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Current status of energy transition and low carbon developments in Japan

Nov. 7, 2017 @COP23

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Who we are: Renewable Energy Institute

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Based on its scientific research, we work;

For realization of non-carbon business model,

Supporting policy makers and media for further understandings of climate change and energy policies,

Collaborating with local governments' and consumers' networks ,

Organizing a business coalition for RES100% procurement,

Dissemination of international knowledge through network,

Being the credible voice as an independent thinktank.

Latest Publications: Renewable Energy Institute

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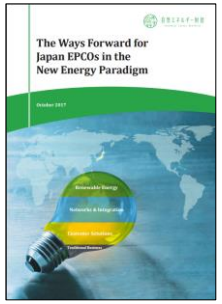
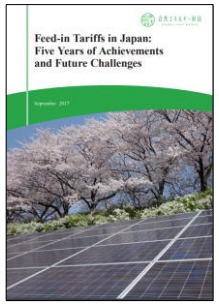


The Ways Forward for Japan EPCOs in the New Energy Paradigm

Business Risks of New Coal-fired Power Plant Projects in Japan
—The Decline in Capacity Factor and Its Effect on the Business Feasibility

Asia International Grid Connection Study Group Interim Report



Feed-in Tariffs in Japan: Five Years of Achievements and Future Challenges

For Greater Deployment of Wind Power
—Examining Land Use Regulations and Environmental Impact Assessment

Proposal for Local Energy Policy

REPORT: 10 Q&A on the German Energiewende
— A contribution to the Japanese **energy debate**

TRANSLATION
Reinventing Fire: China
A Roadmap for China's Revolution in **Energy Consumption and Production to 2050, Executive Summary**

Cost Study of Wind Power Generation in Japan

Outline

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Outline

1. Current status on energy transition in Japan
    - 1-1 Decreasing energy demand
    - 1-2 Increasing renewable energy introduction
    - 1-3 Status on nuclear
    - 1-4 Coal and other thermal power generation
    - 1-5 GHG emission transition
2. Policy status and its challenges in Japan
    - 2-1 Japan’s policy targets and current status
    - 2-2 Policy for Renewable --Ambitious enough?
    - 2-3 Coal Issue
3. Low carbon development in building sector

1-1 Decreasing Energy and Power Demand

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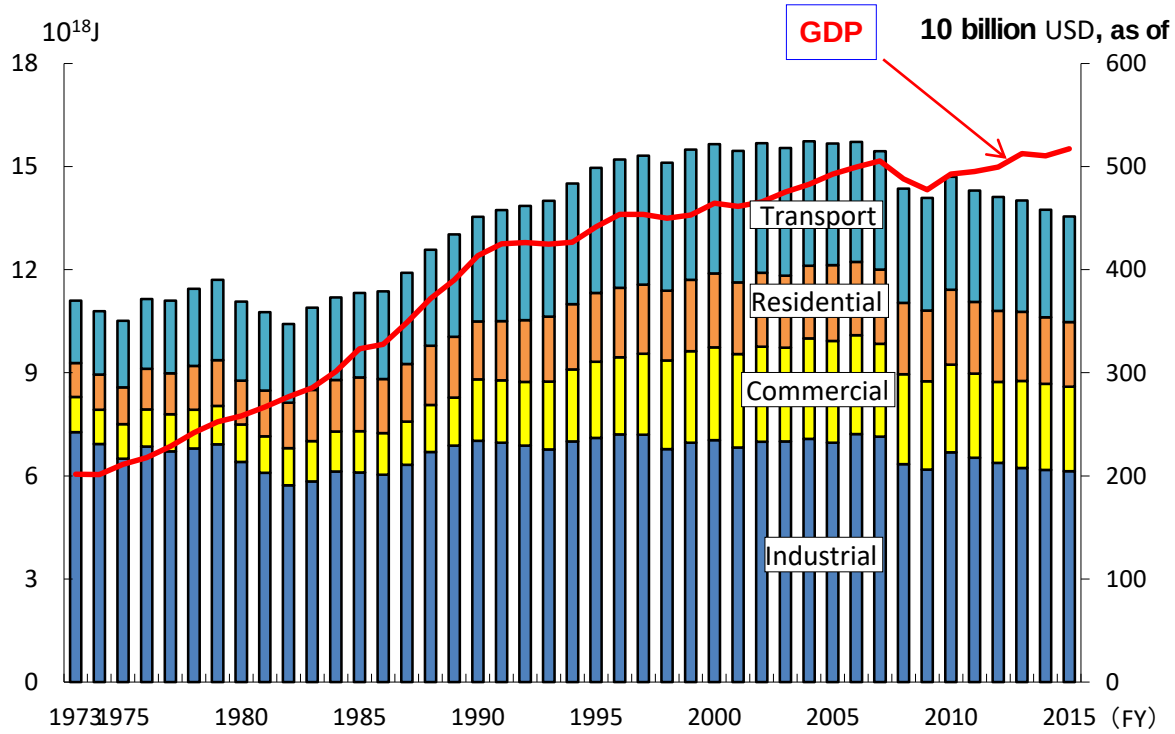
After 2011 energy demand has decreased

Decoupled with GDP

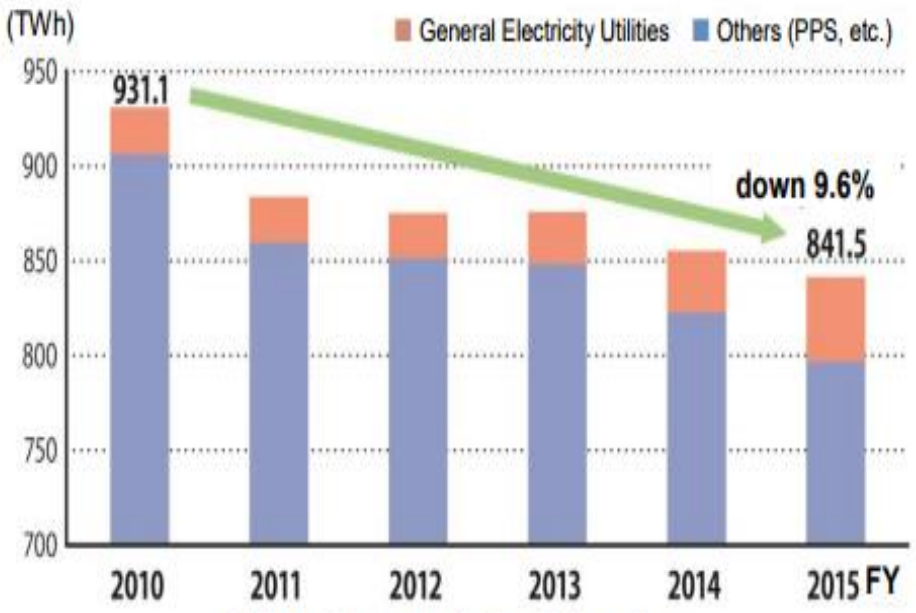
Electricity demand has also dropped

10% down since 2010



Annual Energy Consumption (Final) & GDP Growth

Source: Energy white Paper, METI



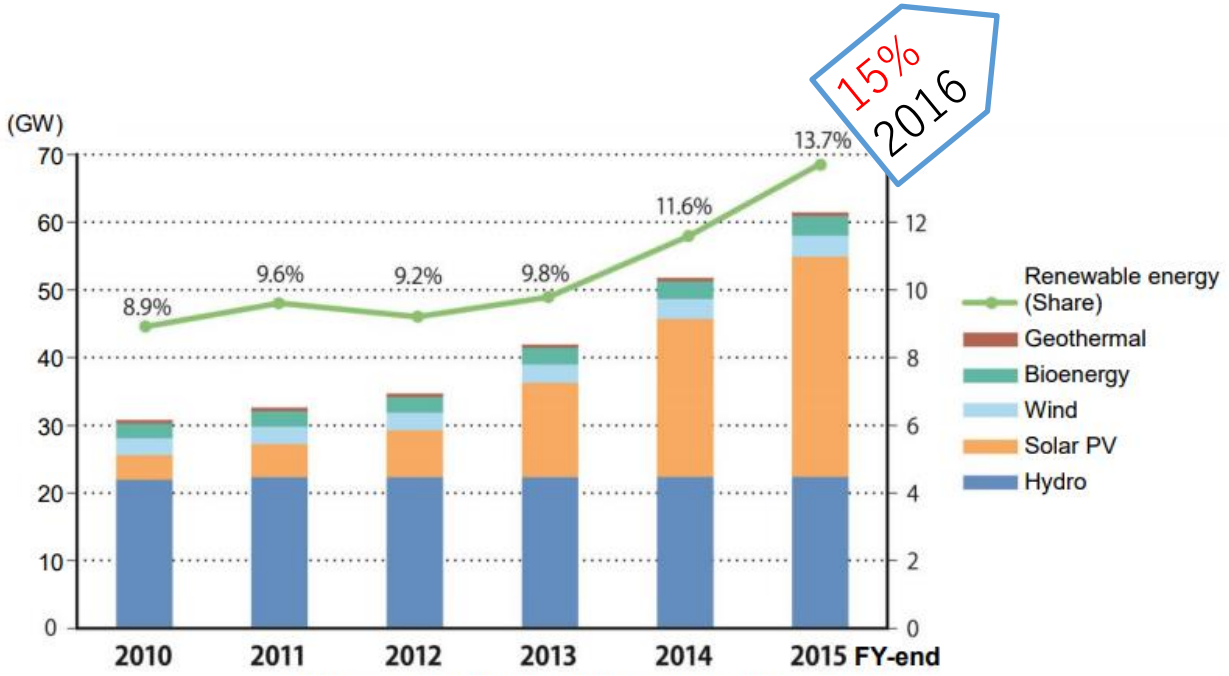
Annual Electricity Sales

Source: Electric Power Investigation Statistics METI

Growing Renewable Energy

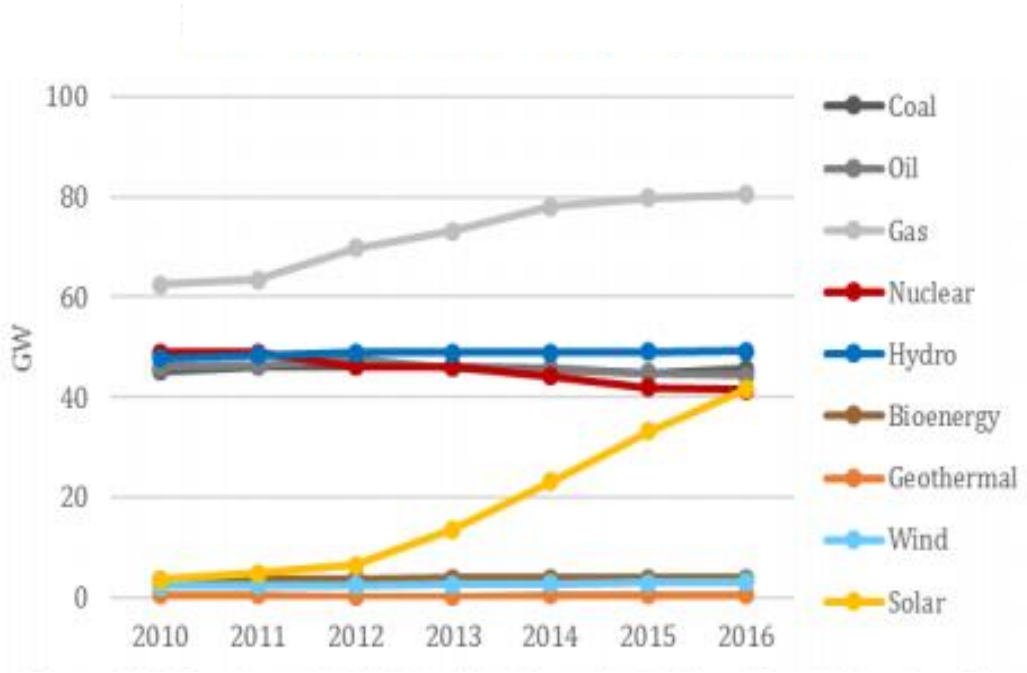
Rapid growth driven by FIT pushed up renewable energy ratio to 15% in 2016 (vs 8.9% in 2010)

PV capacity now excess nuclear



Cumulative installed capacity for renewables

Source: Chart3, Business Risks of New Coal-fired Power Plant Project in Japan (REI 2017)



Japan Electrical Capacity 2010-2016

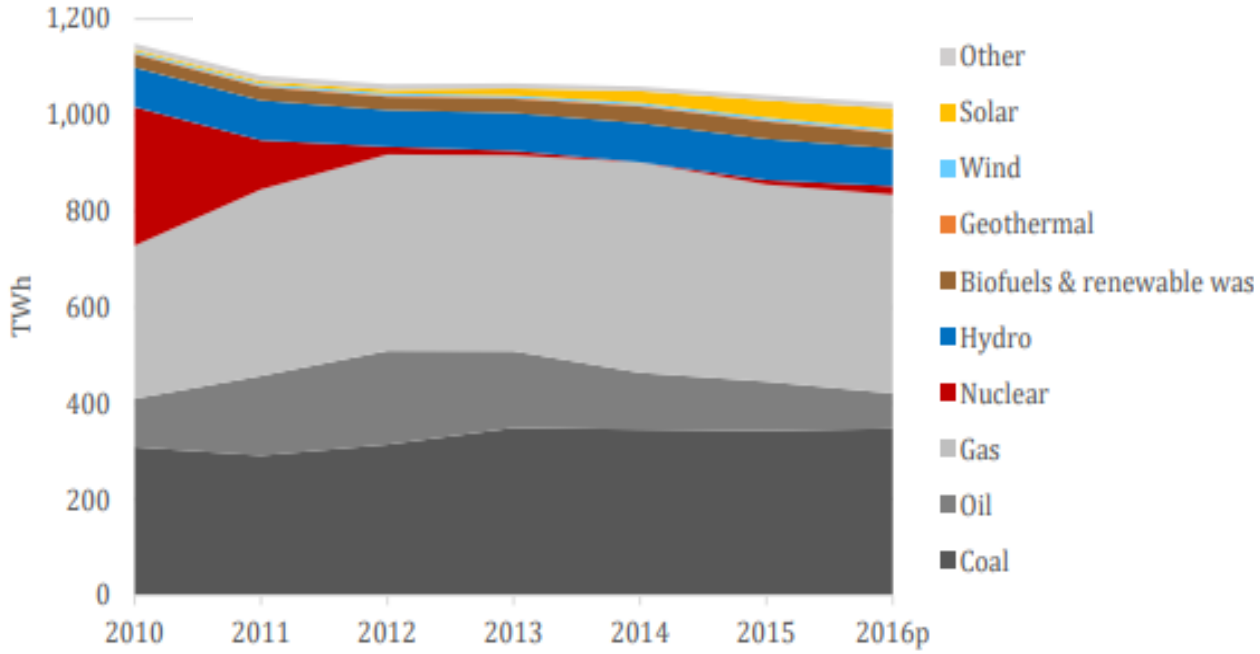
Source: Chart 3, The Ways Forward for Japan EPCOs in the New Energy Paradigm (REI 2017)

1-3 Nuclear

Drastic decrease of nuclear power supply: 2% in 2016

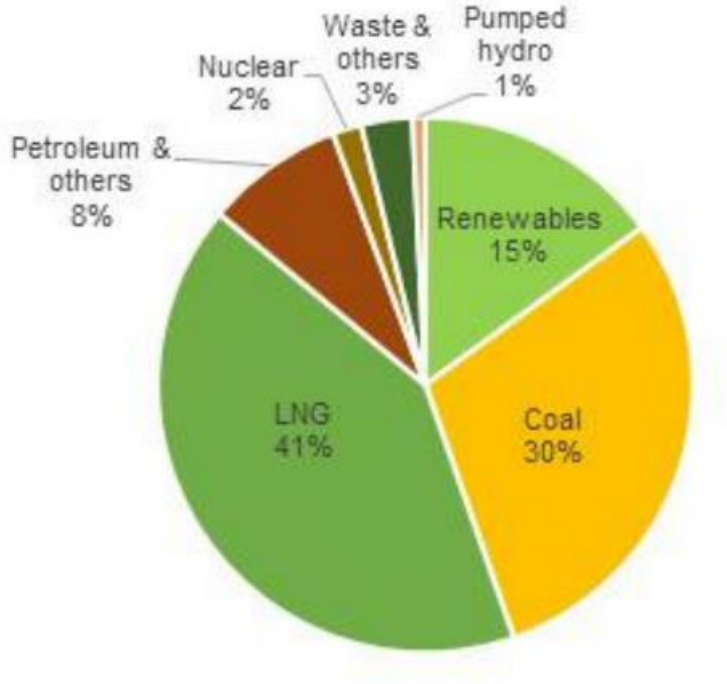
Decommissioned: 12, Application yet to be filed: 18, Under examination: 14,

Permission granted:7, In operation: 5.



Japan Gross Electricity Generation FY2010-FY2016

Source: Chart 3, The Ways Forward for Japan EPCOs in the New Energy Paradigm (REI 2017)



Total Electricity Generated and Purchased (FY2016;Share)

Source: Feed-in Tariffs in Japan: Five Years of Achievements and Future Challenges (REI 2017)

1-4 Coal & other thermal

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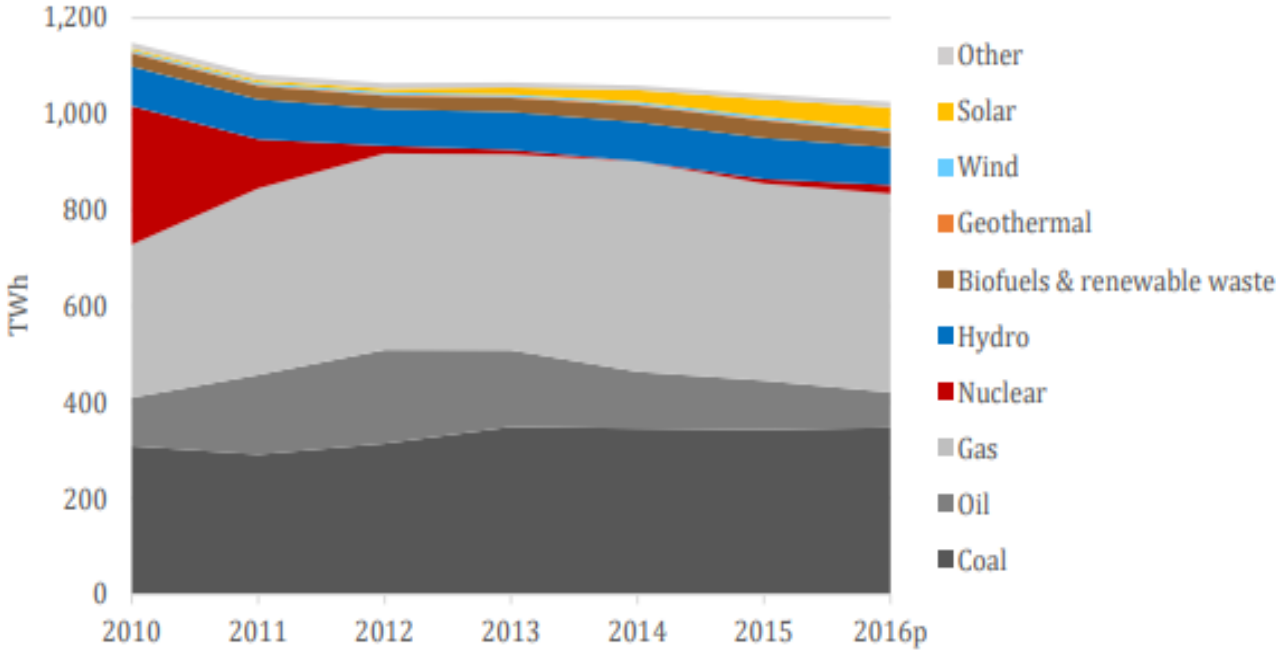
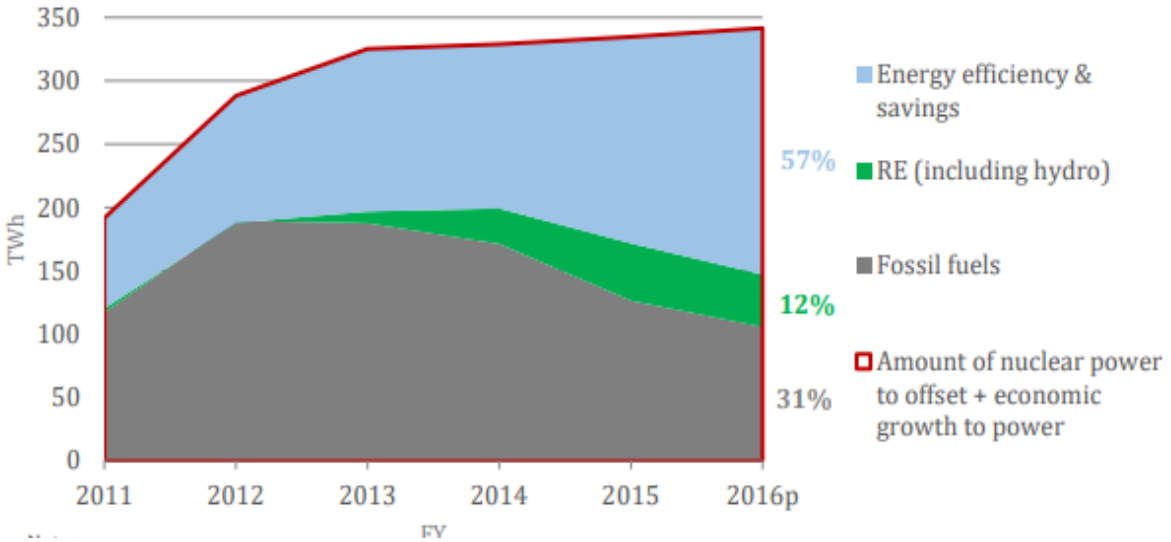
Still major power sources, but changing status

Problematic coal dependence



Japan Gross Electricity Generation FY2010-FY2016

Source: Chart 3, The Ways Forward for Japan EPCOs in the New Energy Paradigm (REI 2017)



How Japan Replaced Nuclear Power

Notes: Assuming constant electricity intensity.
"Other" is included in fossil fuels and is negligible
Source: Chart 49, The Ways Forward for Japan EPCOs in the New Energy Paradigm (REI 2017)

1-5 GHG Emission Transition

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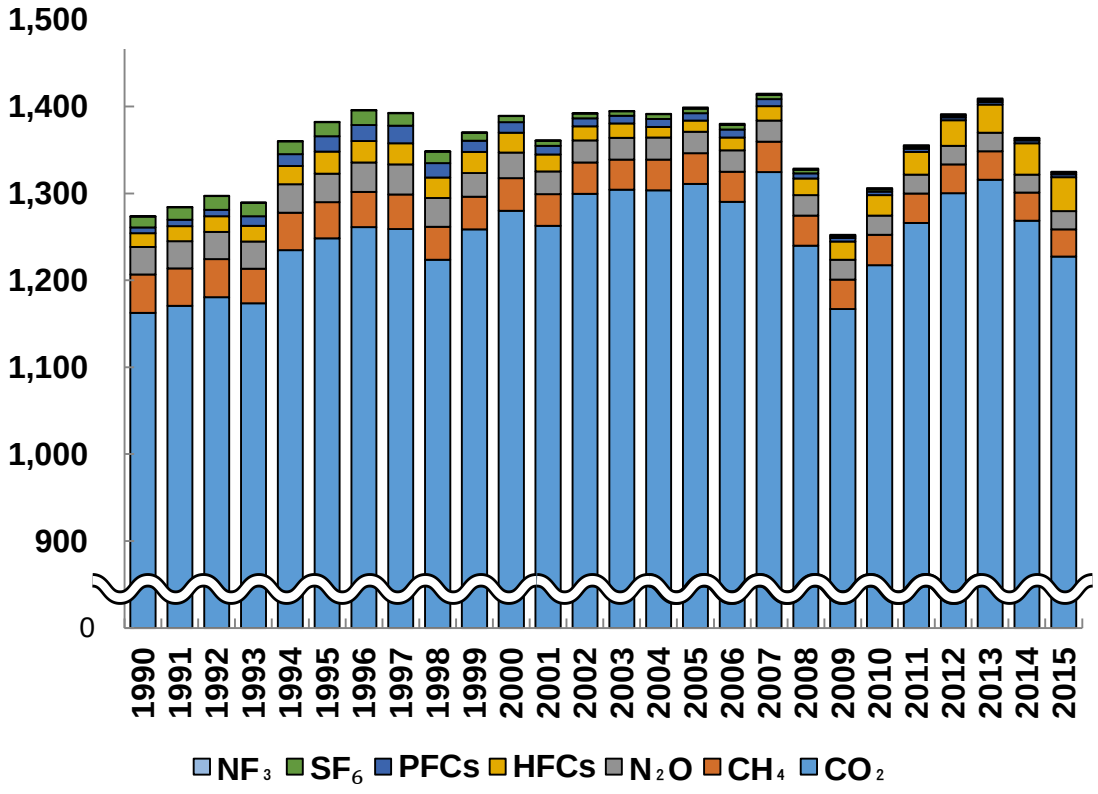
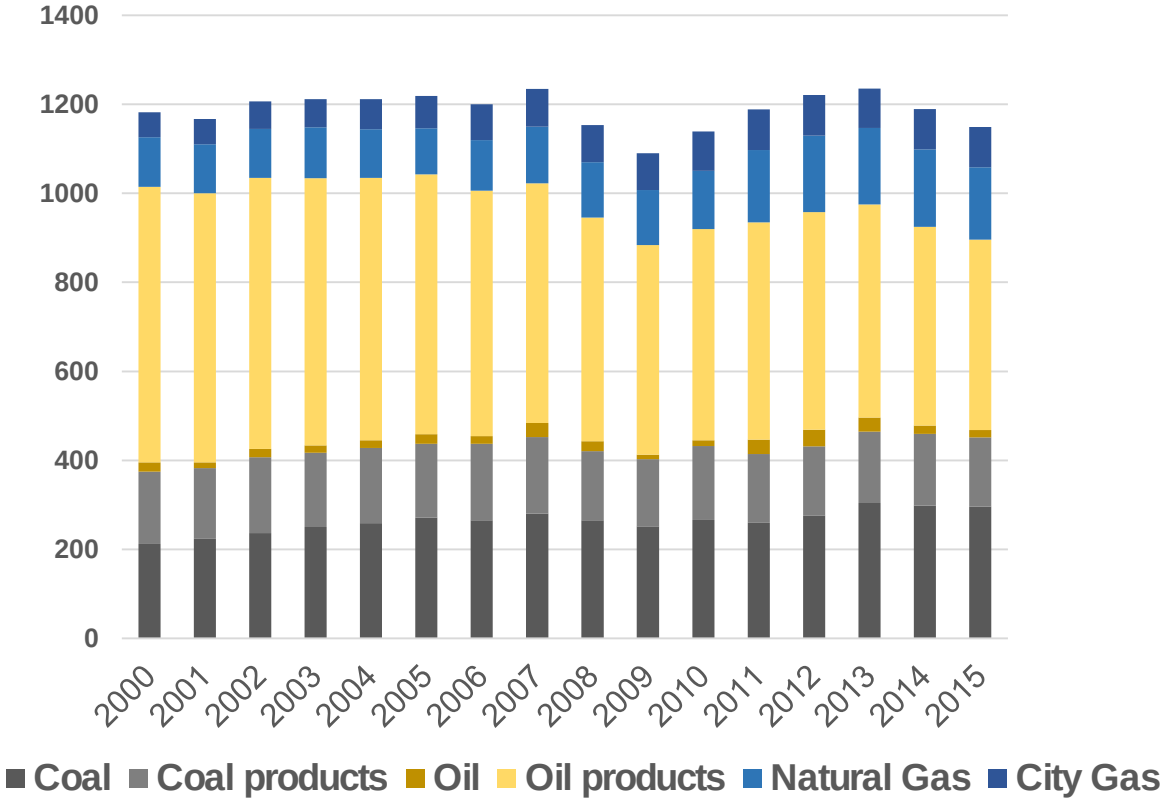
GHG emissions peaked out?

But not so drastic improvement



GHG Emissions in Japan (FY1990-2015)

Source: National Greenhouse Gas Inventory Report of JAPAN (2017)



CO2 Emissions by Fuel Type

Source: National Greenhouse Gas Inventory Report of JAPAN (2017)

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2. Policy status and its challenges in Japan

2-1 Japan's policy targets and current status

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Japan's Target

		Current
GHG reductions		
26~28% reductions by 2030	(2005 base)	-5.3% (2015)
80%	by 2050	
Zero emission power sources		
Renewables	22~24%	15%(2016)
Nuclear	22~20%	2%
Energy Efficiency	330 mil.kl	350 mil.kl
35% improve (with 1.7% economic growth)		

Japan’s energy mix for electricity in 2030

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- Renewables approx. 22～24%
- Nuclear approx. 20～22%
- LNG thermal approx. 27%
- Coal thermal approx. 26%
- Oil thermal approx. 3 %

Still pursue the “Base load” concept

Need ambitious targets for renewables

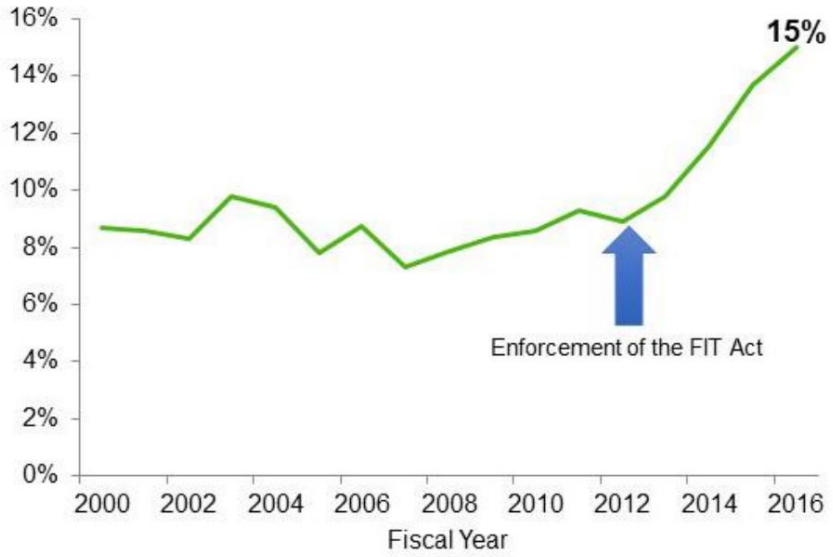
Unrealistic target for nuclear

Coal dependency

2-2 Policy for renewables: For further expansion

Feed in Tariff (2012-)

⇒ increasing deployment, cost down, industrial growth



Challenges

- PV> Biomass > Wind
- Still relatively high cost
- Misleading operation rules

--unlimited curtailment, registration

⇒Improving FIT system

Electricity system reform and other policy reforms

2-3 Coal Issue: New coal power plant development

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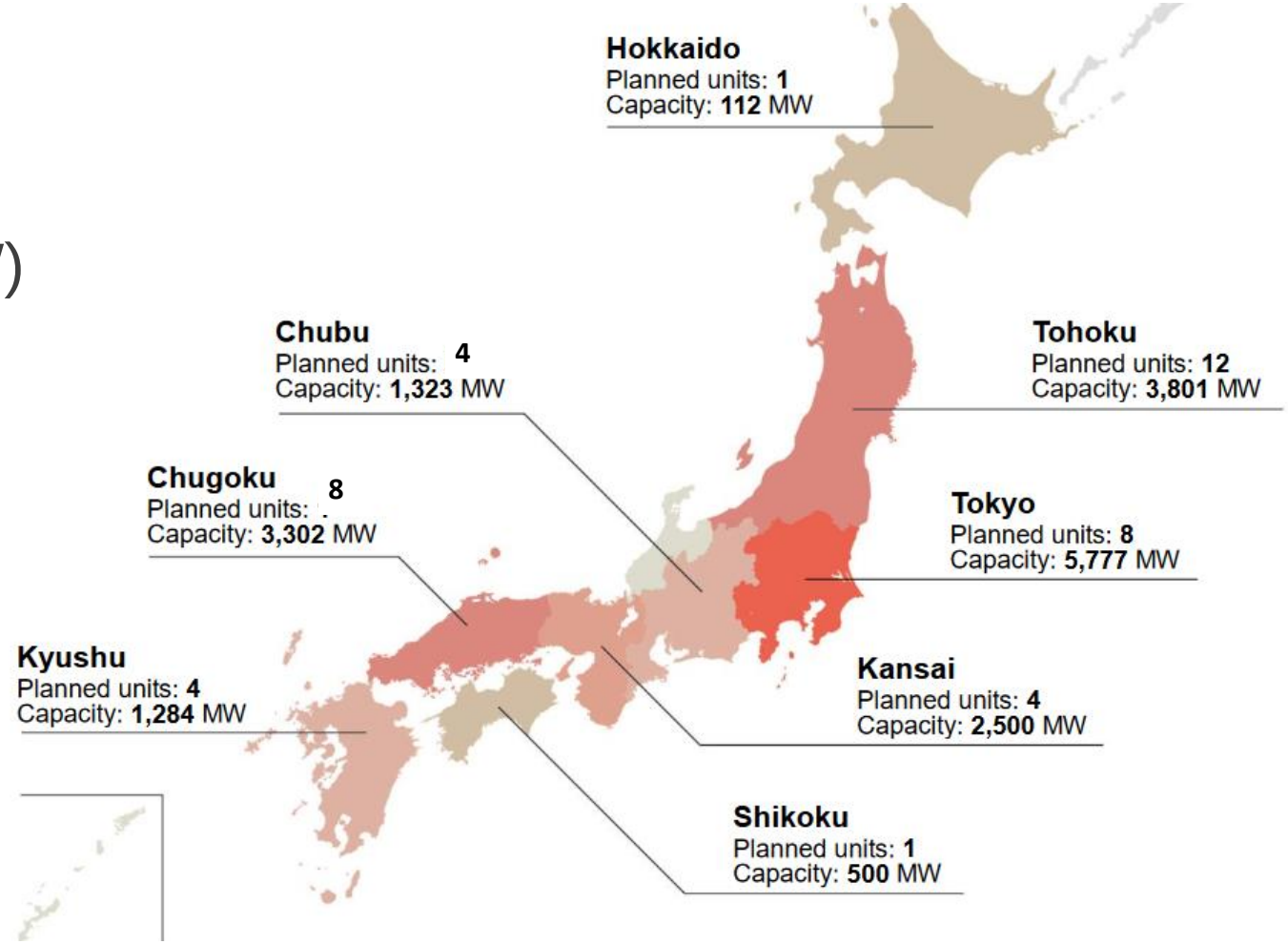
42 projects, 18.6GW as of SEP 2017

STATUS

- 3 in operation (about 390MW)
- 14 under construction (5,310MW)
- 2 finished EIA process (225MW)
- 23 under EIA (12,700MW)
- 3 cancellation (2,300MW)



REI publication on highlighting coal business risk

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Business Risks of New Coal-fired Power Plant Project in Japan (2017) –The decline in capacity factor and its effect on the business feasibility

Status change after 2011

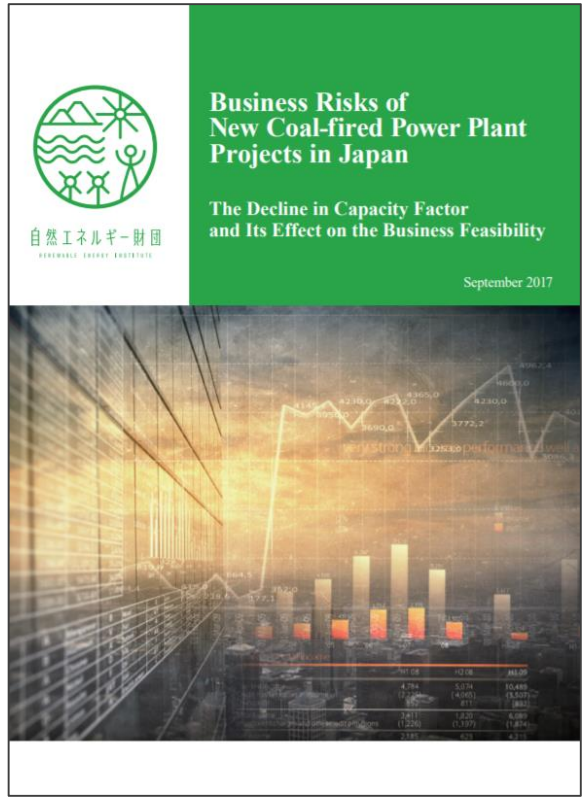
- Electricity demand decrease
- Rapid expansion of renewables
- Drastic decrease of nuclear power supply

Future Capacity factor for coal plants

- REI's estimation: 56% in 2026
- Projection by JGV/OCCT: 69% in 2026

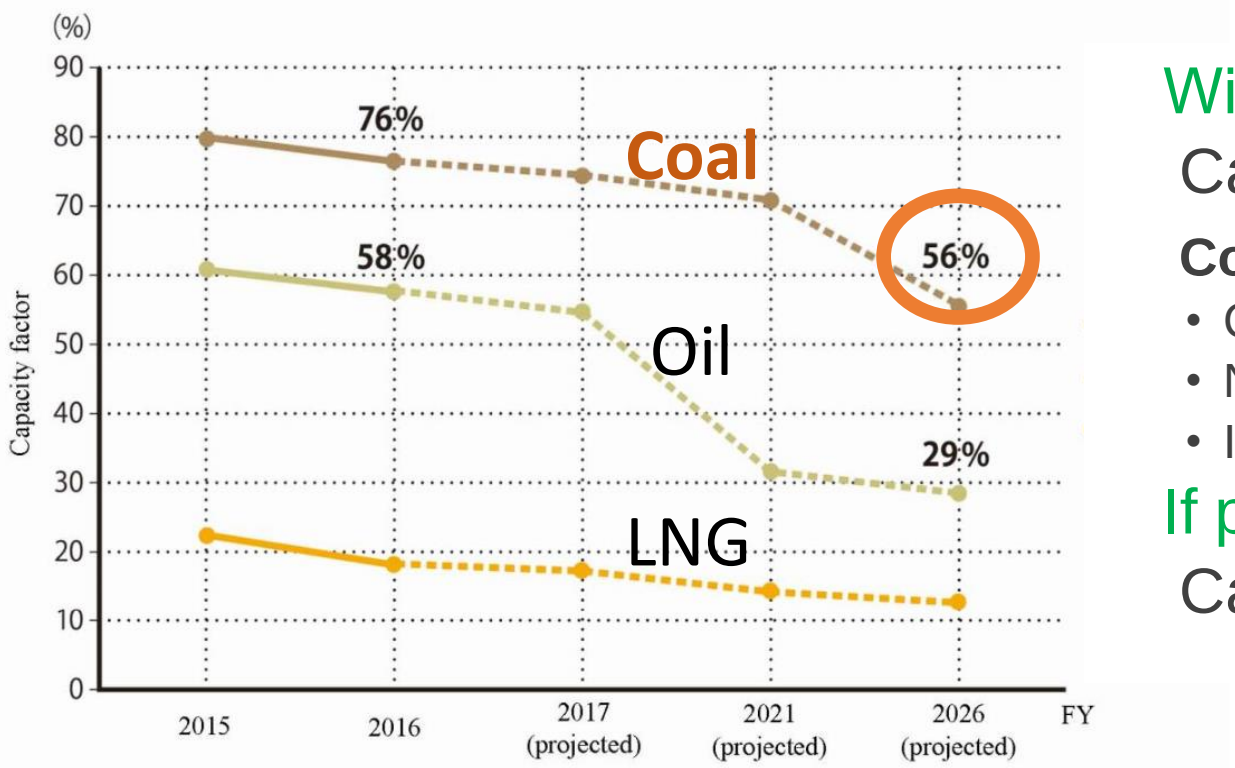
Business risk on coal investment

- Low capacity factor
- Corporate trends & Global policy trends



Business risk on coal investment

Capacity Factor of Thermal Power: REI's estimation



Estimated capacity factor of thermal power
Estimated by Renewable Energy Institute

With all 42 new coal plants…

Capacity factor drop to 56%

Conditions

- Current electricity demand level remain
- Nuclear; 10% (1/2 of Gov't Plan)
- Increase of PV based on current pace growth (RTS)

If power demand declines by 5%...

Capacity factor drop to 49%

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3. Low Carbon Development: in Building Sector

Policy development in building sector

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Enhance the Energy Code Mandate

Energy performance mandate (2017~)

2016 new code

Expand Top Runner Regulations

Building equipment, Home appliances

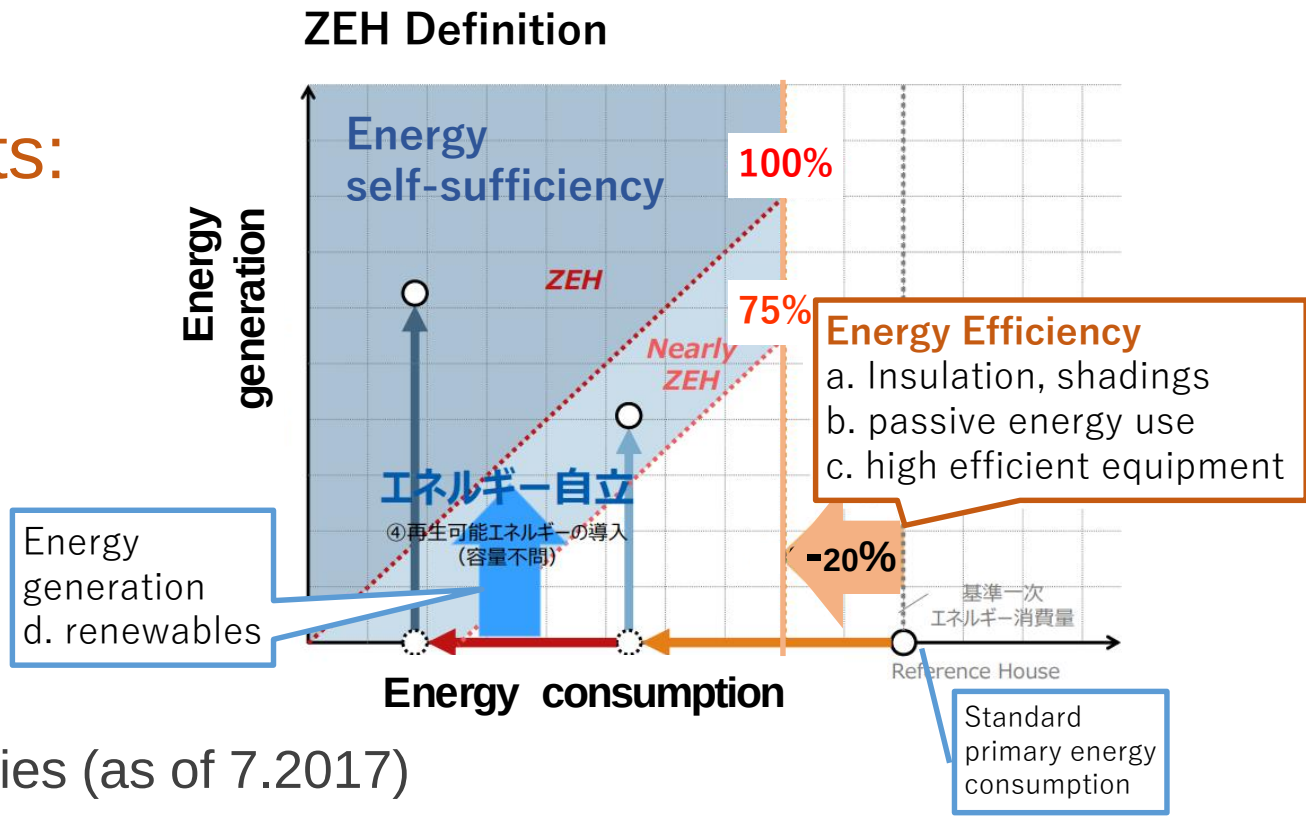
⇒Building materials, housing units

Policy development in building sector

Zero Emission House (ZEH) Targets:

By 2020 1/2 of new detached houses

By 2030 Average new houses



ZEH Roadmap

ZEH Builder Program

ZEH builder registration: about 6000 companies (as of 7.2017)

Prerequisite for subsidy program

Require builders to set own target ⇒aggregate to the national target

Capacity building and information/technology dissemination

Subsidy program

Large scale subsidy program⇒to more than 12,000 houses in FY2016

Zero Emission Buildings

100%

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Zero Emission Building Targets:

By 2020 new public buildings = ZEB

By 2030 Average new buildings =ZEB

ZEB Roadmap

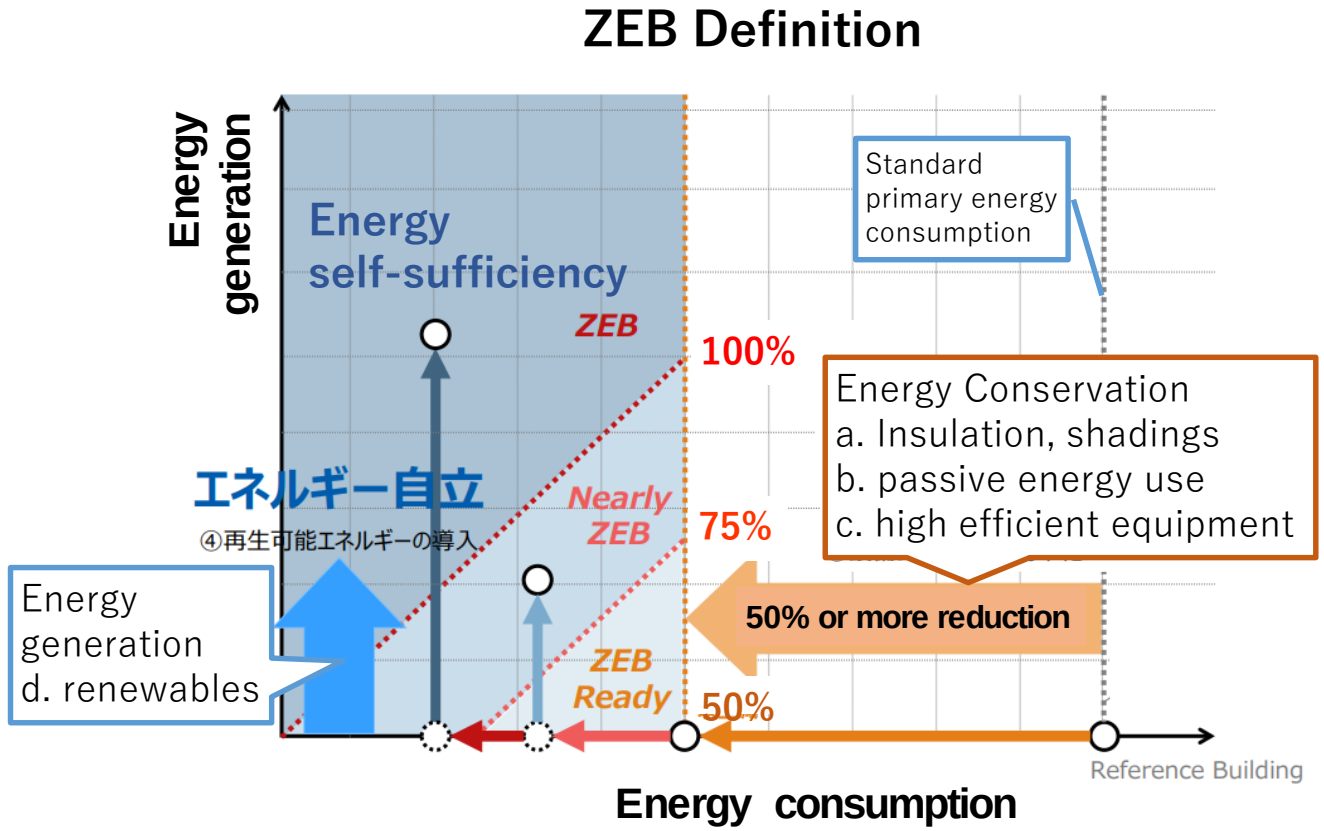
ZEB definition

(allow without on-site renewables)

ZEB design guideline

Subsidy program

Large scale subsidy program



Policy development in local governments

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Green building rating for new buildings

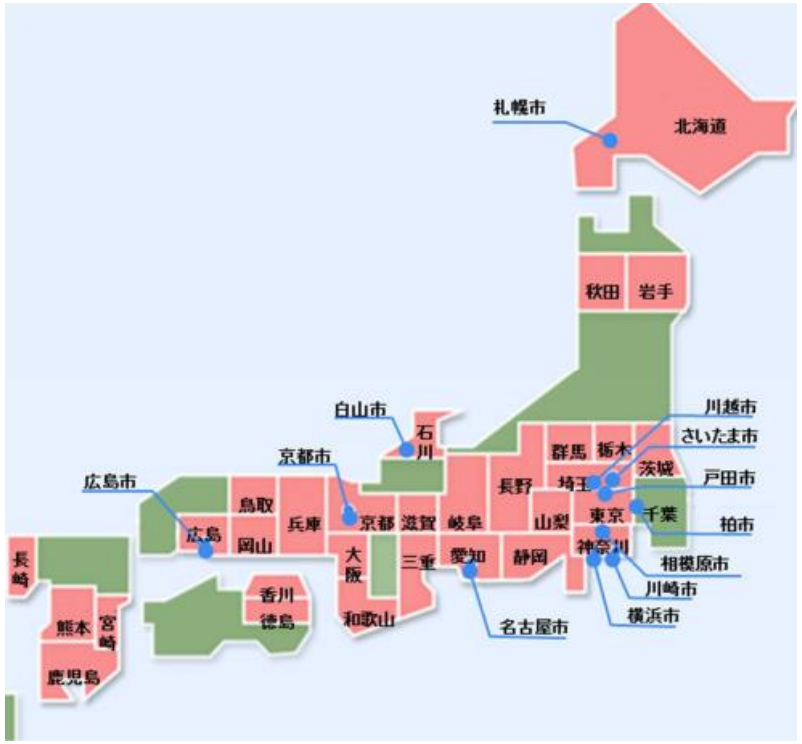
27 local governments (2002~)

CO2 emission reporting program for existing buildings

31 prefectural level governments and 12 cities

Cap and Trade Program Covers Building Sector

Tokyo Metropolitan and Saitama prefecture



Colored 31 prefectures are implementing CO_2 emission reduction reporting program covering existing buildings/facilities

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Paradigm Shift in Energy

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