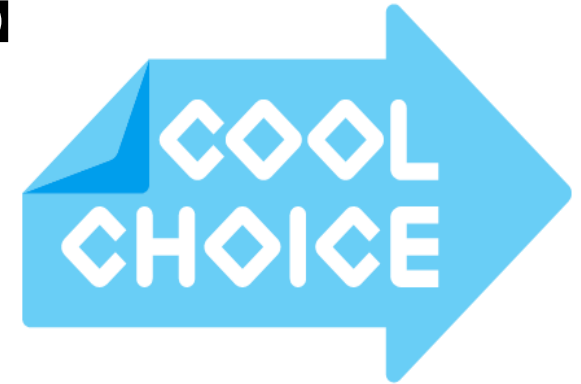
Energy market design in accordance with deregulation: Retailing guideline, etc.

# Popular movement

- It is important for people to choose energy-saving, low carbon “products”, “services” and “actions”, in order to lead the world towards the realization of a low-carbon society.
- In this spirit, foster “COOL CHOICE”, a movement to encourage smart, environmentally-friendly choices to the public

## COOL CHOICE

【Logo】



未来のために、いま選ぼう。

## ● Guidelines to achieve the goal

Popular movement to encourage “smart choice”:  
COOL CHOICE

Focus on smartly choosing energy-saving, low-carbon goods and services.

e.g.

- buy Eco-cars, buy environmentally-friendly consumer electronics
- change to high-efficiency lighting, use Public transport

## Concrete action

- Use common logo
- Provide useful data for smart choice
- Energy-saving campaign during summer, Awareness Month for climate change in December
- Setting specific targets and valuation indices. PDCA cycle to follow up.  
etc

# Industry's action plan towards a low-carbon society

- After the announcement of the Keidanren Voluntary Action Plan on the Environment (VAP) in 1997, industrial organizations voluntarily set up emission reduction targets. prior to the Government's target setting. and promoted efforts for their achievement.
- Under the VAP, 96 industries set up emission reduction targets for 2030. covering about 80% industries Energy conversion section ,50% all sectors.

## Examples of 2030 reduction target

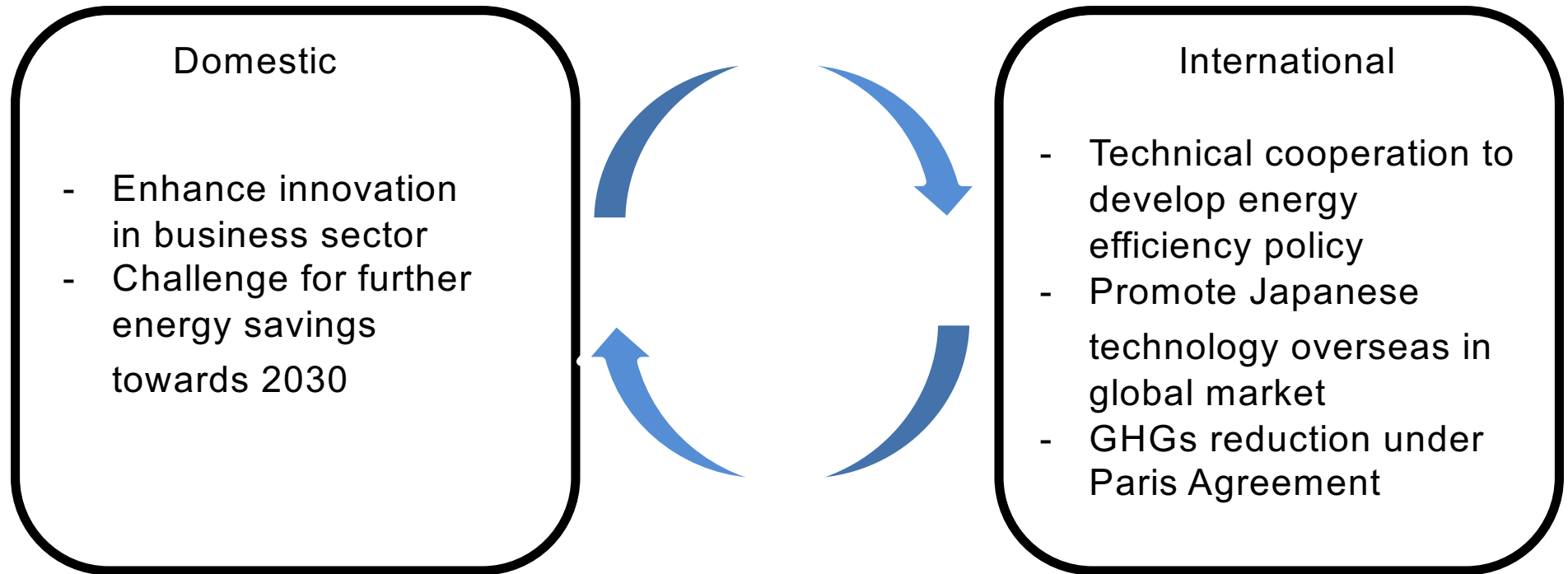
	Target indicator	Baseline year	2030 reduction target
Japan Iron and Steel Federation	CO2 emissions	BAU	-9 Mil t-CO2
Japan Chemical Industry Association	CO2 emissions	BAU	-2 Mil t-CO2
Japan Paper Association	CO2 emissions	BAU	-2.86 Mil t-CO2
Japan Cement Association	Energy intensity	2010	Less than -49MJ/t-cem (more than -1.4%)
Liaison Group of Japanese Electrical and Electronics Industries for Global Warming Prevention	Energy intensity	2012	More than -16.55%
Japan Automobile Manufacturers Association / Japan Auto-Body Industries Association	CO2 emissions	1990	-33%
Federation of Electric Power Companies of Japan	-	-	-
Petroleum Association of Japan	Energy consumption	BAU	-1 Mil kl
The Japan Gas Association	CO2 intensity Energy intensity	1990	-89% -84%

○ Technical cooperation to develop Law Concerning the Rational Use of Energy overseas

○ Cooperation to develop Energy saving-labeling e.g. Vietnam

○ Sectorial cooperation such as Steel, Coal fire power plant, and LED.





-Virtuous Cycle of business and economic growth  
-Contribution to reduce GHGs emission globally