Proposal for Future Energy Policy

-For a Rich and Vigorous Economic Society-

【Outline】

November 14, 2017

Keidanren
Japan Business Federation

Basic structure of Japan's energy policy

Basic Act on Energy Policy (enacted in 2002)

April 2014 (Fourth) Strategic Energy Plan

- ○**A plan for the long-term, comprehensive, systematic energy policy**
- ○**Consideration in the Advisory Committee for Natural Resources and Energy**
  → **Cabinet decision**
- ○**Reviewed every three years (revisions made as required)**

Government review launched in August 2017

July 2015 Long-term Energy Supply and Demand Outlook (the "**Energy Mix**")

- ○Outlook and best energy mix for fiscal year (FY) 2030 based on the Strategic Energy Plan
- ○Consideration in the Advisory Committee for Natural Resources and Energy
  → approved by the Minister of Economy, Trade and Industry
- ○Reviewed as required along with the Strategic Energy Plan

Formulated based on the envisioned Energy Mix

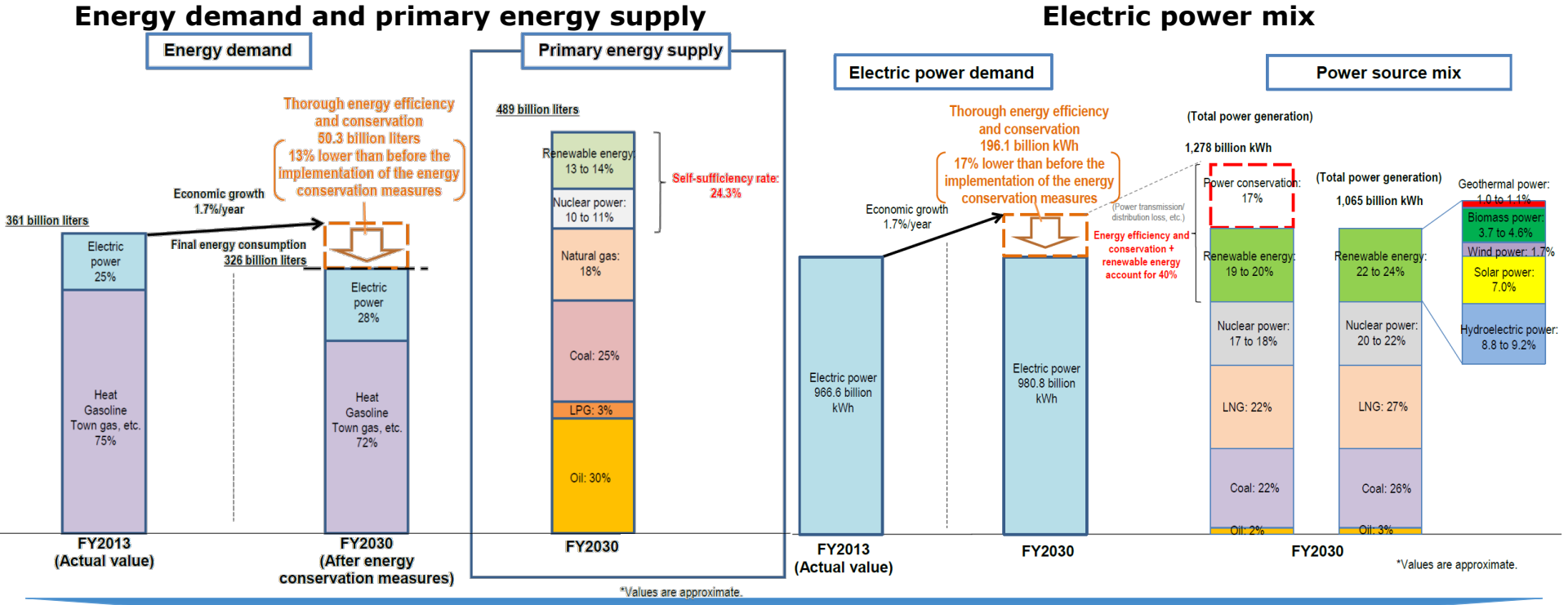
July 2015 Submission of Japan's INDC to UN (FY2030 **GHG reduction target**)
＊a reduction of 26% compared to FY2013

1. Basic approach regarding energy policy and current energy situation

(1) The new energy policy must balance the goals of **stable supply**, **economic efficiency**, and **environmental suitability** based on the premise of ensured **safety** (**S+3E**).
← Energy sources should be diversified (best mix)

(2) We will demand that the government enhance efforts towards achieving the FY2030 "Energy Mix."

Japan's energy mix in FY2030 (formulated in 2015)



Self-sufficiency rate
24%: Higher than before the earthquake (around 20%)

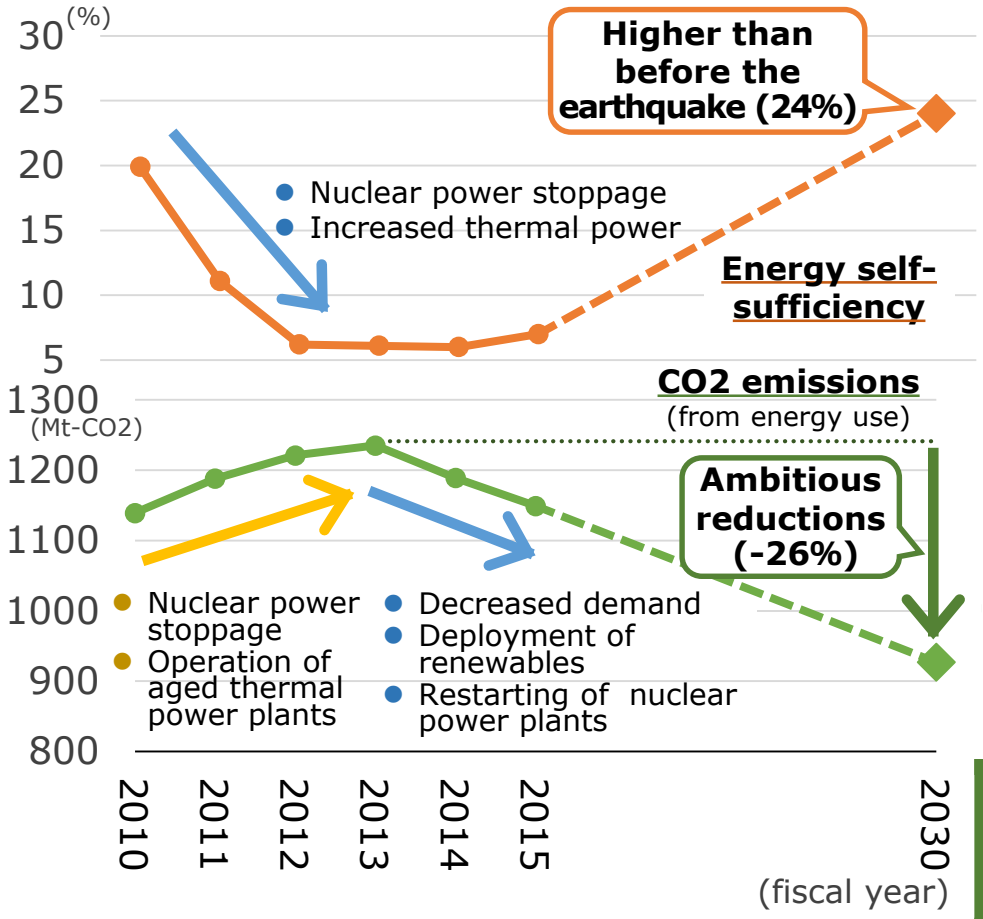
Electricity rates
Lower from aftermath of the earthquake

GHG emissions
26% reduction target not inferior to US and EU levels

<Reference> Status of 3Es in Japan

○ Self-sufficiency, CO2 emissions and cost levels have improved to a certain extent from the aftermath of the 2011 earthquake, but enhanced efforts are called for.

Energy self-sufficiency and CO2 emission trends



Electricity rate trends

Fiscal year	2010 (before earthquake)	2013 (earthquake aftermath)	2016 (status quo)	…	2030 (target)
Fuel costs (T¥)	5.0	9.2	4.2	Concerns ● Higher oil prices ● Continually high renewable energy costs, etc.	5.3
Renewable energy costs (T¥)*1	0	0.6	2.0		3.8～4.1
Cost of electricity (T¥)	5.0	9.8	6.3		9.2～9.5
Electricity demand (TWh)	1,029	967	928*2		981
Electricity rate (¥/kWh)	20.4 (Household) 13.7 (Industrial)	24.3 17.5	22.4 15.6		?

Concerns ● Will the international competitiveness of electricity rates be secured?

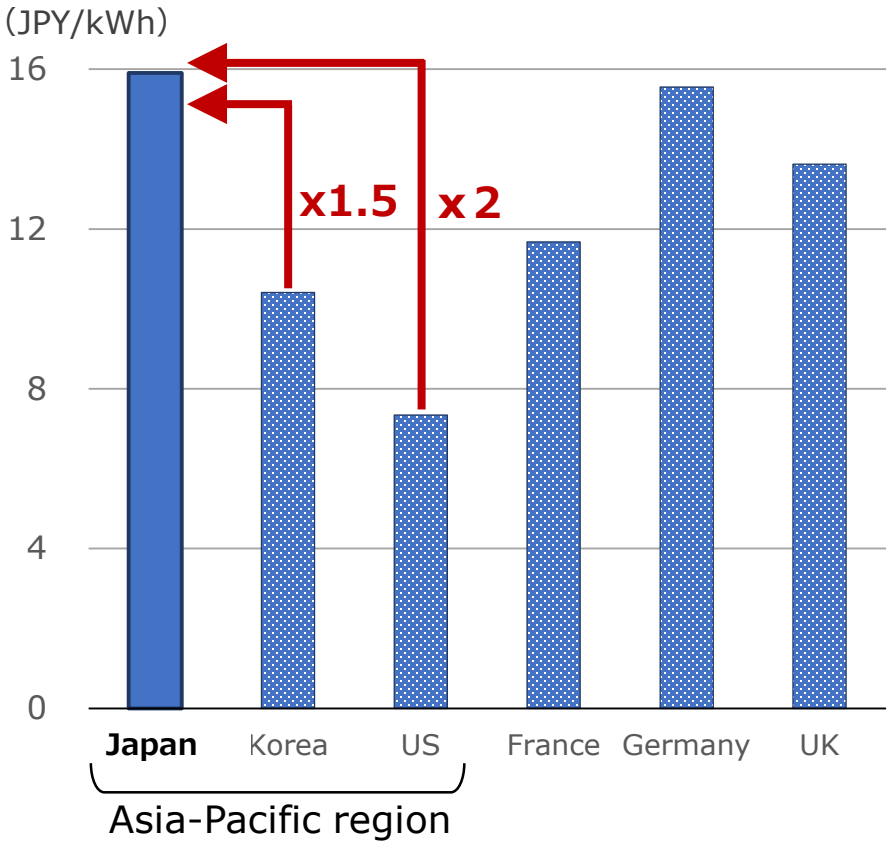
*1: Purchasing price electricity under FIT scheme.
*2: Confirmed figures for 2015

(Compiled based on government material)

2. Japan's future energy policy from an energy price perspective

○ The policy package should, as a whole, **aim to supply energy at internationally competitive prices** with a view to promoting domestic investment.

Industrial electricity prices in major countries (2016)



(Compiled based on UK Department for Business, Energy and Industrial, *International industrial energy prices*)

Key contributing factors to electricity price changes

<Price lowering factors>
⇒ steady implementation

- Use of economically efficient energy sources (Proactive utilization of baseload power)
- More efficient and optimal power generation & transmission
- Electric power system reform→more competition

Internationally competitive electricity prices

<Price raising factors>
⇒ maximized mitigation of impact

- Subsidies for energy sources with lower economic efficiency
- Updates and new installations & reinforcement of power transmission and distribution infrastructure
- Increased backup costs for wind and solar power

3. Enhancing investment in energy technologies and overseas deployment

(1) The environment and energy sectors are promising investment destinations.

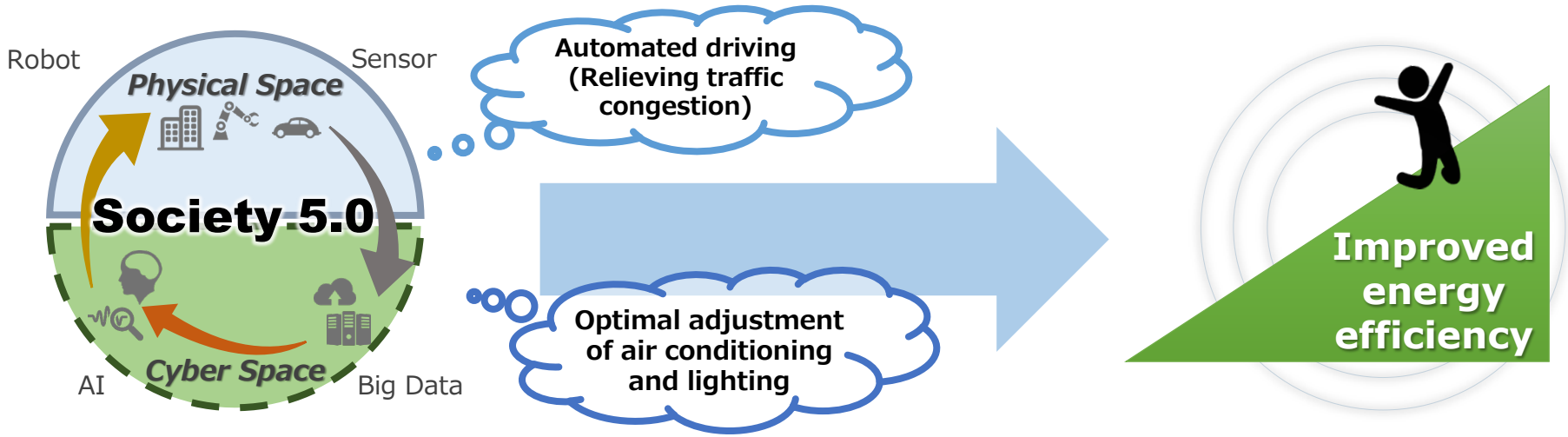
(2) In addition to R&D support measures, measures to facilitate investment by users (tax benefits, etc.) can also be effective.

(3) Japan should deploy its sophisticated energy technologies overseas. It is important to encourage the economic growth of developing countries and absorb their growth potential.

4. Establishing a new energy system under Society 5.0

(1) Society 5.0, which harnesses big data, AI, IoT, etc. will improve energy efficiency.
⇒ advancement towards overcoming energy constraints

(2) Promoting efforts towards the realization of Society 5.0 (continuing technology development, flexible system design and operation) will be important.



<Reference> The World of Society 5.0

Going beyond individual optimization to realize the optimization of society as a whole
Breaking free of various restraints with the aim of resolving social issues and creating abundance for society and its citizens

Society 4.0

Invention of the computer
Start of information distribution

Information society

Second half of 20th century

Individual optimization through application of ICT

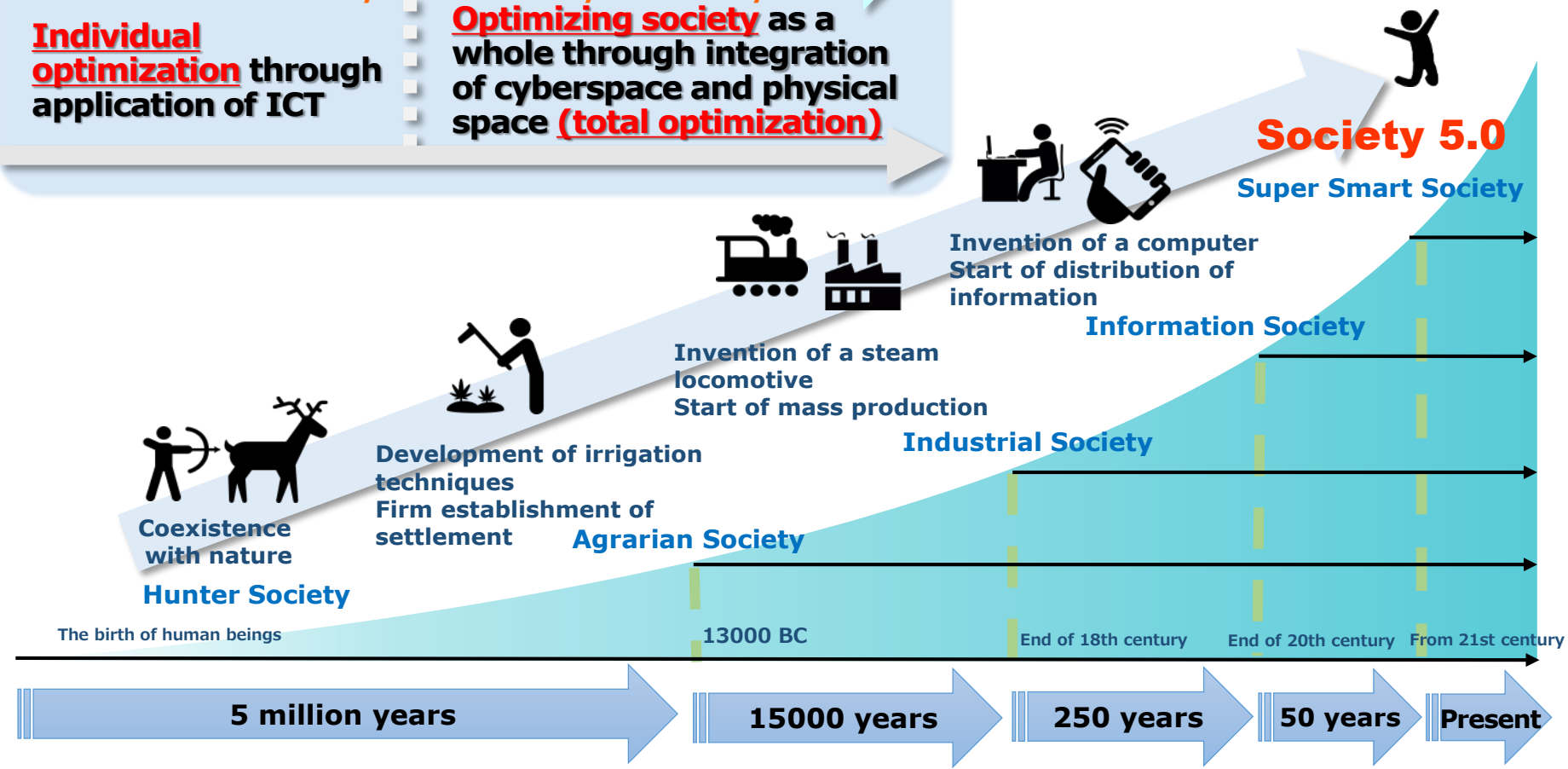
Society 5.0

Use of IoT and AI
Advances in biotechnology

Super-smart society

From early 21st century

Optimizing society as a whole through integration of cyberspace and physical space (total optimization)



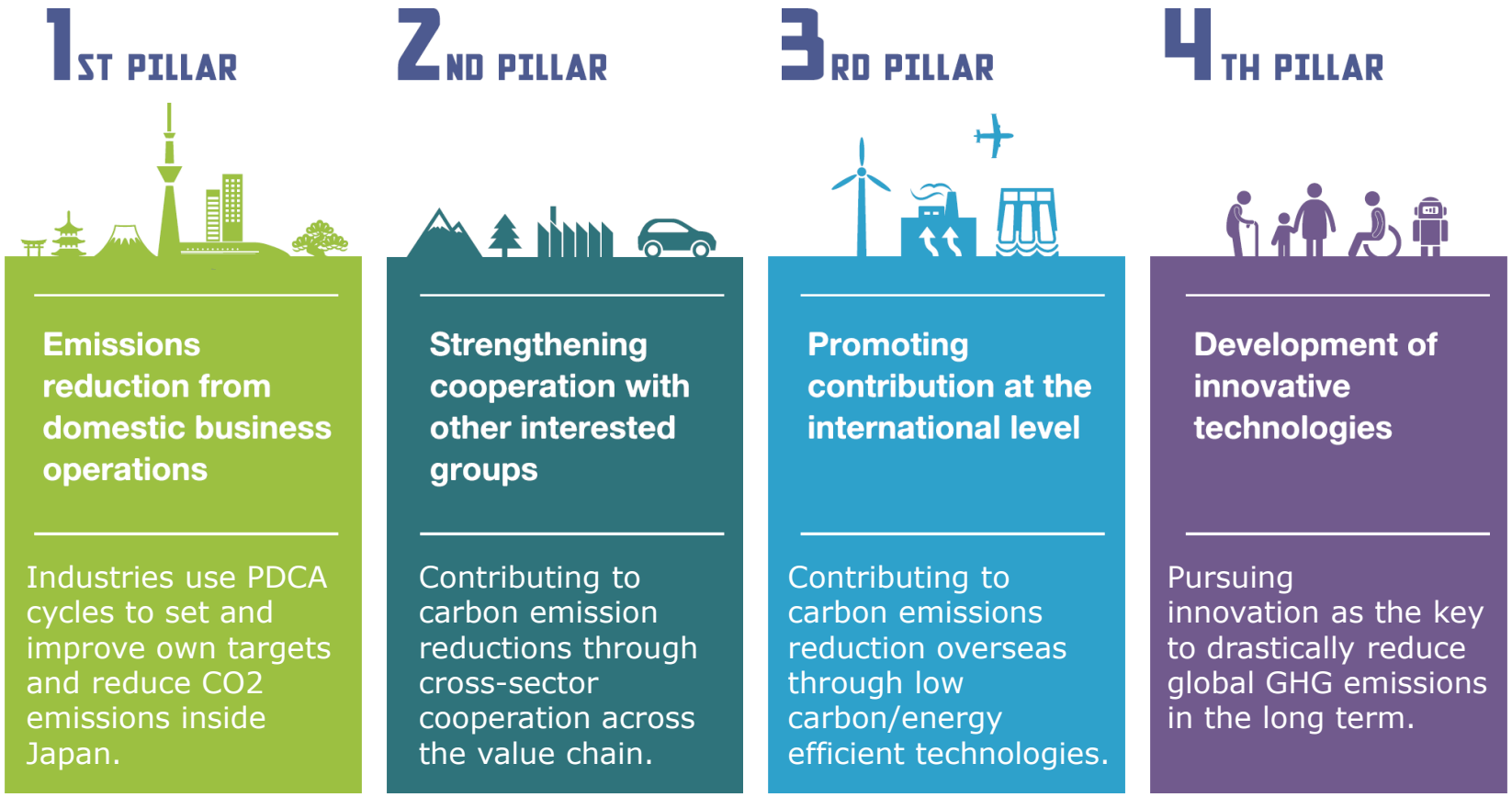
1. Energy conservation

(1) Energy conservation is an important challenge that basically covers all 3Es.

(2) The Japanese business community will **continue to pursue voluntary approaches under *Keidanren's Commitment to a Low-Carbon Society***.

(3) We expect the government to support proactive efforts by business operators by performing fair evaluations based on the actual situation of business operations and taking support measures including tax benefits.

Keidanren's Commitment to a Low-carbon Society: the 4 pillars for reduction of global GHG emissions



2. Fossil fuels

(1) Fossil fuels remain important. The continued effective use of fossil fuels **requires efficiency improvements and decarbonization**.

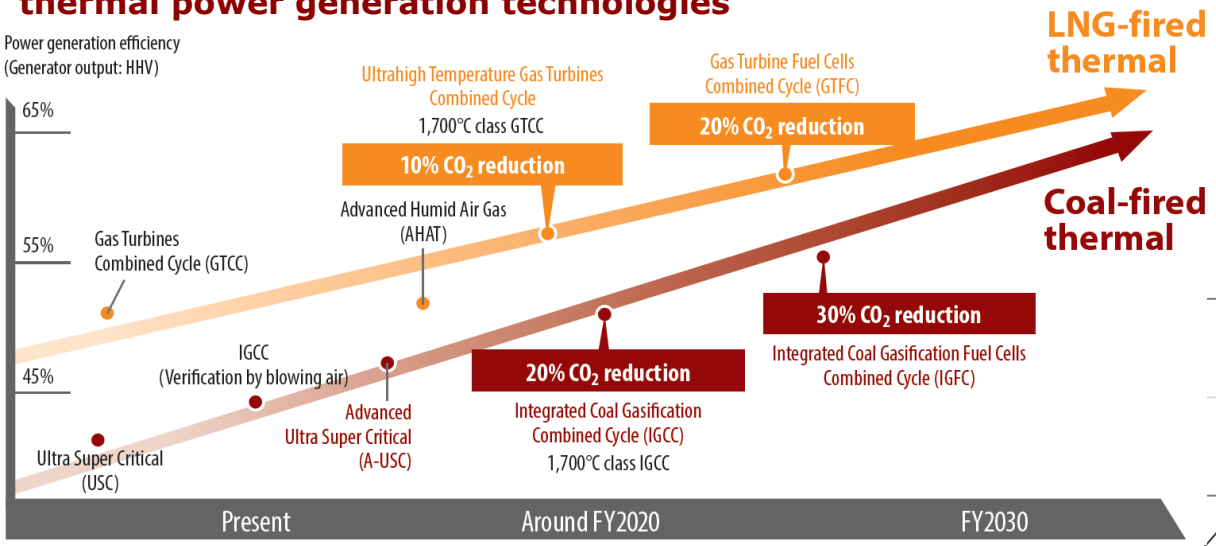
(2) The government should make efforts to procure stable and inexpensive resources through proactive resource diplomacy and the provision of support for overseas resource development.

<Basic approaches by fuel type>

Petro-leum	● Important energy source with a wide range of uses. ● "Last resort" of energy supply in natural disasters. ● Important to maintain a resilient supply system.
Natural gas	● Well-balanced in terms of 3Es. A promising energy source for a wider range of uses. ● Cogeneration systems are highly efficient distributed energy sources that can be flexibly operated. Promises to be bear an important role in BCP design.
Coal	● While CO2 emissions remain a challenge, economic efficiency and stable supply are coal's strong points that make it a promising fuel for power generation etc. ● Japan can contribute to countering global warming on a global scale by deploying its high-efficiency coal use technologies globally.

<Reference> Role of coal-fired thermal power generation

Prospects for highly efficient, low-carbon next-generation thermal power generation technologies



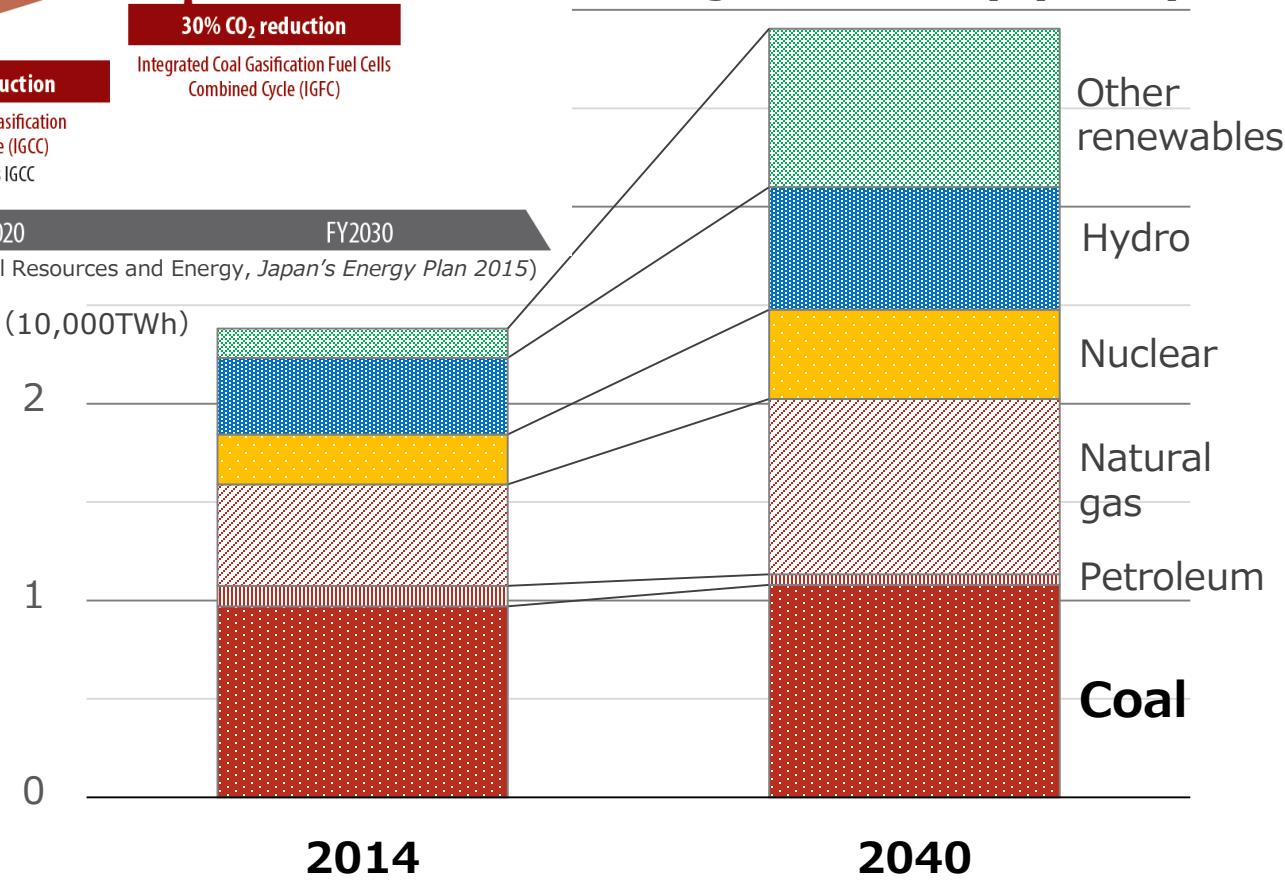
(Source: Agency for Natural Resources and Energy, *Japan's Energy Plan 2015*)

Coal-fired thermal in 2040

- Ratio to total electric power generated: 28%
  (**Largest** ratio among fuels for power generation)
- Power generated: 11,000TWh
  (**10% increase** from current levels)

Efficiency improvements in coal-fired thermal power are of key importance.

World electric power generation (by fuel)



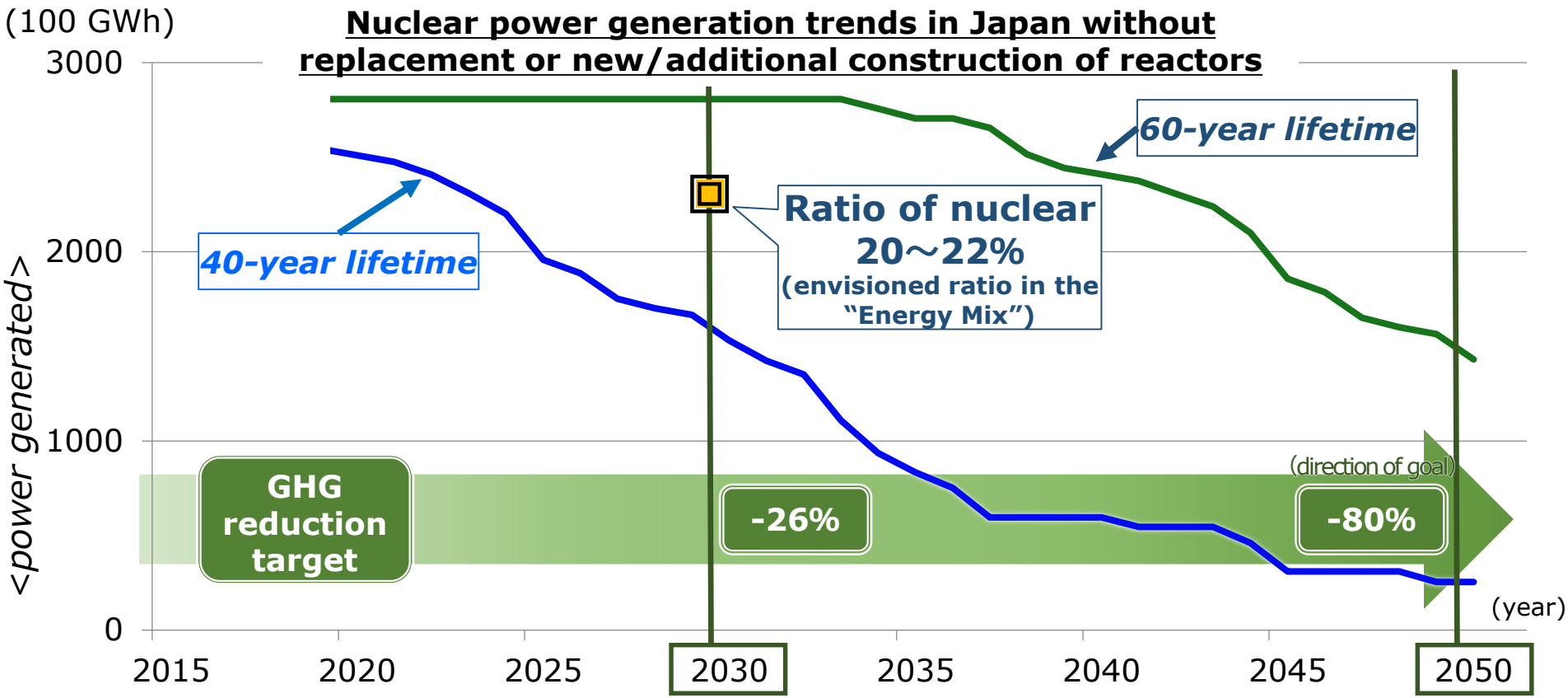
(Compiled based on IEA *World Energy Outlook 2016*. 2040 outlook based on New Policies Scenario)

3. Nuclear power

(1) Securing **safety** and **restoring public trust** are of key importance.

(2) Should be utilized as baseload power with high 3E performance.
⇒**Ensured restart** and **plant lifetime extensions to 60 years** are needed.

(3) A certain level of nuclear power remains indispensable for long-term global warming countermeasures etc.
⇒ **Replacements and building new or additional reactors** should be included among government measures.



*Based on assumption that all 45 plants will be in operation, includes 3 plants under construction; utilization rate: assumed to be 70%;

(Source: material from the Federation of Electric Power Companies of Japan (with additions by Keidanren secretariat))

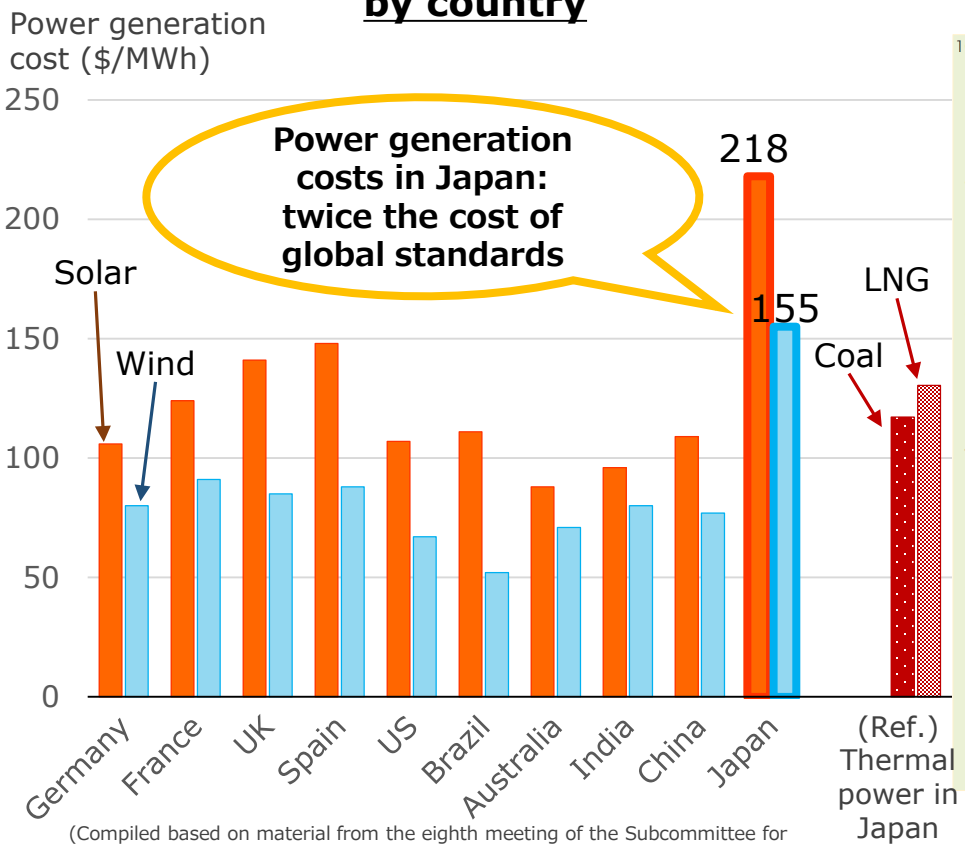
4. Renewable energy ①

(1) In the long term, renewable energy is **expected to bear an important role** in Japan's energy supply.

(2) Japan is currently faced with two major challenges towards increased deployment of renewables, which **require the collective efforts of industry, government and academia to overcome**.

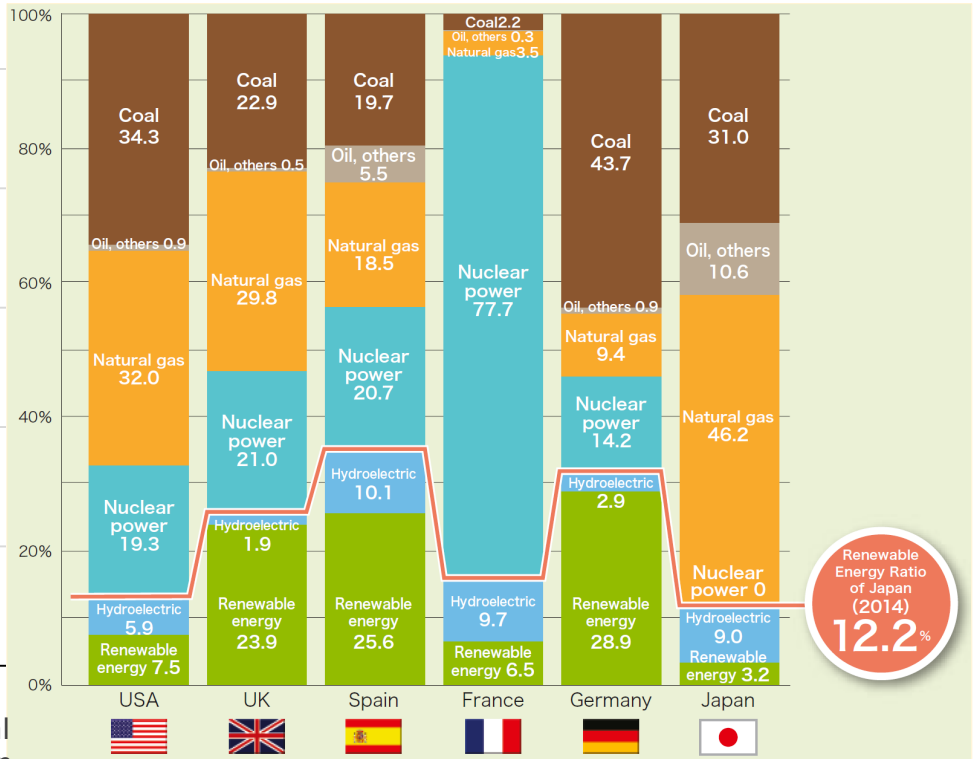
- Challenge ① stabilizing supply: Wind and solar power depend on thermal backup to minimize the effects of their intermittency.
- Challenge ② costs for power generation etc. : While the world introduces renewables less expensive than thermal power, Japan's power generation costs for renewable energy remain high.

Solar and wind power generation costs by country



(Compiled based on material from the eighth meeting of the Subcommittee for Reforming Systems Related to Introduction of Renewable Energy, etc.)

Comparison of the renewable energy ratio in the generated electric power amount



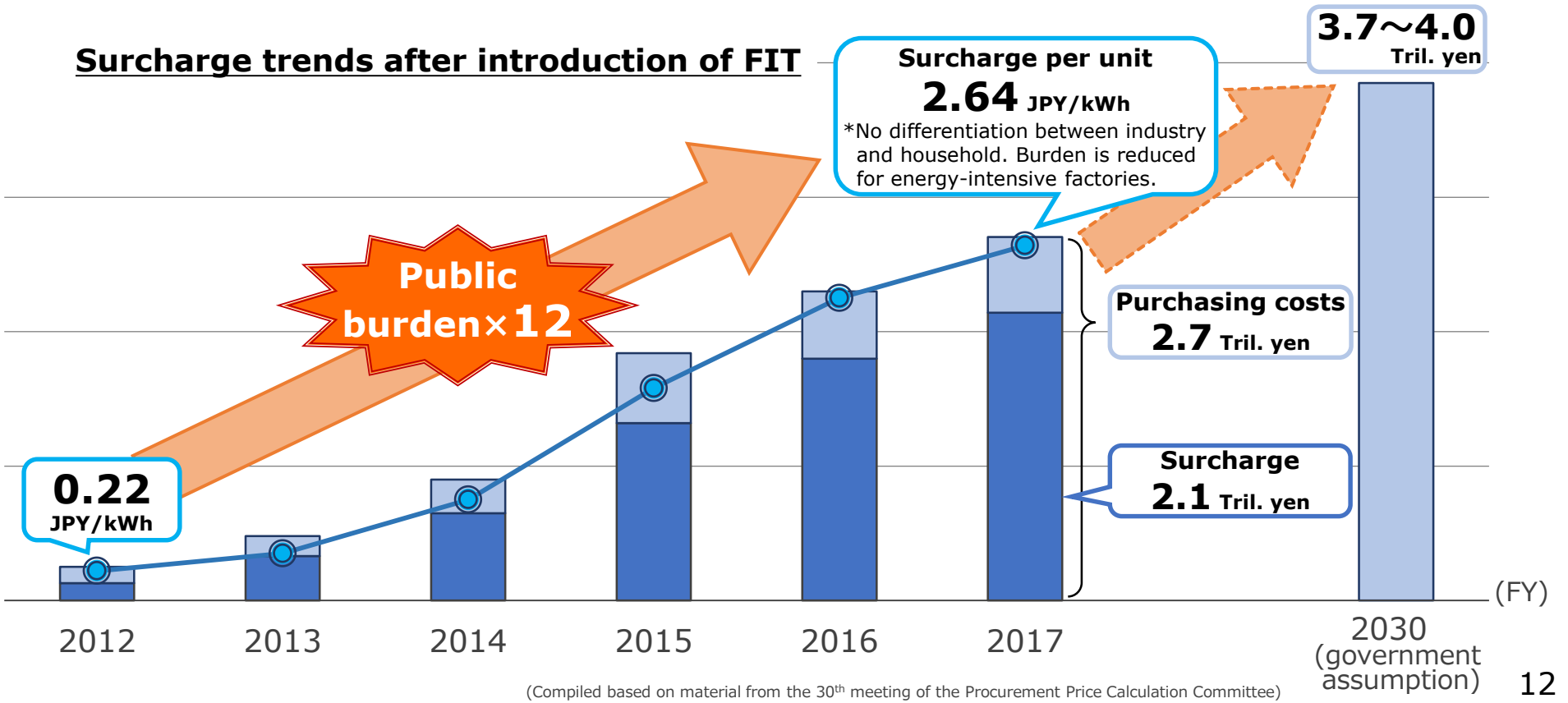
(Source : Agency of Natural Resources and Energy, *Japan's Energy 2016 edition*)

4. Renewable energy ② (Feed-in-tariff scheme)

(1) **Feed-in-tariff** (FIT) **imposes a high surcharge** on users due to high purchase prices. Scheme should be rationalized to reduce public burden (expanding eligible bidders, committing to information disclosure).

(2) Fundamental system review is required. Setting up a maximum purchasing costs that is compatible with the "Energy Mix." Law provides for the fundamental review by FY2020.

※**Feed-in-tariff scheme**: A scheme where electric power sourced by renewable energy is bought at a high fixed price for a period of 10-20 years.



(Compiled based on material from the 30th meeting of the Procurement Price Calculation Committee)

5. Energy network

(1) We should consciously continue to **use large-scale centralized power supplies** while also **harnessing distributed power supplies** in our energy networks encompassing electric power, gas and heat.

(2) Japan's energy demand is not forecasted to increase drastically, but power transmission and distribution networks that are determined truly necessary based on cost-benefit analysis should be installed for the realization of a new energy system.

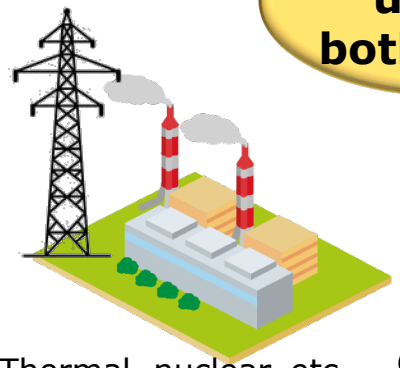
Large-scale centralized power supplies

Continued use

Distributed power supplies

Expanded use

Balanced use of both types

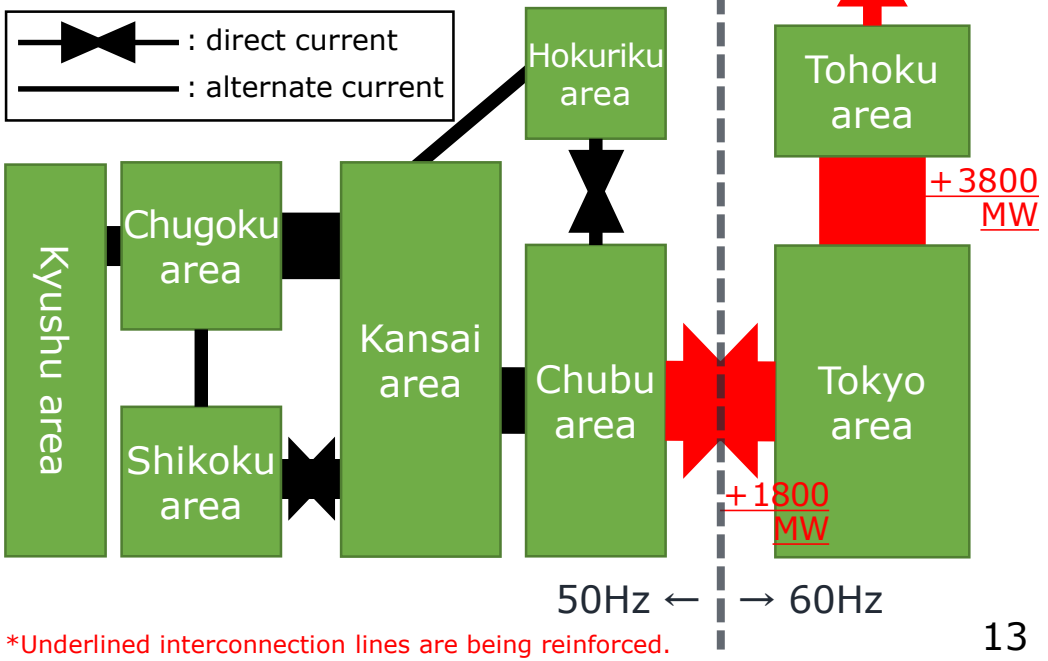


Thermal, nuclear, etc.

Cogeneration systems, rooftop PV systems, etc.

Electricity supply areas in Japan

- Japan is divided into 9 regional service areas, each with a power transmission and distribution operator (monopoly).
- Cross-regional interconnection lines have relatively small capacity.



*Underlined interconnection lines are being reinforced.

6. Electric power market

(1) As a part of electric power system reform the Japanese government is currently designing a baseload power market, a capacity market and a non-fossil value trading market.

(2) For the business community, it is most important that "**electric power users can enjoy the benefits of lower electricity prices and a secure supply**" as a result of reforms.

Baseload power market

Require former general electricity utilities to offer a part of the baseload power sources in their possession for a fair price to enable purchases by PPSs (Power Producer and Supplier).

↓

PPSs will gain access to inexpensive and stable baseload power.

⇒ Affordable electric power supply, more options for users

Capacity market

Required power generation capacities (kW) are secured through a call for bids to power generation operators. Costs are shouldered by retailers.

↓

By securing prospects for investment recovery, tight supply-demand balances can be avoided in the future.

⇒ Stable electricity rates

Non-fossil value trading market

The non-fossil value of renewable and nuclear power is written out on a certificate which is traded separately from the power generated.

↓

① Encourages the achievement of electric power retailer targets under the Act on Sophisticated Methods of Energy Supply Structure (ratio of non-fossil fuel power sources: 44%).
② Reduces FIT scheme-induced public burden.
③ Provides more options for users who appreciate environmental value.

Conclusion: In view of 2050 and the future beyond

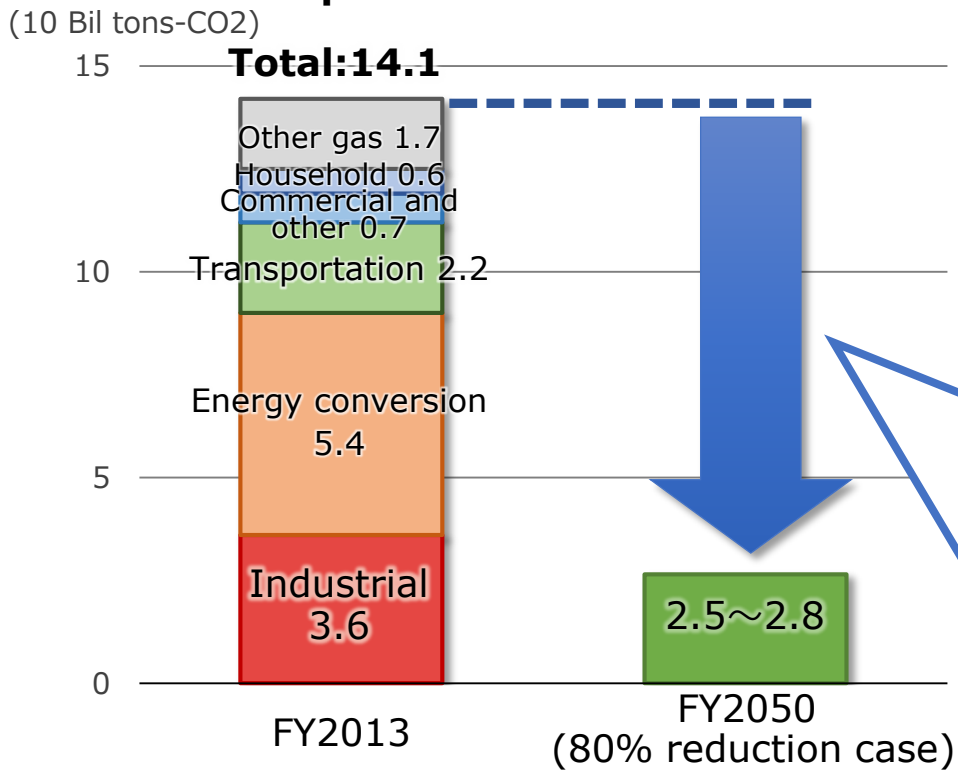
(1) The Paris Agreement invites countries to formulate their long-term climate strategies for 2050. The Japanese government aims to reduce GHG emissions by 80% in 2050.

(2) 90% of Japan's GHG emissions are from energy use; and therefore, global warming countermeasures need to be underpinned by energy policy.

(3) **Energy supply-demand will largely impact future industrial structure**.

(4) Responsible discussion regarding the long-term climate and energy strategy needs to be deepened based on **a vision of an industrial sector that can enrich national life**.

<Japan's GHG emissions>



In order to achieve **80% GHG reductions by 2050** relying only on domestic efforts,

- **Households, offices and transportation must be fully electrified**
- **Electric power: renewables + nuclear = 100%**
  +
- **Drastically shrinking or withdrawing manufacturing industry**

Discussions should be based on such realities.