Update of Japan's energy mix policy

11 September, 2017

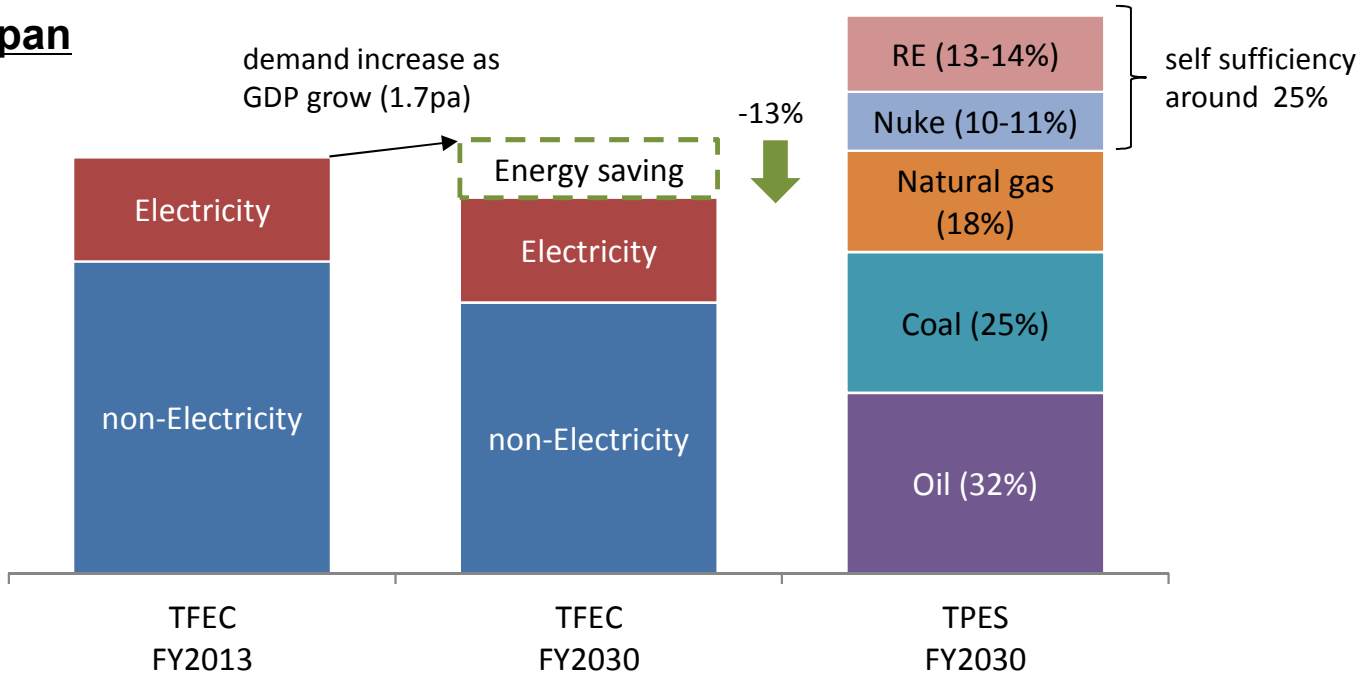
Mr. Ichiro Kutani
The Institute of Energy Economics, Japan

2030 target

Safety	Enhance safety
Security	Self-sufficiency goal: around 25%
Economics	Reduce electricity cost from present level
Environment	GHG reduction goal: comparable level to other OECD countries

Ideal energy mix in Japan

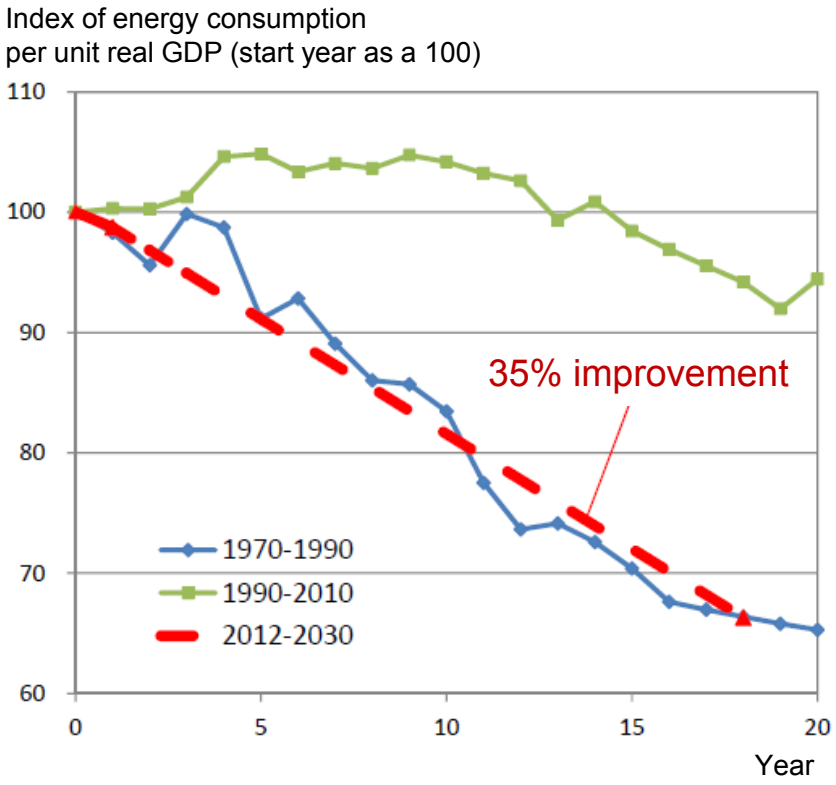
Source: METI



Energy efficiency

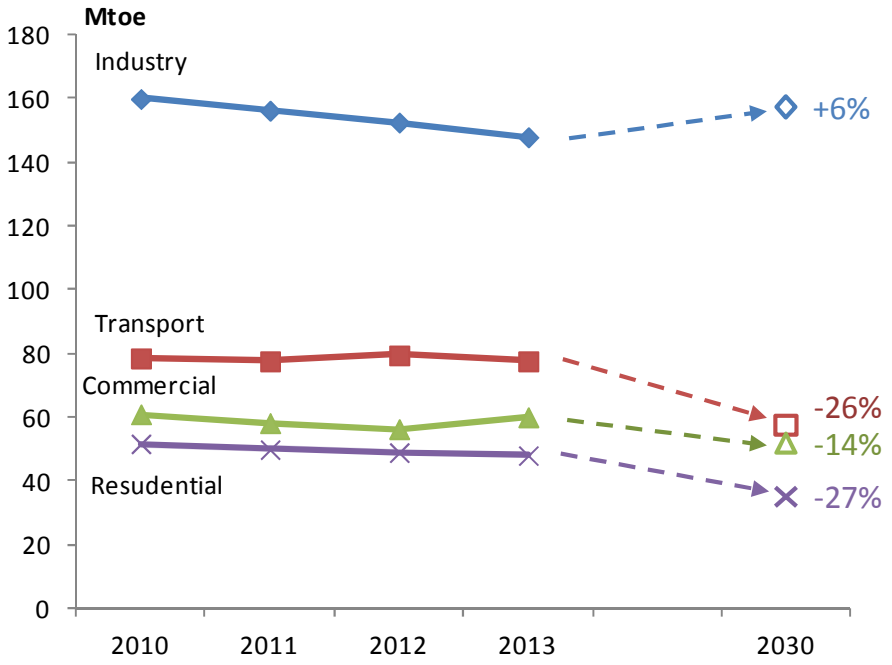
- Toughest ever energy efficiency actions are required, in particular in transport and residential sector.

Efficiency improvement



Source: METI, May 2015

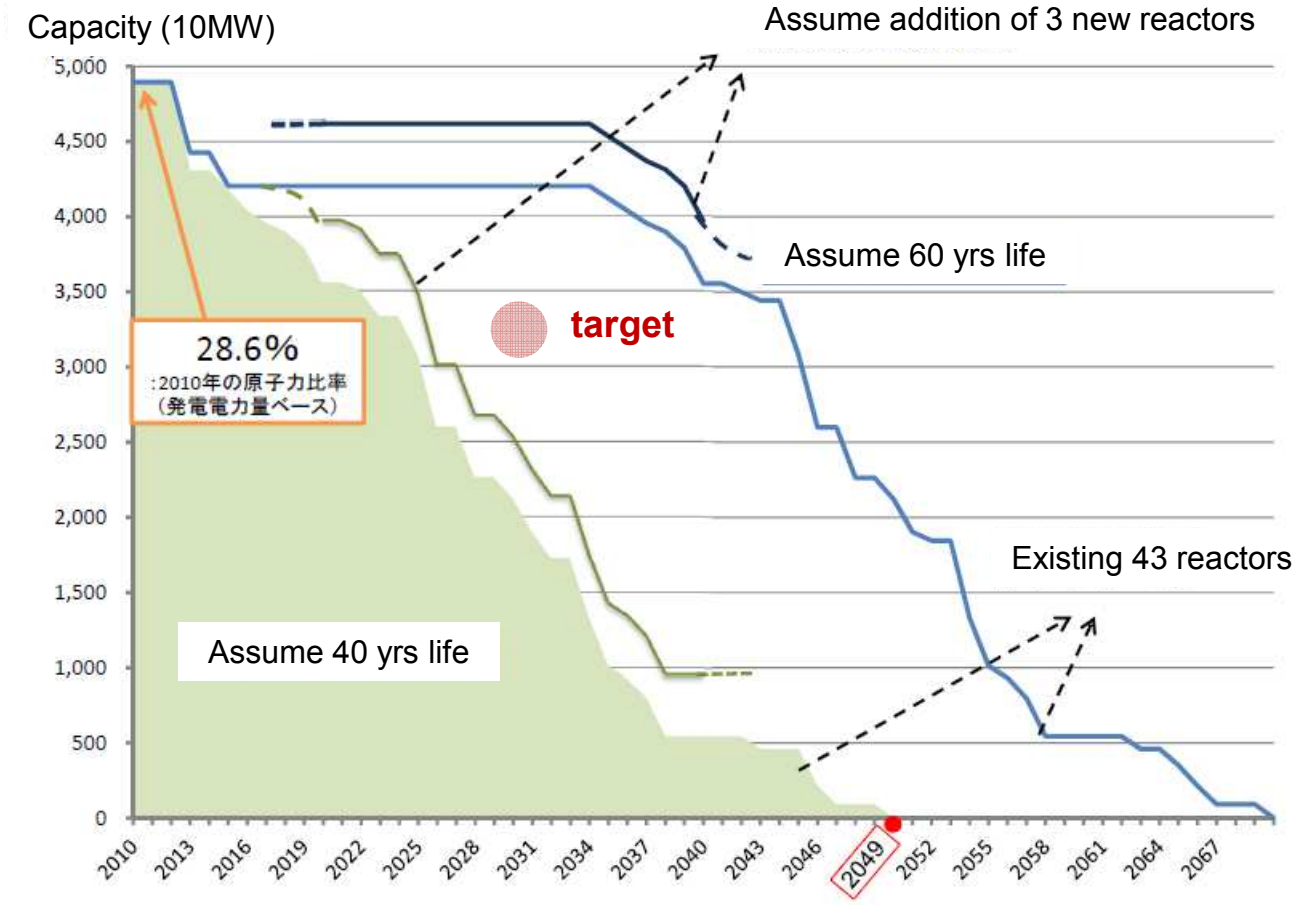
Reduction target of final energy demand



Source: METI, May 2015

Necessary nuclear capacity

- Japan need to run at least 30-33GW [*1] of nuclear fleets to reach the target of 2030 power generation mix [*2].
  - *1: at 80% of operating rate
  - *2: 20-22% share of nuke in power generation



Prospect of nuclear capacity

Source: METI, May 2015

Slowly progressing

- Safety review and restart of operation is progressing, but long way remains ahead.

Available nuclear capacity and progress of restart operation (as of 24 May 2017)

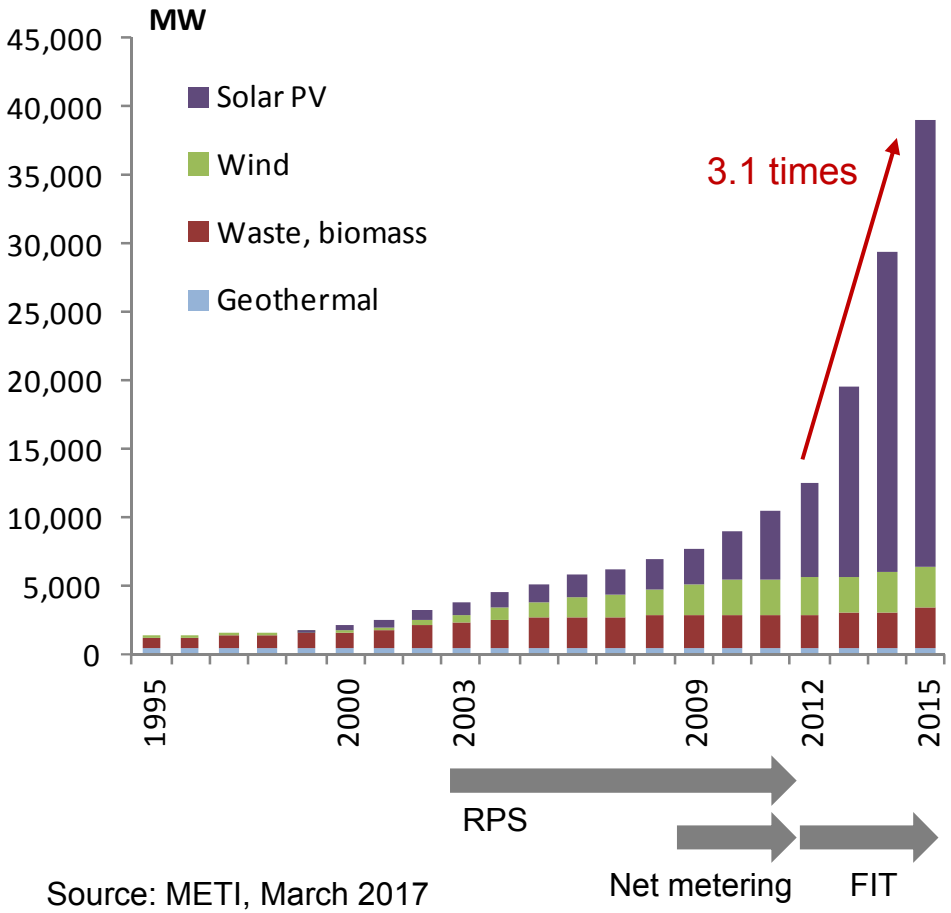
Status			Number of reactor	Capacity of reactor
Before the earthquake			54	49.0GW
Decide to decommission			-12	7.5GW
Available reactors			42	41.5GW
	Of which; Safety review underway		13	13.2GW
	Of which; Safety review approved		12	11.6GW
		Of which; Operating	5	4.4GW
		Of which: Life extension approved	3	2.5GW

Source: Japan Nuclear Safety Association

Fast growing renewable energy

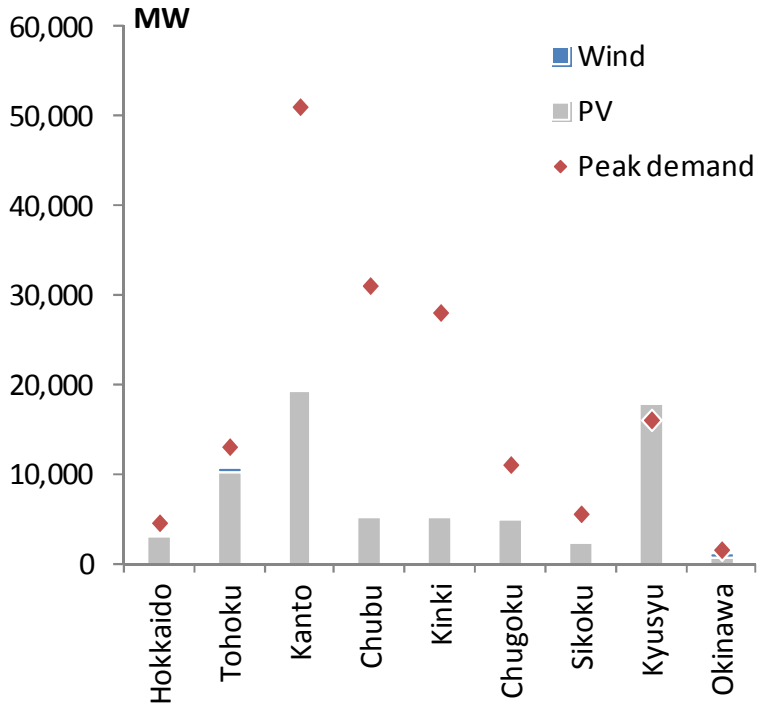
- (Very) Rapid build up of Solar PV capacity.
  - ✓ While, actual installation is not catching up the pace.
  - ✓ Slower growth of other types of REs.
- Flexibility of grid already become critical in some regions.

RE power generation capacity (except Hydro)



Source: METI, March 2017

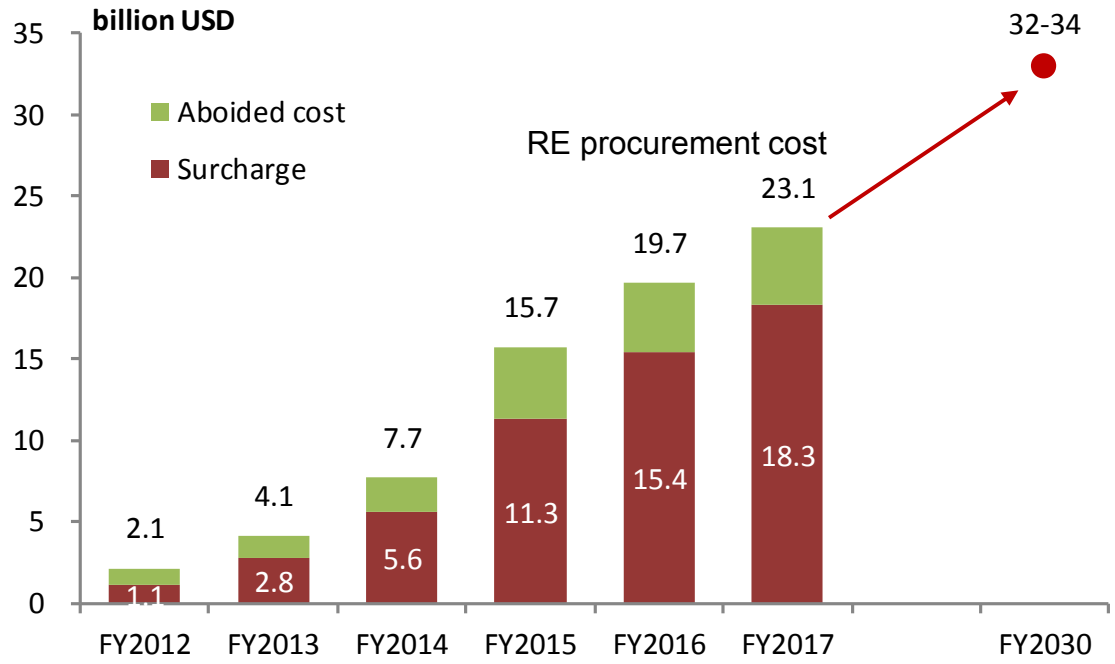
Authorized RE capacity and peak demand by region



Source: METI, Sep 2014

Cost become an issue

- FIT surcharge for consumer's bill become larger, and expected to increase further.
- High cost nature of PV and wind in Japan compare to other countries.



	FY2012	FY2013	FY2014	FY2015	FY2016	FY2017
Unit surcharge [UScent/kWh]	0.2	0.3	0.6	1.4	1.9	2.3
Monthly surcharge [USD/month]	0.6	0.9	1.9	4.1	5.8	6.8
ref.) Monthly bill [USD/month]	90	96	97	-	-	-

Monthly surcharge : rate for 300kWh/month consumer
Monthly bill : average of household consumer

Surcharge of FIT

Source: METI, March 2017
Electric power business handbook 2014

What if already authorized 88GW capacities come to reality?

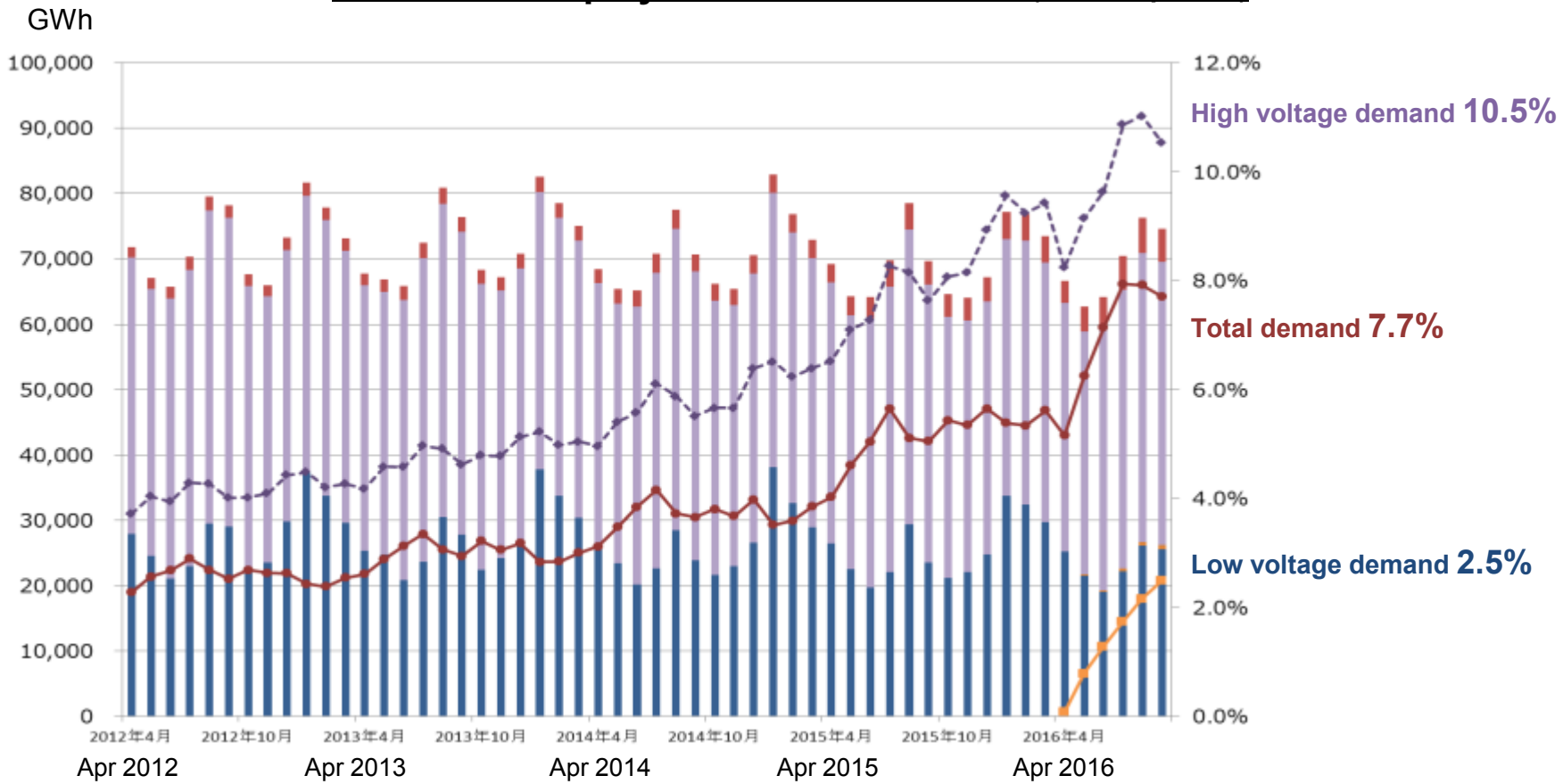
USD500 billion — Cumulative FIT cost for next 20 yrs after 2017

+UScent2.8/kWh — Tariff hike of;
14% for household
20% for industry

Retail competition

- Retail market (residential consumers) competition has started.
  - ✓ Power market: April 2016 -
  - ✓ Gas market: April 2017 -

Share of New players in Power Market (as of Sep 2016)



Source: METI, April 2017

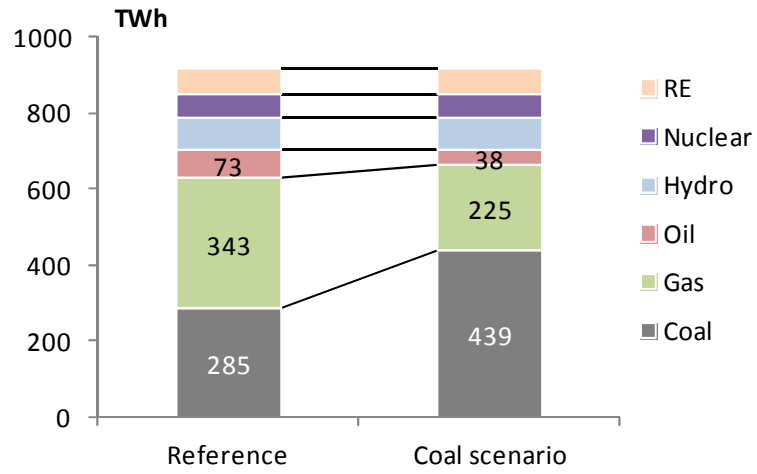
New form of power market

- Deregulation and competitive pressures changed the rule of game.

Coal power plant

- Many new plans emerged.
  - ✓ 48 units, 23GW (as of Dec 2016)
- Benefit to reduce electricity cost while increase CO_2 emission.
- Limit operation of gas units.

If planned coal capacities come online

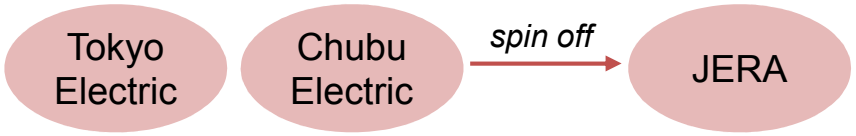


Source: IEEJ, Dec 2016

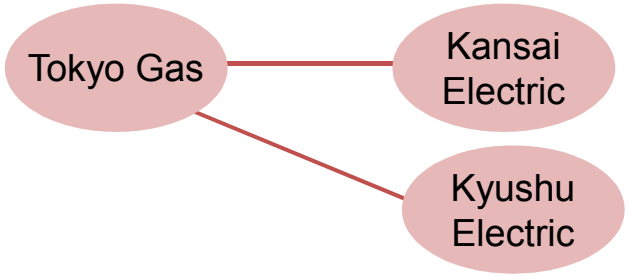
New market alignments

- Mutual complement of competitive area.
- Increase flexibility of fuel arrangement.

Increase flexibility of LNG procurement
Increase efficiency of thermal power business in Japan



Increase flexibility of LNG procurement

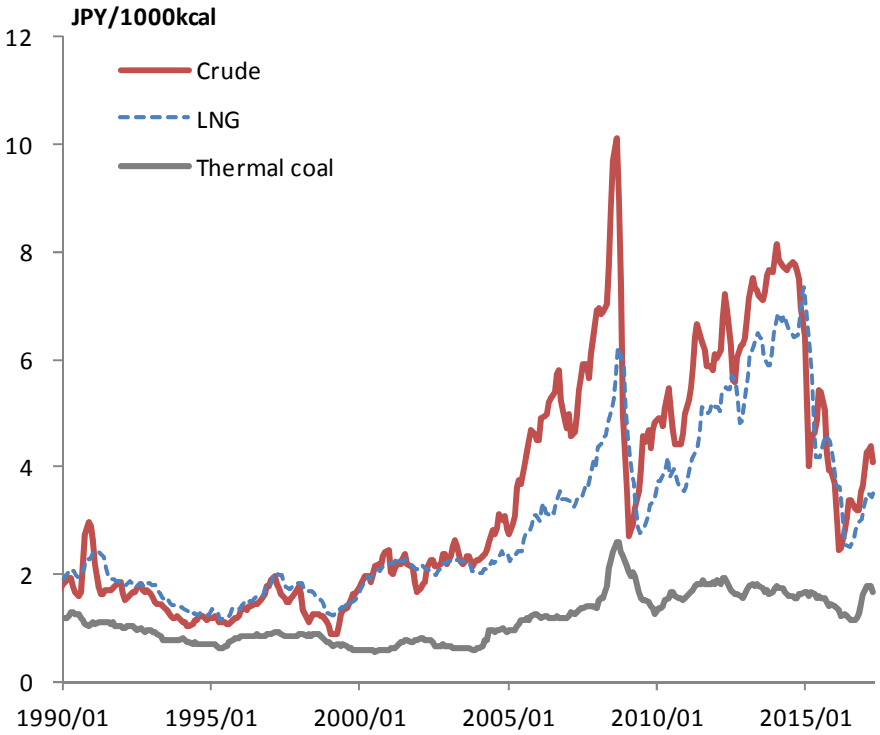


Develop coal power plant in Tokyo bay area

Squeezed out?

- Natural gas have no economic advantage against coal.
- Similar environment was observed in Europe, where natural gas has squeezed out from power market.

Import price of fossil fuel



Source: IEEJ-EDMC

Elements to squeeze out natural gas from market

		EU	JP
1	Competition in power generation sector	✔	✔
2	Rapid increase of politically supported REs	✔	✔
3	Less price competitiveness against cheaper coal	✔	✔
4	Insufficient mechanism for GHG reduction	✔	?

Source: Author

As a conclusion

- The discussion to revise the Strategic Energy Plan has started.
  - ✓ Indication of long term energy policy goal.
  - ✓ Revised every 3 years.

- What would be the discussion points?

Energy efficiency	• How much energy demand can be reduced?
Nuclear	• How much can we expect to be operated?
Renewable energy	• How much amount can we introduce while avoiding side effect for supply stability and economy.
Coal and natural gas	• How to control the coal use in a liberalized market? • How to enhance price competitiveness of LNG?

Thank you for your attention.

IEEJ was evaluated as the world's number 3 in the **energy sector** of the "**Global Go To Think Tank Index**" (published in Jan. 2017) announced every year by the University of Pennsylvania.
IEEJ has been ranked top for three years in a row.
(number 1 in 2015, number 3 in 2014)

"2016 Global Go To Think Tank Index Report"(p.80)
http://repository.upenn.edu/think_tanks/

We provide part of our cutting-edge research results on energy and the environment on our website free of charge.

IEEJ Website
http://eneken.ieej.or.jp/en