

Challenges for Japan's Energy Transition

Session 1-1. Korea Energy Vision 2040 Korea Energy Transition Conference 2018

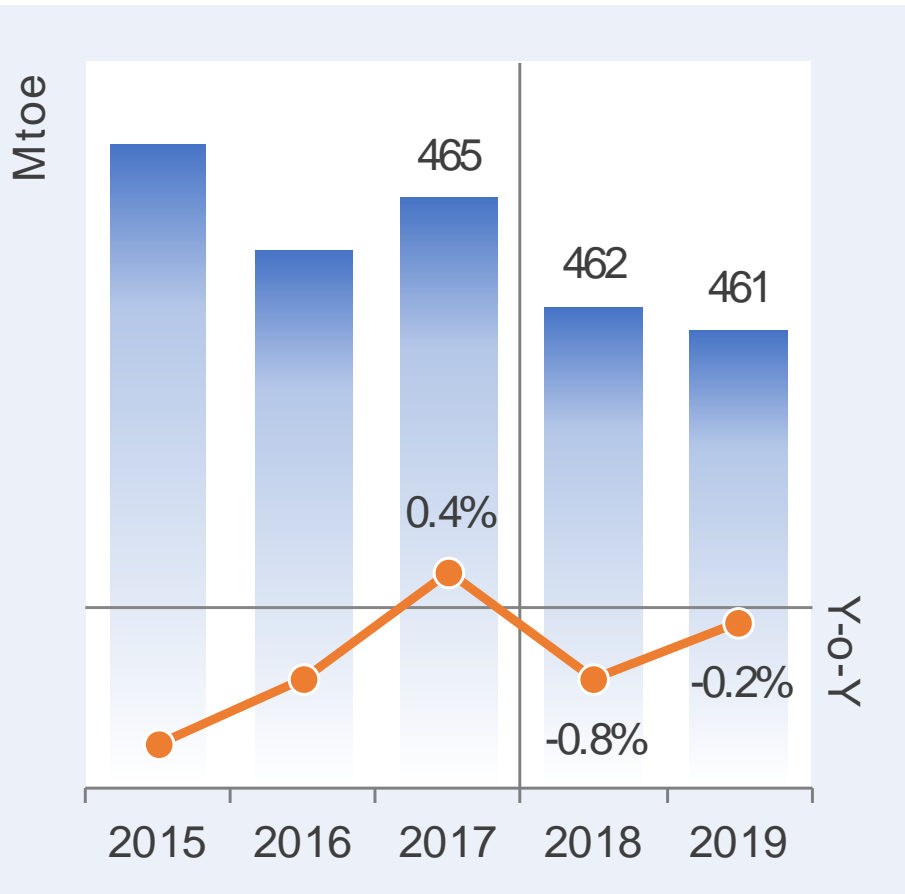
October 4th 2018

Dr. Ken Koyama

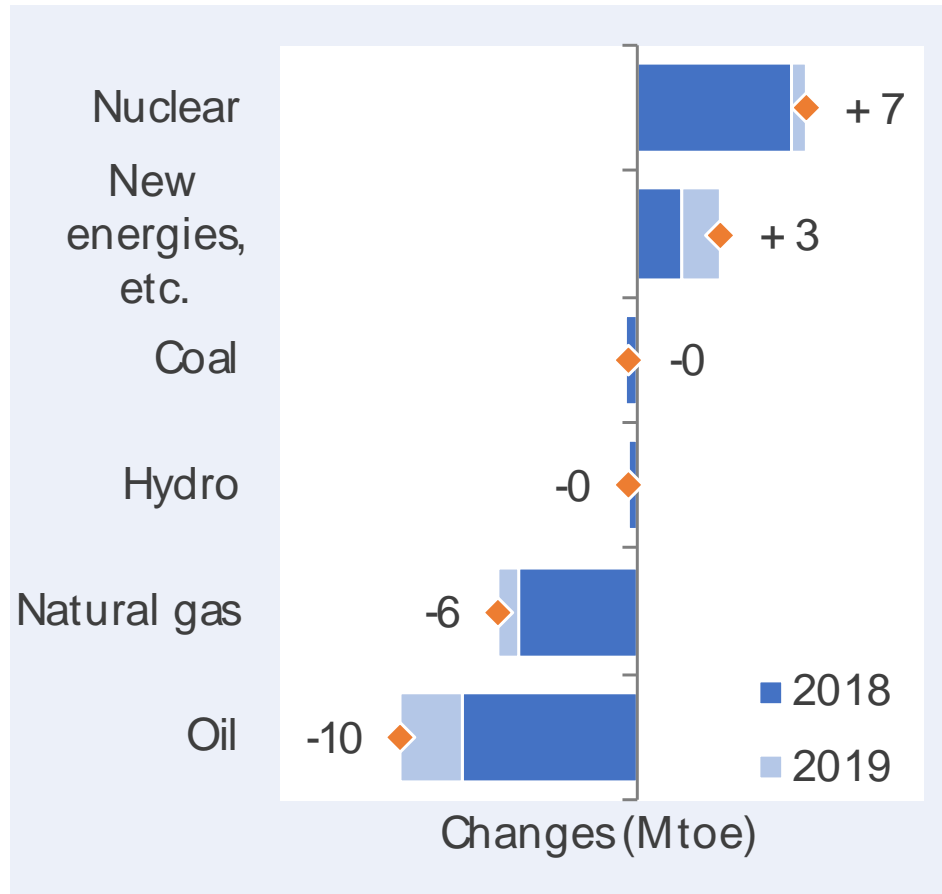
Chief Economist
Institute of Energy Economics, Japan

Japan's energy outlook up to FY 2019

Primary energy supply in Japan



Primary energy supply changes by source



Source: Akira Yanagisawa "Economic and energy outlook of Japan through 2019"(IEEJ, July 2018)

Challenges for Japan's Energy Policy

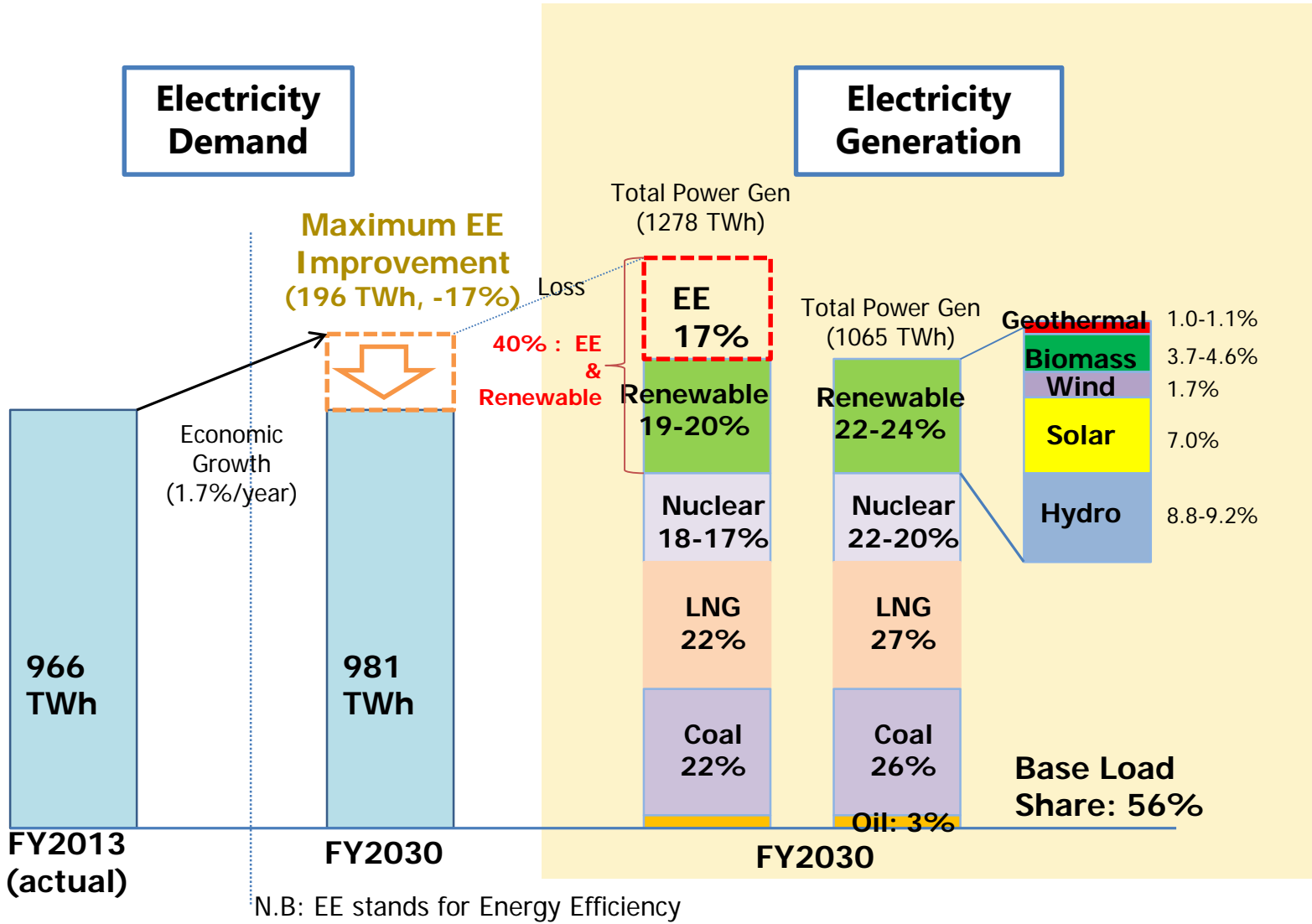
- **Best Energy Mix: How to achieve it?**
- **Re-start of Nuclear Power**
- **Energy Market Reform**
- **Security of Supply for Fossil Fuels**
- **GHG Emission Reduction Target**

- ***Revised "Strategic Energy Plan" approved by Cabinet***

“3E+S” Policy Target to be Achieved

- **“Safety” as a top-priority precondition**
- **“Energy security”**: To increase energy self sufficiency rate from 6% to 25%
- **“Economic efficiency”**: To reduce electricity cost from current level
- **“Environment”**: To set GHG emission reduction goal in line with US and EU

Japan's Energy Mix Target



Source: METI

Comparison of GHG Reduction Target

	vs 1990	vs 2005	vs 2013
Japan	▲ 18.0% (2030)	▲ 25.4% (2030)	▲ 26.0% (2030)
US	▲ 14~16% (2025)	▲ 26~28% (2025)	▲ 18~21% (2025)
EU	▲ 40% (2030)	▲ 34% (2030)	▲ 24% (2030)

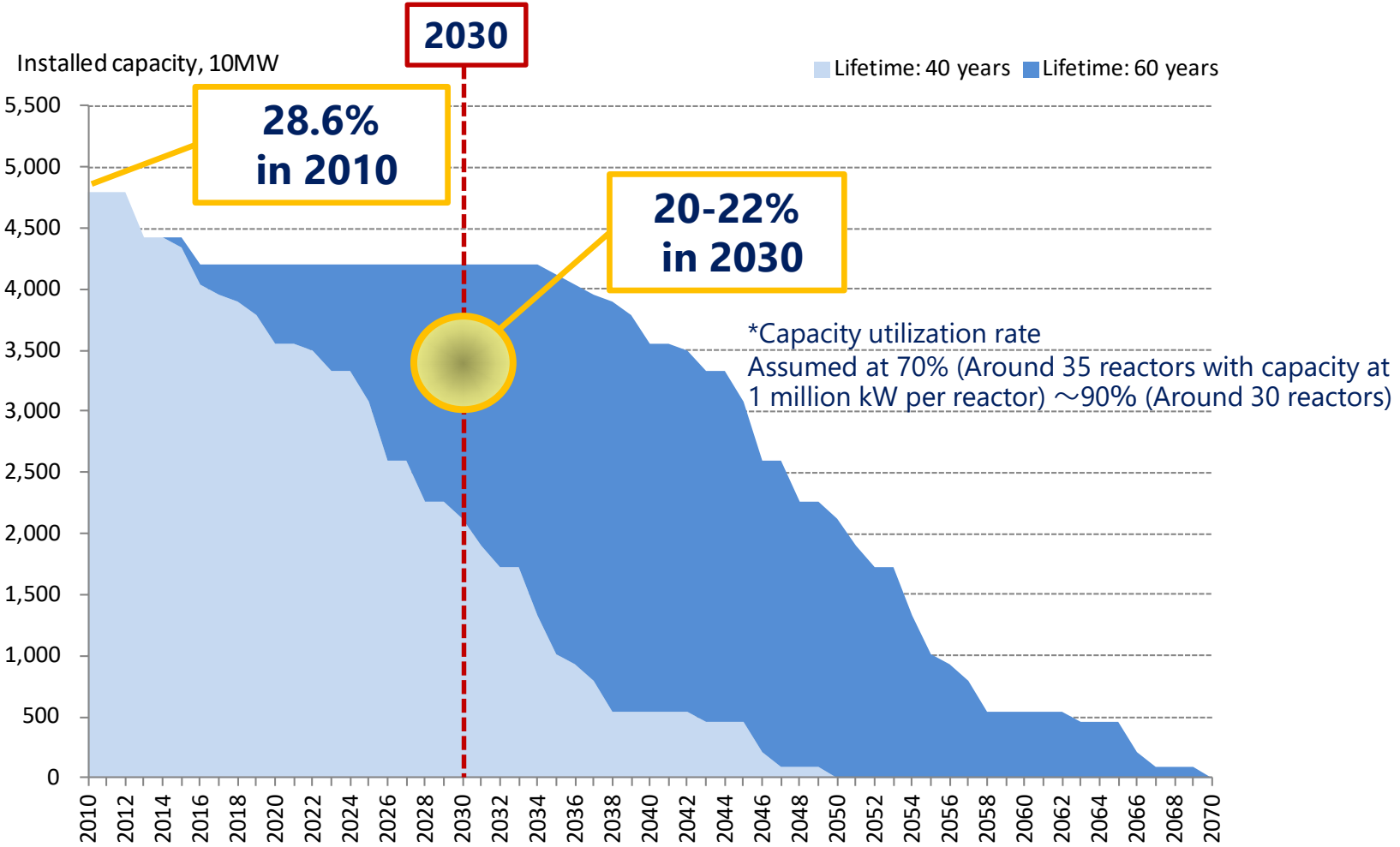
Source: Prepared by the Author based on METI data

Points in the revised “Strategic Energy Plan”

- **Re-confirmation of the “Energy Mix Target”**
- **Longer-term policy perspectives up to 2050**
 - **Renewable energy: To be “major source of power generation”**
 - **Energy efficiency: Best use of “AI, IoT, Big Data, etc”**
 - **Nuclear Power: Rebuilding confidence. Safer, more economically competitive and flexible technology**
 - **Further enhancement of fossil fuel security of supply**
 - **Promotion of hydrogen, methane hydrate, etc.**
- **Strategic emphasis on innovative technology**

Challenge to secure a 20-22% nuclear share

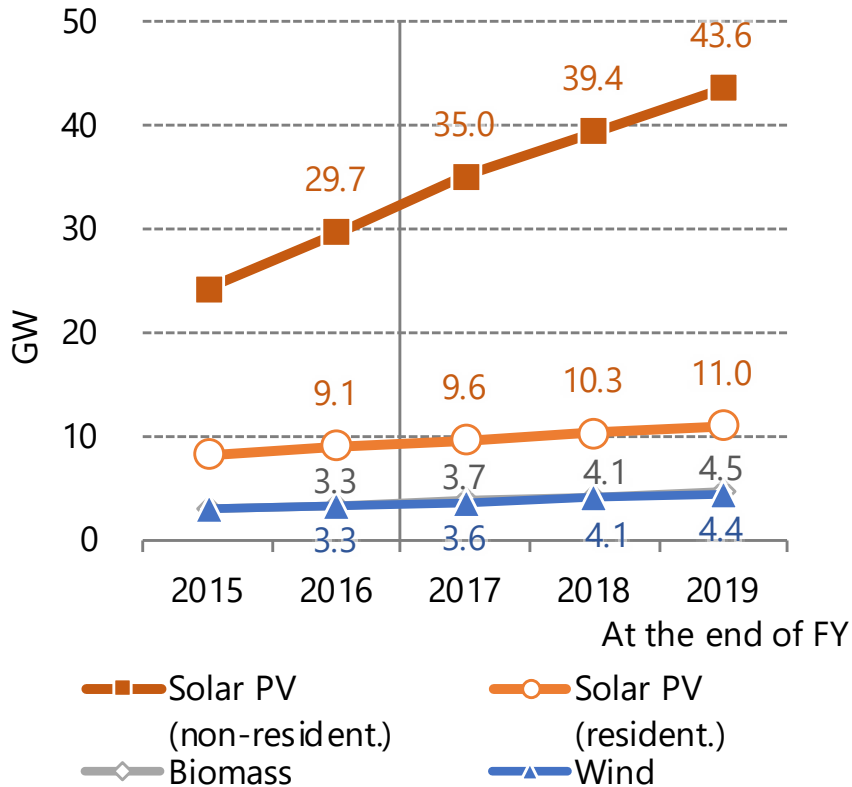
❖ Extension of lifetime or construction of new reactors is required



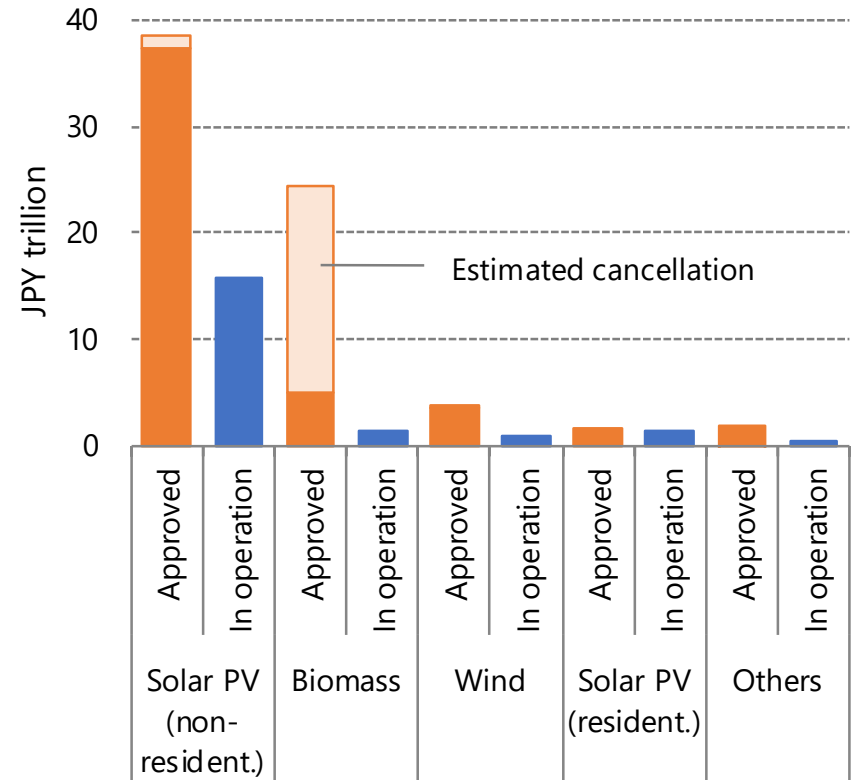
Huge Economic Burden by FIT Surcharge

- As of End March 2017, FIT Approved capacity reached at 105 GW, of which some capacity will be canceled.
- If all the approved capacity will be in operation, cumulative FIT surcharge will reach at JPY 50 trillion.

Installed Capacity in Operation of RE Generation

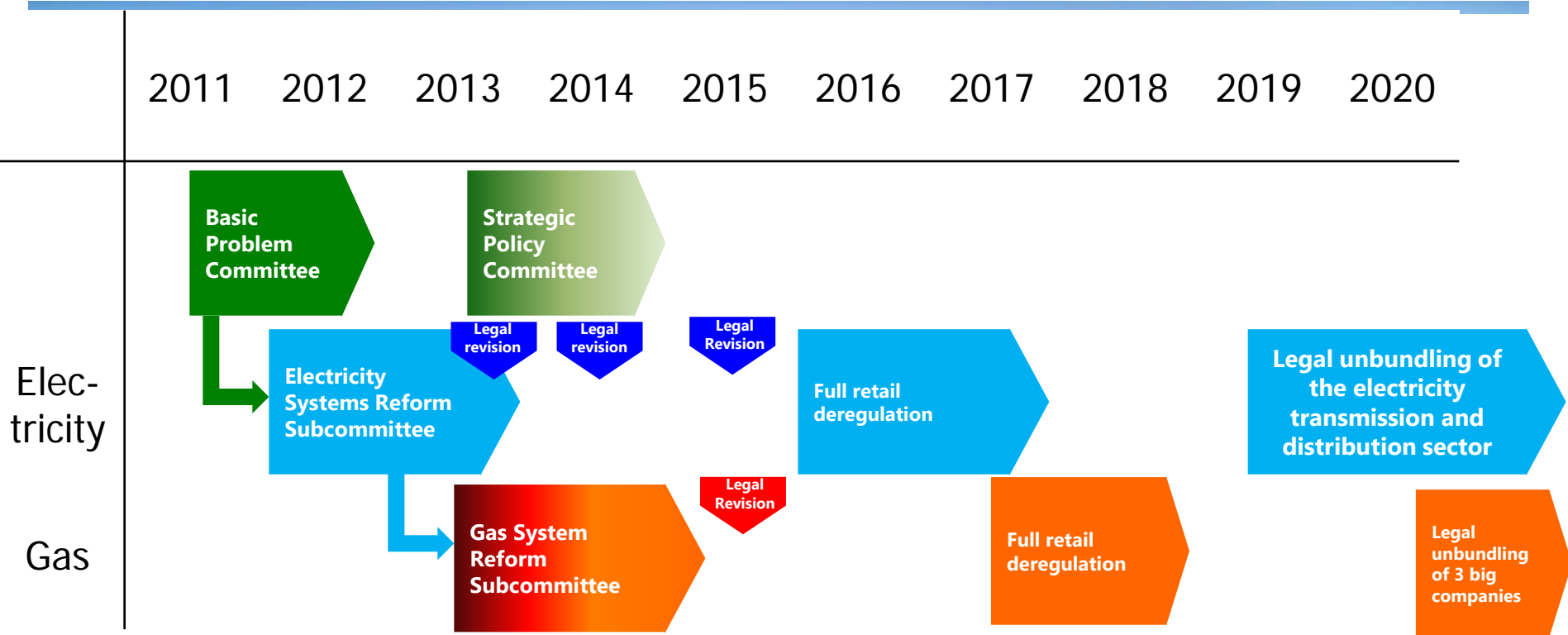


Cumulative Burden of FIT over 20 Years



(Note) Capacity approved and in operation at the end of September 2017

Electricity and Gas Systems Reform after 2011



- Electricity system reform has 3 steps, and gas system reform has 2 steps.
- Electricity market: Full retail market liberalization (April 2016) and legal unbundling (2020)
- Gas market: Full retail market liberalization (April 2017) and legal unbundling for big 3 companies (2022)

Japan's Primary Energy Demand Outlook

Fossil fuel demand is projected to decline, accounting for 76% in 2030

	FY2010		FY2013		FY2030	
	Million KLOE	%	Million KLOE	%	Million KLOE	%
Oil	212 (3.65MBD)	37	216 (3.72MBD)	40	145 (2.50MBD)	30
LPG	16	3	16	3	13	3
Coal	129	23	136	25	123	25
Gas	110	19	131	24	92	19
Nuclear	64	11	2	0.8	48~51	10~11
Renewable	43	8	41	8	64~67	13~14
Total	572	100	542	100	489	100

Source: Prepared by Data from METI

Ken Koyama, IEEJ, October 4th 2018

Outline of the 5th Basic Energy Plan : Chapter 1

Chapter 1: Structural Issues, Changes in Circumstances, and Policy Timeframe

Section 1: Structural issues faced by Japan

1. **Vulnerability due to high dependency on overseas energy resources**
2. **Mid- to long-term changes in the energy demand structure** (population decline, etc.)
3. **Instability of resource prices** (increased energy demand in emerging countries, etc.)
4. **Increasing global greenhouse gas emissions**

Section 2: Changes in energy environments

1. **Start of inter-technology competition for decarbonization**
(renewable energy, fossil fuels, nuclear, etc.)
2. **Geopolitical risks increased by technology changes**
3. **Intensified competition between nations and firms**

Section 3: Achievement of an optimal energy mix by 2030 and its relation with the 2050 scenario

Outline of the 5th Basic Energy Plan : Chapter 2

Re-confirmation of Energy Mix Target

Chapter 2: Basic Policies and Measures towards 2030

Section 1: Basic policies ⇒ Seeking to securely implement energy mix for 2030

Section 2: Policy measures towards 2030

- | | |
|---|---|
| 1. Promotion of securing of resources: | ⇒ Promotion of independent development of fossil fuel and mineral resources and establishment of a robust industrial system
Independent development ratio (oil/natural gas): 27%(2016)→40%(2030)
Methane hydrate: Seeking commercialization between 2023 and 2027 |
| 2. Realization of a thorough energy efficient society: | ⇒ Using artificial intelligence, internet of things, big data, etc. |
| 3. Efforts for the utilization of renewable energy as the major power source: | ⇒ Initiatives to develop renewable energy into baseload power source |
| 4. Re-establishment of the nuclear energy policy: | ⇒ Sincere remorse, restoration of public trust, reconstruction of Fukushima continuous safety improvement, spent nuclear fuel measures |
| 5. Efficient and stable use of fossil fuel: | ⇒ Introducing regulatory measures while promoting voluntary initiatives |
| 6. Fundamental reinforcement of measures for realizing a hydrogen society: | ⇒ Implementation of measures based on the Basic Hydrogen Strategy |
| ... | |
| 10. Development of energy industry policy: | ⇒ Expanding markets for storage batteries, hydrogen, fuel cells and other technologies for which Japan has taken global leadership |

Section 3: Promotion of technology development

- Energy technology development plan/roadmap

Section 4: Enhancement of communication with all levels of the society

- Expanding interactive communications

Outline of the 5th Basic Energy Plan : Chapter 3

Longer-term Energy Policy beyond 2030

Chapter 3: Efforts for Energy Transitions and Decarbonization towards 2050

Section 1: **Ambitious multiple track scenario** – Pursue every option

Section 2: Designing of the 2050 scenario

- Energy security: Improving resources self-sufficiency rate
+ raising technology self-sufficiency rate, securing diversification

Section 3: Issues faced by each option and priorities in response thereto

- Nuclear: **Pursuing safer. More economical and flexible reactors** to restore social trust, developing backend technologies

Section 4: All-out efforts to realize the scenario