Challenges for renewables in Japan

2019 18. Dec

New Energy and Industrial Technology Development Organization
Smart Community Department
Director General
Kazuhiko Muto

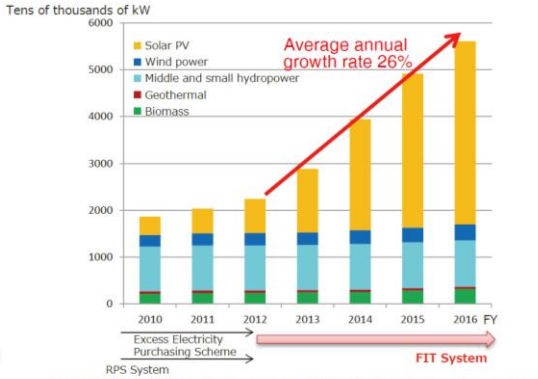
Renewable Energy in Japan

Current State of Renewable Energy

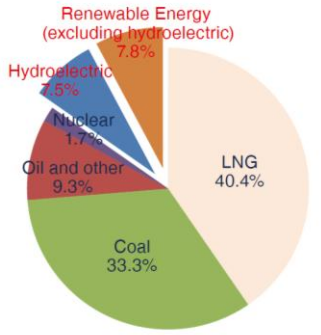
Renewable energy currently accounts for 7.8% of total power generation in Japan (as of FY 2016, excluding hydro electric).

Introduction Target in 2030

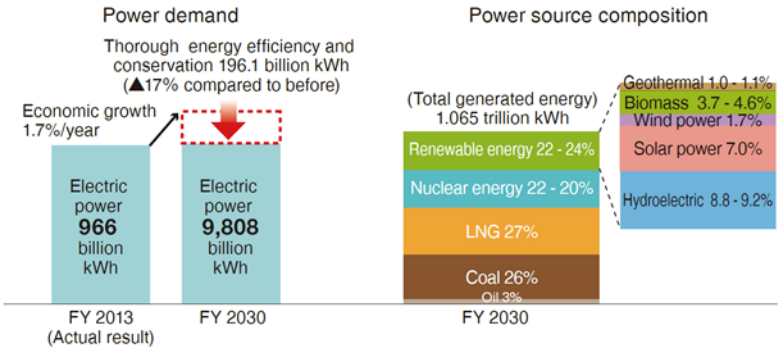
Renewable energy source is supposed to be increased to 22 - 24% by 2030.



Installed capacity of power generation from renewable energy sources(excluding large-scale hydroelectric)



Composition of power generation by energy source in Japan (FY 2016)



The Power source composition in FY2030 based on Long-term Energy Supply and Demand Outlook
Source: Ministry of Economy, Trade and Industry (METI)

Source: Information material provided by the Committee on Energy Efficiency and Renewable Energy of The Advisory Committee for Natural Resources and Energy, METI

Japan's recent Energy Policy Document

5th Strategic Energy Plan (2018)

Integration of 22~24% Renewable Energy

- RE (PV・Wind・Geothermal・Hydro・biomass)
- Hydrogen
- Grid integration..

Energy Innovation Strategy (2016)

~2030

Strategy for Energy mix

National Energy & Environment Strategy for Technological Innovation towards 2050 (2016)

~2050

Energy Saving

- Production process
- Structural material

Energy Storage

- Storage battery
- Hydrogen

Energy generation

- PV
- Geo-Thermal

Usage & capture

- CCUS

PV and Wind

Renewable Technology for Photovoltaics

Innovative solar cells

- triple-junction compound solar cell that has achieved the world's highest conversion efficiency of 31.17% in a solar cell module.

PV-powered vehicle

- light-weight and high-efficiency solar cell module proposed a PV-powered vehicle.

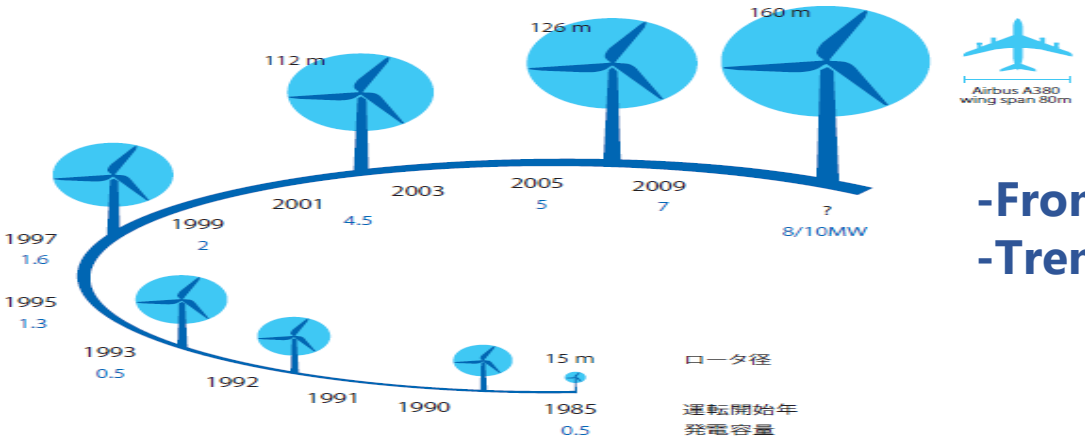


the module with both lightweight and flexibility



the PV-powered vehicle

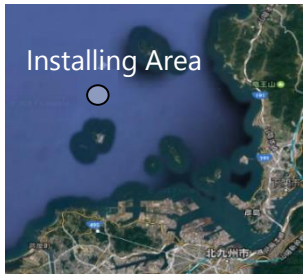
Renewable Technology for Wind-power



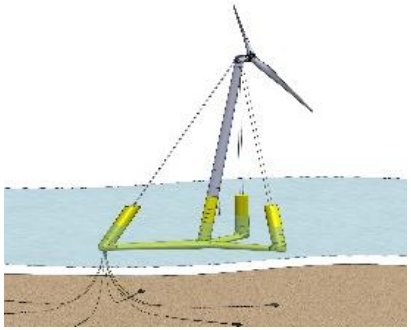
-From Onshore to Offshore
-Trend of Further Increase in Scale

Next Generation Floating Offshore Wind Power System Demonstration





Turbine: 2 blades upwind
Rated Power: 3MW
Rotor diameter: 100m
Height: 72m
Floater: Barge type (Steel)
51m×51m×10m



Turbine: 2 blades upwind
Rated Power: 6MW
Floater: Semi-submarine type (Steel)

Hydrogen

Hydrogen Strategic Road map

		Goals in the Basic Hydrogen Strategy		Set of targets to achieve	
Use	Mobility	FCV 200k by 2025 800k by 2030	2025	● **Price difference between FCV and HV**	(¥3m → ¥0.7m)
				● **Cost of main FCV system**	FC ¥20k/kW → ¥5k/kW Hydrogen Storage ¥0.7m → ¥0.3m
		HRS 320 by 2025 900 by 2030	2025	● **Construction and operating costs**	Construction cost ¥350m → ¥200m Operating cost ¥34m → ¥15m
				● **Costs of components for HRS**	Compressor ¥90m → ¥50m Accumulator¥50m → ¥10m
		Bus 1,200 by 2030	Early 2020s	● Vehicle cost of FC bus	(¥105m → ¥52.5m)
		※In addition, promote development of guidelines and technology development for expansion of hydrogen use in the field of FC trucks, ships and trains.			
	Power	Commercialize by 2030	2020	● Efficiency of hydrogen power generation	(26%→27%) ※1MW scale
	FC	Early realization of grid parity	2025	● Realization of grid parity in commercial and industrial use	
Supply	Fossil Fuel +CCS	Hydrogen Cost ¥30/Nm3 by 2030 ¥20/Nm3 in future	Early 2020s	● Production: Production cost from brown coal gasification	(¥several hundred/Nm3→ ¥12/Nm3)
				● Storage/Transport : Scale-up of Liquefied hydrogen tank	(thousands m³→50,000m³)
				Higher efficiency of Liquefaction	(13.6kWh/kg→6kWh/kg)
	Green H2	System cost of water electrolysis ¥50,000/kW in future	2030	● Cost of electrolyzer	(¥200,000m/kW→¥50,000/kW)
				● Efficiency of water electrolysis	(5kWh/Nm3→4.3kWh/Nm3)

Power to gas and international supply chain

International H_2 Supply Chain

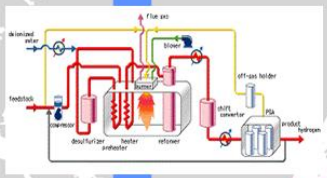
Japan-Brunai Pilot Project

2020～ AHEAD

Off-gas



Steam Methane Reforming



Hydro-genation*
(TOL→MCH)



Chemical Tanker



Dehydro-genation*
(MCH→TOL)



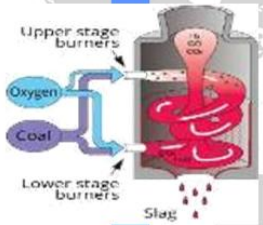
Japan-Australia Pilot

2020～ HySTRA

Brown Coal +CCS



Gasification



Liquefied H_2 Carrier*



Loading Facility*



Power-to-gas

Fukushima Renewable H_2 Project

2020～ FH2R



Power-to-Gas Plant*



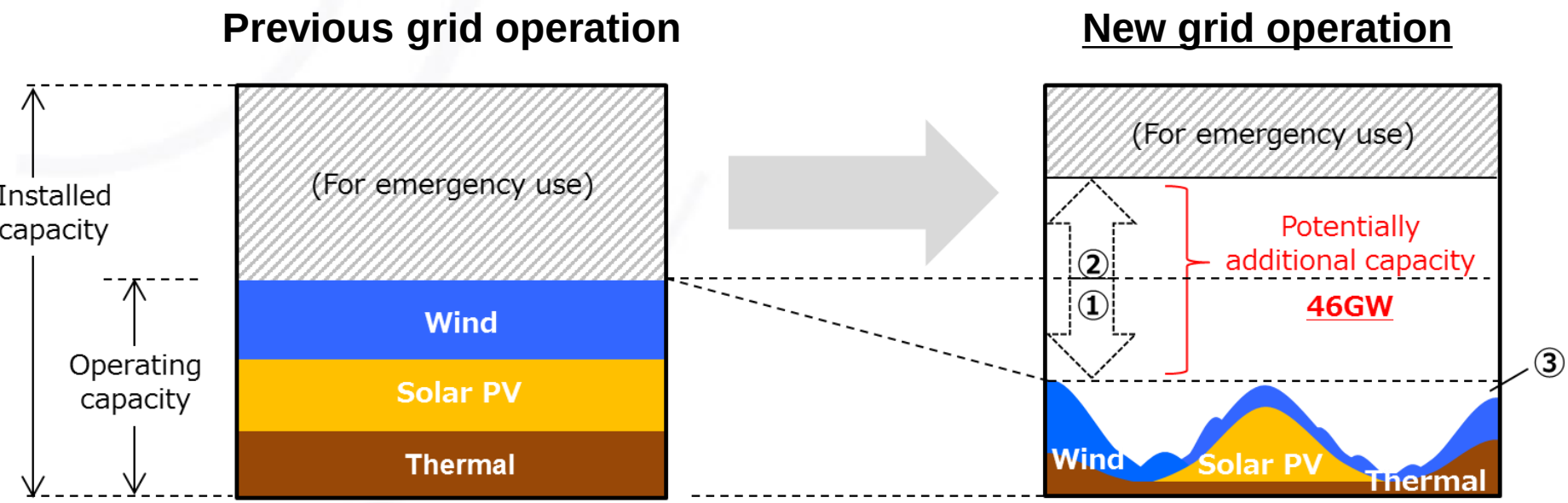
Electrolysis System (Alkaline)

TOKYO 2020 TOKYO 2020



Grid integration

Maximum usage of existing grid



① Probabilistic evaluation of each generator
② Release the capacity by inter-tripping in emergency condition
③ Grid access with the conditions of curtailment

Thank you