Japanese New Low-Carbon Energy Strategy under the New Climate Change Regime

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Japan's National Determined Contribution

Emission of 1.042 Billion t-CO2 in FY 2030

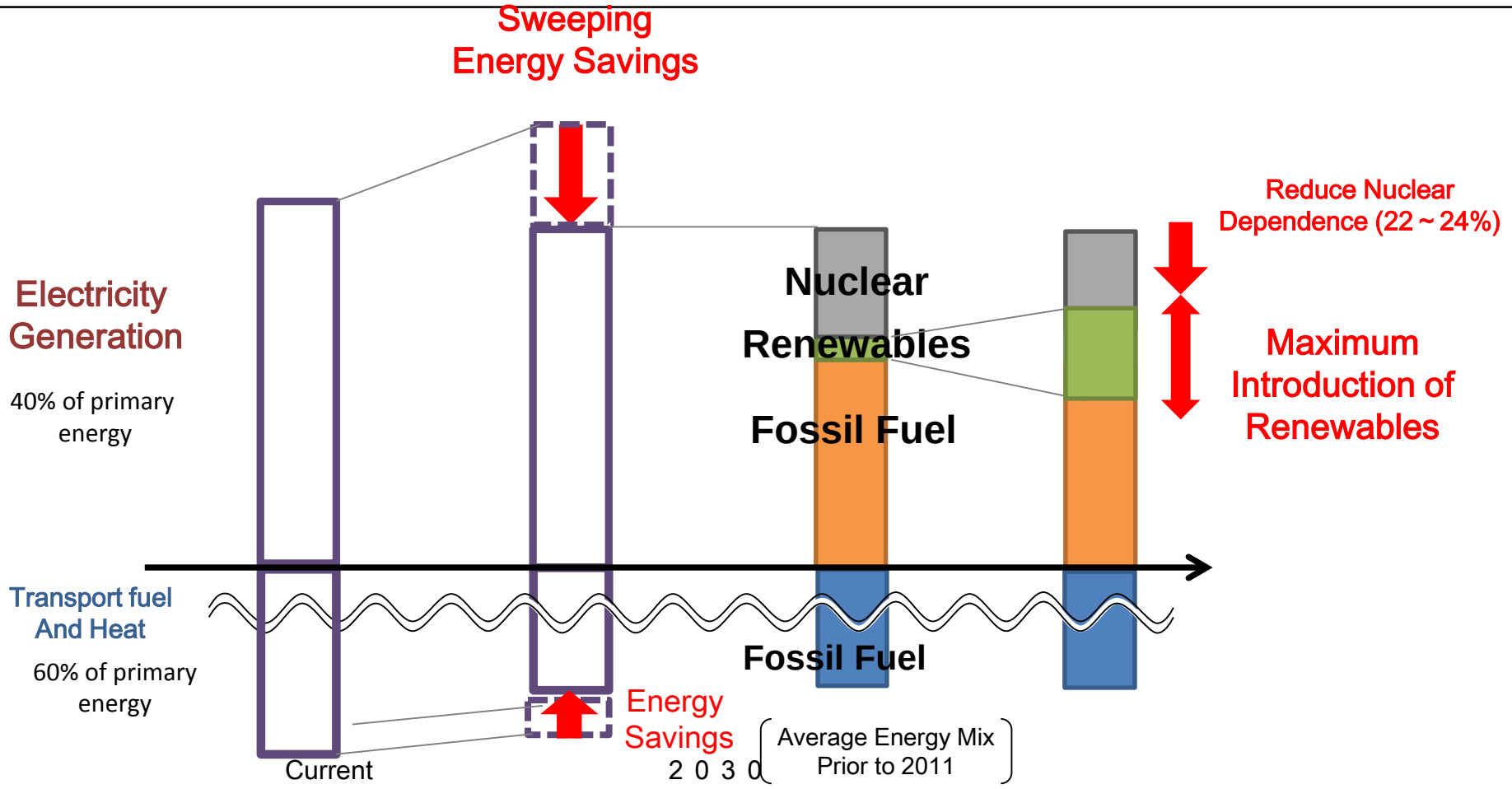
= 26% reduction from FT2013 and 25.4% reduction from FY2005

Energy related CO2 emission reduction, 24.9% from FY 2013 and 24.0% from FY 2005

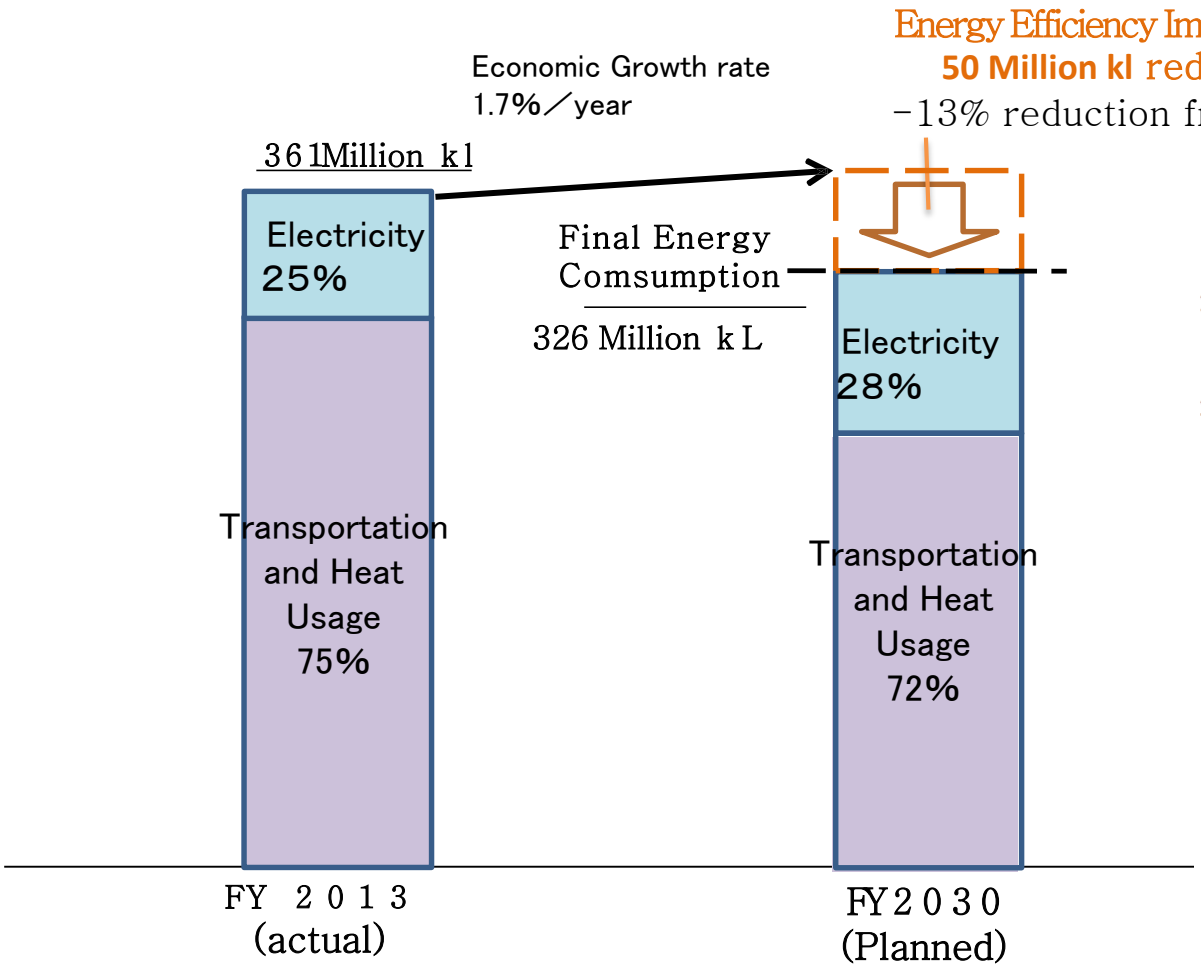
	Estimated emissions of each sector in FY 2030	FY 2013 (FY 2005)
Energy originated CO_2	927	1,235 (1,219)
Industry	401	429 (457)
Commercial and other	168	279 (239)
Residential	122	201 (180)
Transport	163	225 (240)
Energy conversion	73	101 (104)

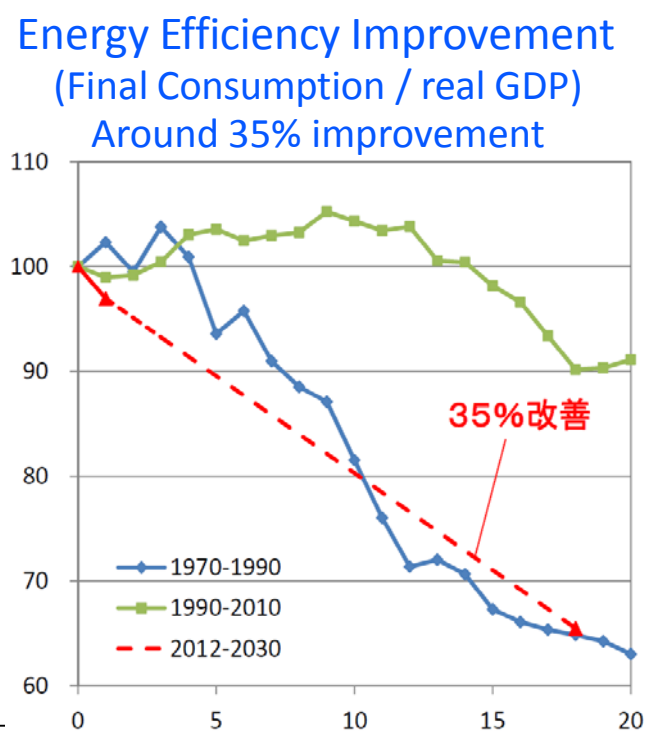
Japanese Energy Policy to realize its NDC

- **<u>Sweeping energy savings</u>**, **<u>maximum introduction of renewable</u>** and improvement of thermal efficiency at power generation to reduce nuclear dependence
- Maximum introduction of renewable at minimum consumers' burden



Ambitious Energy Savings Plan





Measures and Energy Saving Potential by Sector

Achieve 50.3 million kL of energy savings by 2030 with the various measures deployed across the sector

Industry <▲10.42 million kL>

- Energy-intensive industry (iron/steel, chemical, cement, paper/pulp)
  - Voluntary agreement
- Energy management
  - IT technology and energy management
- Innovative technology
  - COURSE50 (CO_2 Ultimate Reduction in Steelmaking process by Innovative technology for cool Earth 50)
  - Use of CO2 as feedstock
- Advanced EE technology
  - boiler, cogeneration

Transport <▲16.07 million kL>

- Next generation vehicles, fuel economy improvement
  - next generation vehicles to represent 1unit /2units
  - more than 100,000 fuel cell vehicles to be sold annually
- Traffic stream management

Commercial <▲12.26 million kL>

- Building EE improvement
  - Large-scale buildings' compliance on EE standards
- LED and OEL diffusion
- BEMS and energy management
  - half of buildings to install BEMS
- Awareness promotion

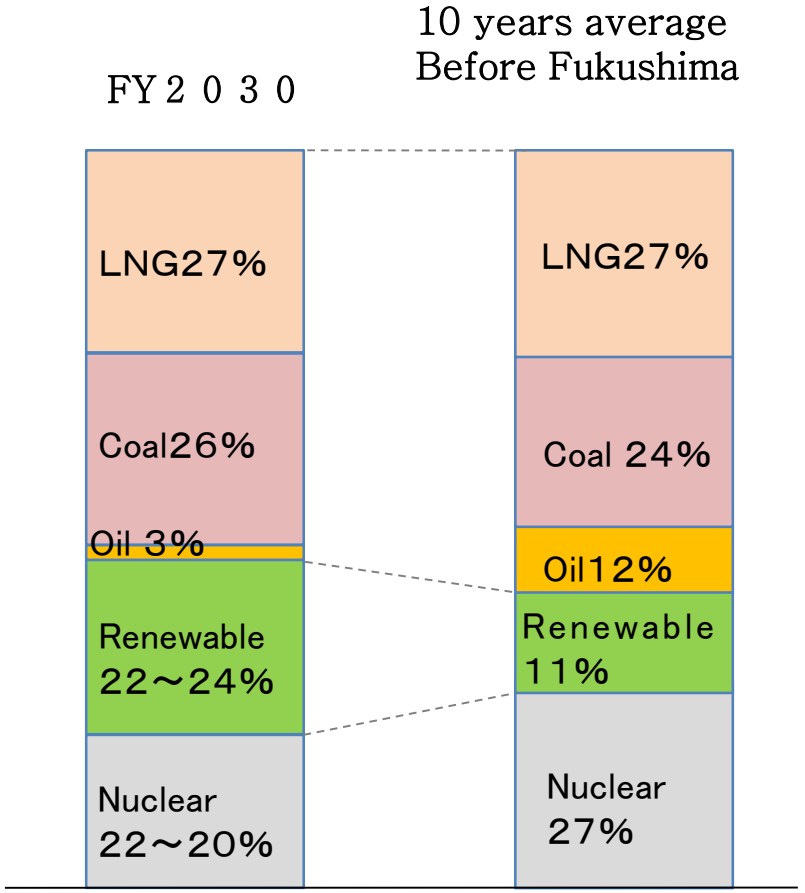
Residential <▲11.60 million kL>

- Building EE improvement
  - Residential buildings' compliance on EE standards after 2020
- LED and OEL diffusion
- HEMS and Energy management
  - all residential households to introduce the system
- Awareness promotion

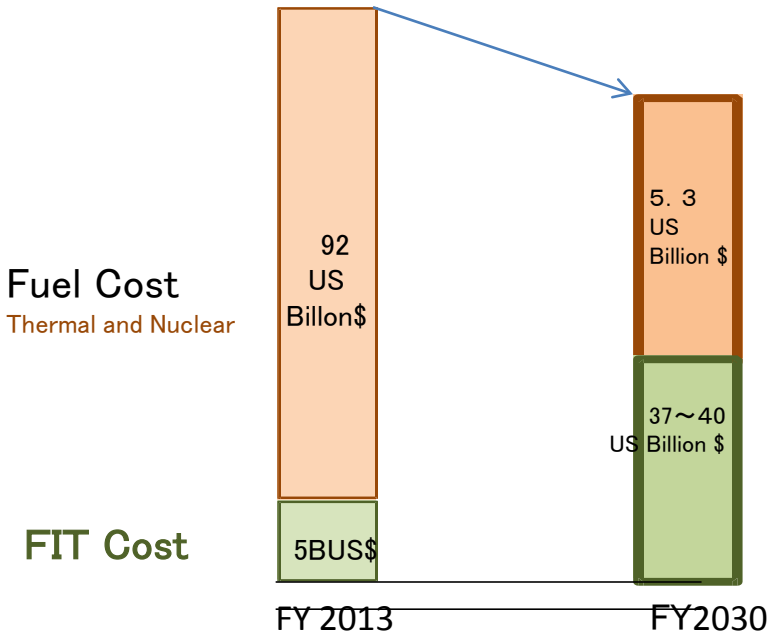
Power Supply configuration
(Power Generation GWh)

	FY2030	
Oil	315	3%
Coal	2,810	26%
LNG	2,845	27%
Nuclear	2,317～2,168	22～20%
Renewables	2,366～2,515	22～24%
Total	10,650	100%

Solar	749	7.0%
Wind	182	1.7%
Geothermal	102～113	1.0～1.1%
Hydro	939～981	8.8～9.2%
Biomass	394～490	3.7～4.6%

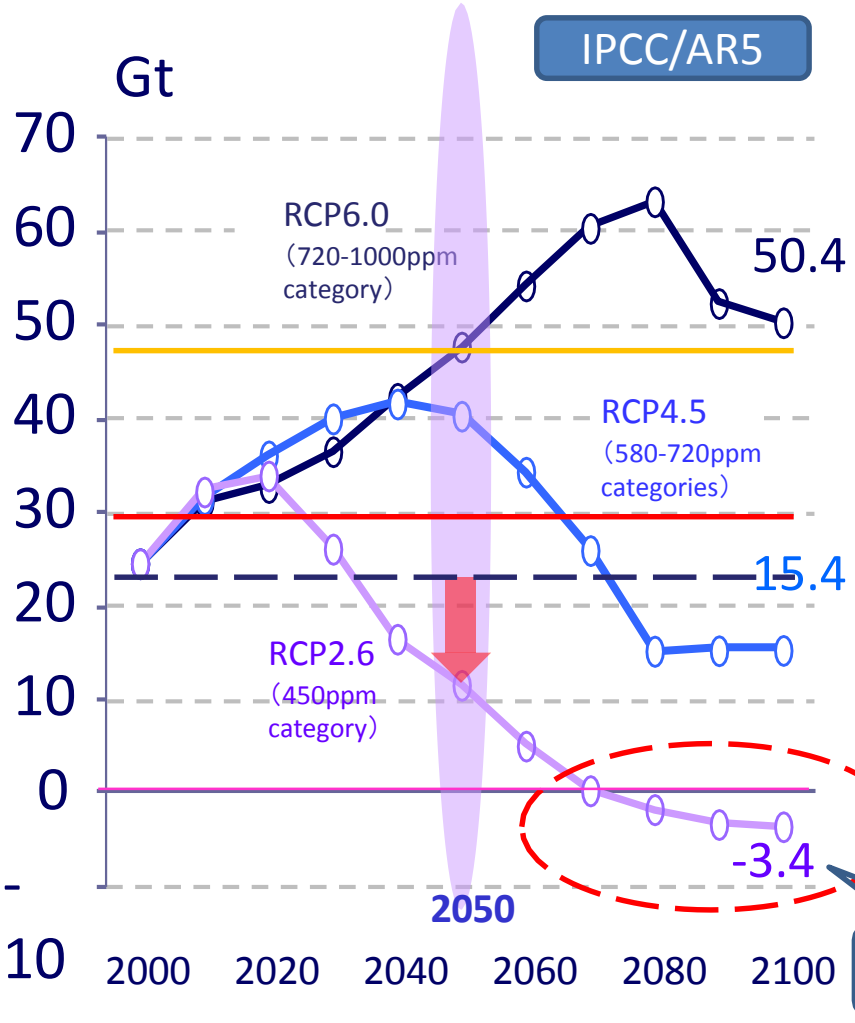


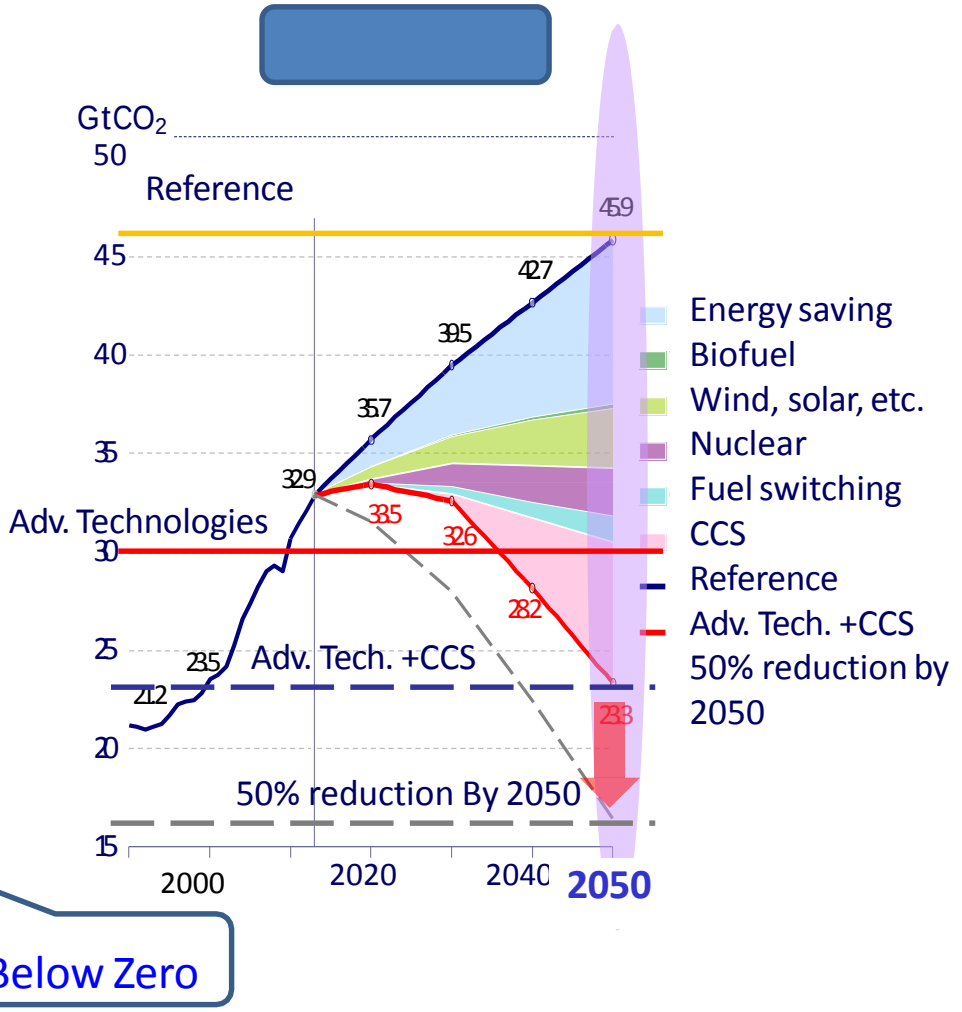
FIT is major tool to enhance Renewables but it is costly



	Power Generation	FIT Cost US Billions $
Geothermal	10.2～11.3TWh	1.7～2.0
Hydro	93.9～98.1TWh	1.9～2.9
Biomass	39.4～49.0TWh	6.3～8.3
(sub-total)	143.5～158.4TWh	10.0～13.1
Wind	18.2TWh	4.2
Solar	74.9TWh	23.0
(sub-total)	93.1TWh	27.2
(Total)	236.6～251.5TWh	37.2～40.4

Comparison of CO2 Emission Pass between AR5 and IEEJ Outlook





※Calculated using MAGICC 6.0
Meinshausen, M., S. C. B. Raper and T. M. L. Wigley (2011). "Emulating coupled atmosphere-ocean and carbon cycle models with a simpler model, MAGICC6: Part I – Model Description and Calibration." Atmospheric Chemistry and Physics 11: 1417-1456.

The Climate Sensitivity and its impact to CO2 emission path (History of Climate sensitivity in IPCC reports)

IPCC Report	Published in	Climate sensitivity	Best estimate
1st Assessment R.	1990	1.5 – 4.5 °C	2.5 °C
2nd Assessment R.	1995	1.5 – 4.5 °C	2.5 °C
3rd Assessment R.	2001	1.5 – 4.5 °C	2.5 °C
4th Assessment R.	2007	2.0 – 4.5 °C	3.0 °C
5th Assessment R.	2014	1.5 – 4.5 °C	Not shown

Although no consensus about climate sensitivity within WG1/AR5, WG3/AR5 used 3.0℃ as climate sensitivity to conduct analysis

Impact of different Climate Sensitivity to possibility of below 2℃ scenario

	Climate Sensitivity 3.0℃ Case				
RCP Scenario	Concentration of GHG		Overshoot of Concentration of GHG	Temperature Increase at the end of 21st Century	
				10%～90%Confidencial	Possibility of below 2℃
RCP2.6	**450ppm** (430–480ppm)		○	1.5–1.7℃ (1.0-2.8℃)	66%–100%
New Scenario added by IPCC WG3	**500ppm** (480–530ppm)		×	1.7–1.9℃ (1.2-2.9℃)	50%–100%
			○	1.8–2.0℃ (1.2-3.3℃)	33%–66%
	550ppm (530–580ppm)		×	2.0–2.2℃ (1.4-3.6℃)	0%–50%
			○	2.1–2.3℃ (1.4-3.6℃)	
RCP4.5	580–720ppm	580–650ppm	×	2.3–2.6℃ (1.5-4.2℃)	
		650–720ppm		2.6–2.9℃ (1.8-4.5℃)	Below 33%
RCP6.0	720–1000ppm			3.1–3.7℃ (2.1-5.8℃)	

	Climate Sensitivity 2.5℃ Case				
RCP Scenario	Concentration of GHG		Overshoot of Concentration of GHG	Temperature Rise at the end of 21st Century	
				10%～90%Confidencial	Possibility of below 2℃
RCP2.6	**450ppm** (430–480ppm)		○	1.3–1.4℃ (0.8-2.3℃)	66%–100%
New Scenario added by IPCC WG3	**500ppm** (480–530ppm)		×	1.4–1.6℃ (1.0-2.7℃)	
			○	1.5–1.7℃ (1.0-2.8℃)	
	550ppm (530–580ppm)		×	1.7–1.8℃ (1.2-3.0℃)	50%–100%
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RCP4.5	580–720ppm	580–650ppm	×	1.9–2.2℃ (1.3-3.5℃)	0%–50%
		650–720ppm	×	2.2–2.4℃ (1.5-3.8℃)	
RCP6.0	720–1000ppm		×	2.6–3.1℃ (1.8-4.8℃)	Below 33%

Conclusions

1. New Japanese Energy Plan is ambitious but not impossible even it is not easy to apply.

2. Most probably Japan need new tool to realize its energy plan and NDC.

3. In case climate sensitivity is below 3℃、
   IEEJ's Advanced Scenario could be one solution to maintain global temperature below 2℃, although it is also very ambitious plan.

50th ANNIVERSARY

Mapping the Energy Future

IEEJ will celebrate its 50th anniversary in June of this year.

IEEJ was evaluated as the world's number 1 in the **energy sector** of the "**Global Go To Think Tank Index**" (published in Jan. 2016) announced every year by the University of Pennsylvania. IEEJ has been ranked top for two years in a row in Asia.

Since the start of the survey, it is the first time for a non-U.S./European research institute to be chosen as the top in the world ranking, based on research field.
(IEEJ was ranked third in the world, and top in Asia, in the 2014 index.)

Ranked 1ST in the WORLD Energy Think Tank

"2015 Global Go To Think Tank Index Report" (p.83)

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