



A Roadmap to a Low-Carbon Society in Japan

Contingency analysis for feasibility of energy pathways

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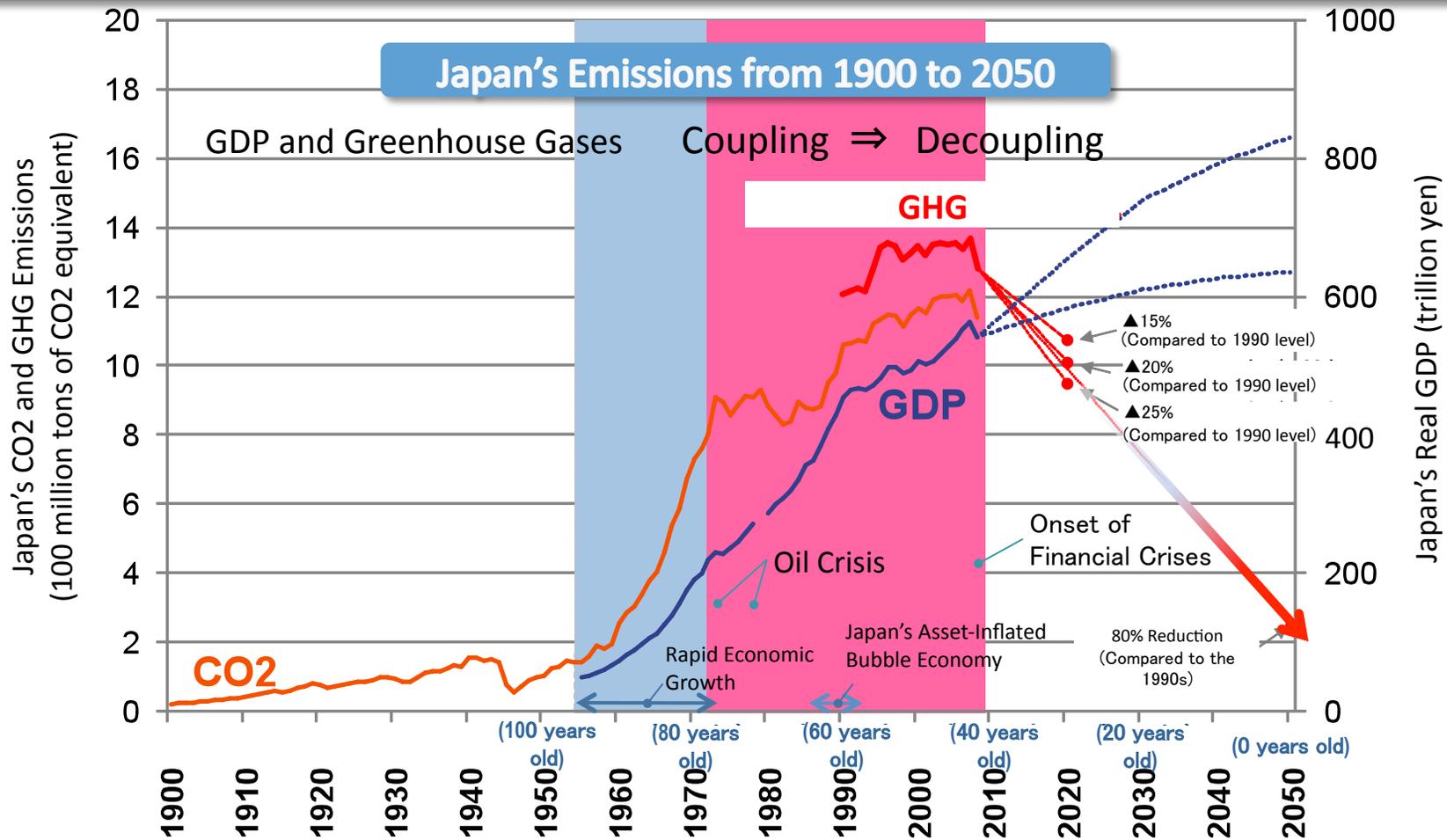
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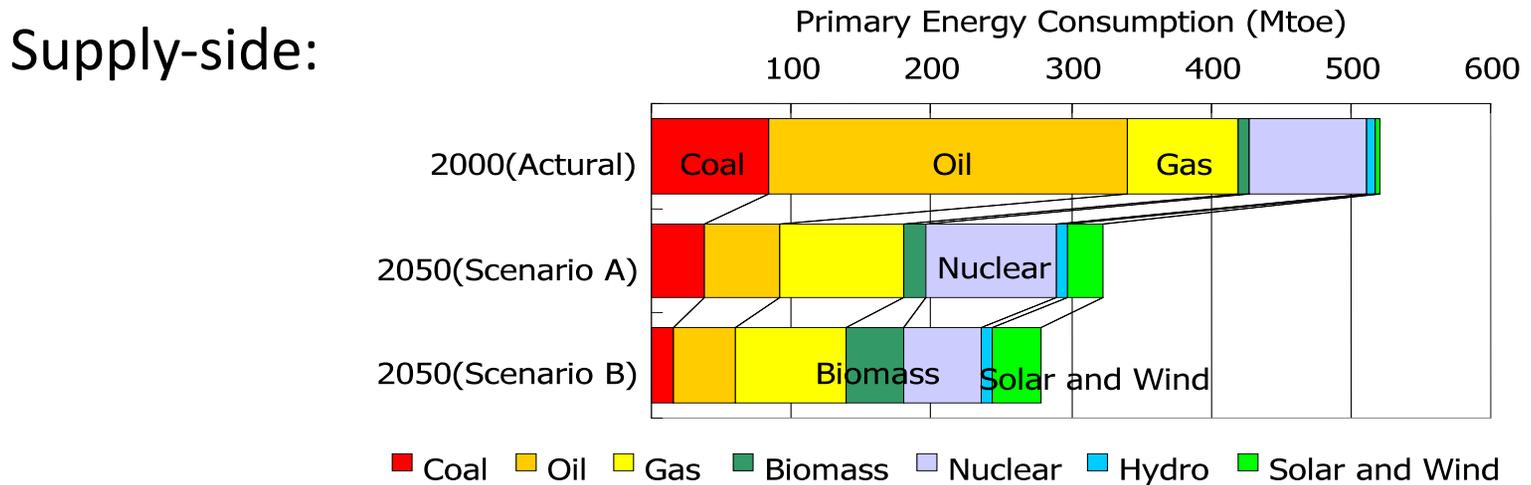
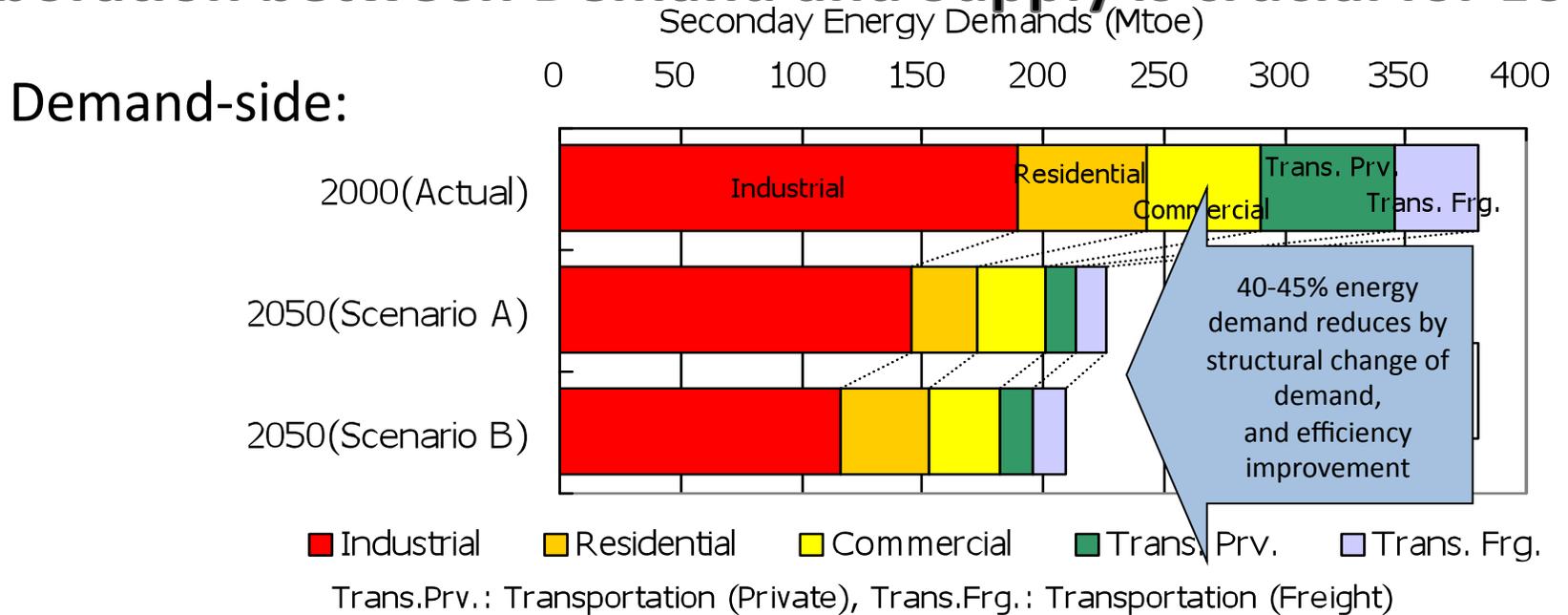
Voyage to a Never-Before-Seen Society

An 80% emission reduction by 2050 will create a largely different society from today. It will be critical to strategically move forward under mid-term 2020 and 2030 targets that take into account this eventual 80% reduction.



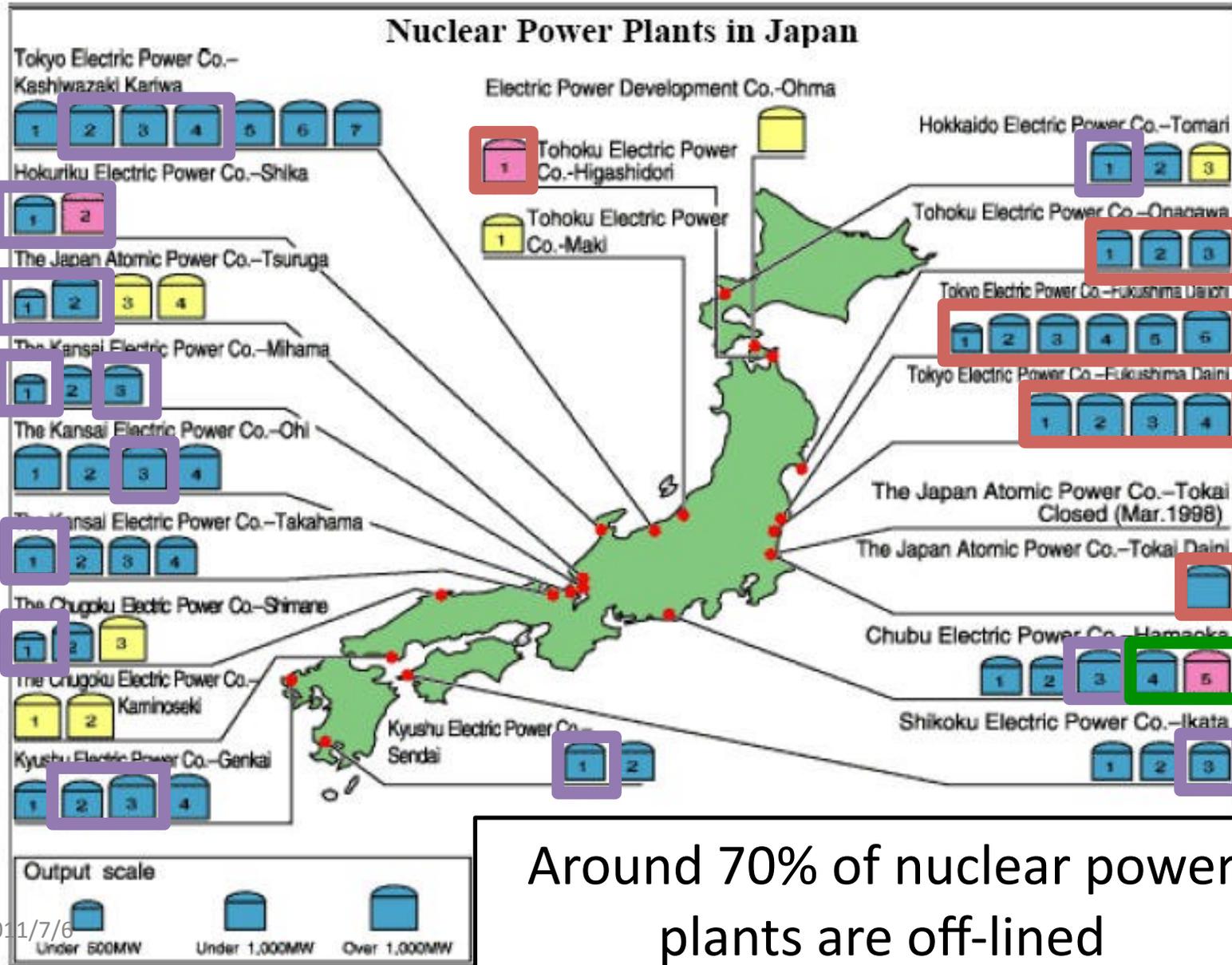
- 1) Parenthesis indicates the age of which persons born in each respective year will be in the year 2050
- 2) Future GDP values are assumed values based on scenarios A and B from the NIES Low Carbon Society Research Project 2050

Collaboration between Demand and Supply is crucial for LCS



In supply-side, CCS, Nuclear and Renewables are indispensable.

15/51 plants are stopped due to the earthquake,
 18/51 for periodical inspection, and 2/51 for political reason



Around 70% of nuclear power plants are off-lined

Need to grow renewables more and more

(Mtoe)

	2005	2050 (Scenario A)	(Compare d to 2005)	2050 (Scenario B)	(Compar ed to 2005)
Photovoltaics	0.3	15.6	520%	18.2	610%
Wind (Onshore/ Offshore)	0.2	6.9	345%	9.3	465%
Biomass	11.2	28.8	260%	32.9	295%
Geothermal	0.3	4.9	165%	4.9	165%
Hydro	16.0	16.5	103%	33.9	215%

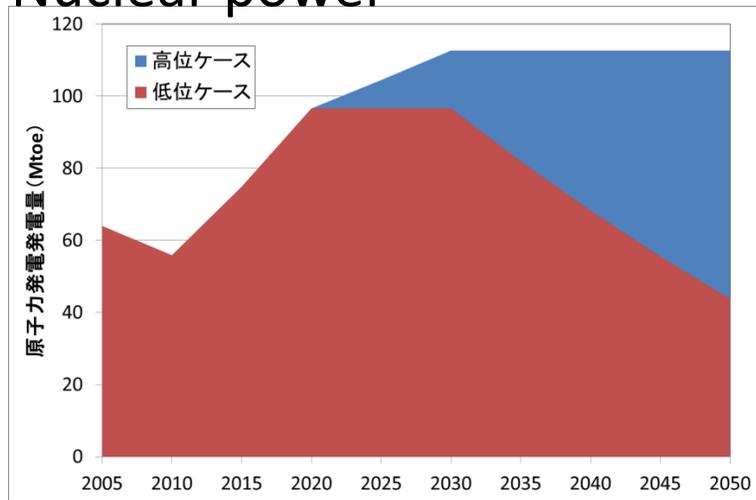
For PV: 31 MW in 1994 -> 1,422 MW in 2005 = 126 MW/yr (ave.)

If installation speed is same as before:

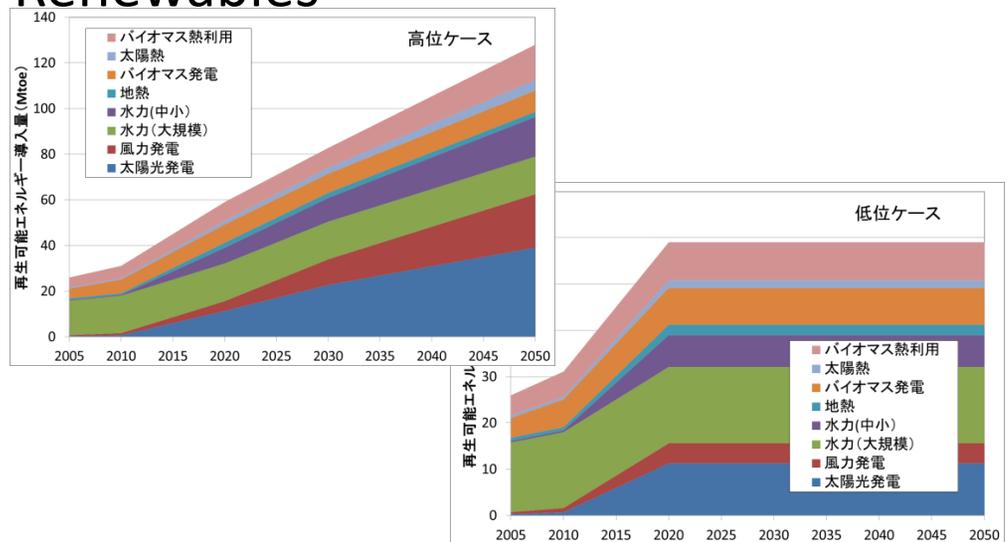
1,422 MW in 2005 -> 7,092 MW in 2050 : 5 times of 2005

If Japan loose one or some energy-supply options, Japan LCS is still feasible target or not?: Contingency analysis

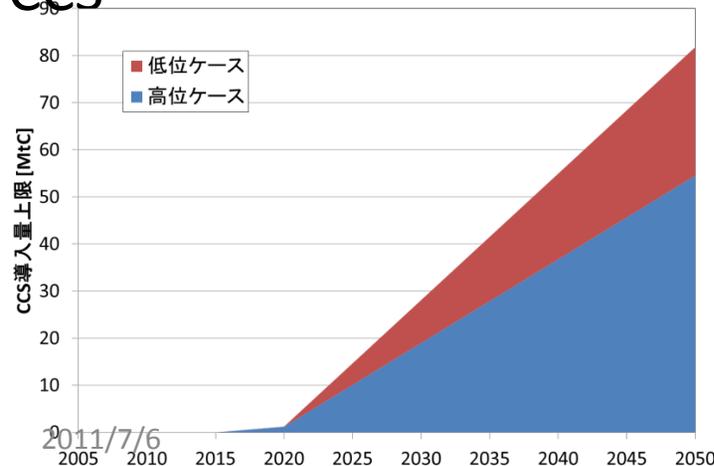
Nuclear power



Renewables



CCS



Contingency plan

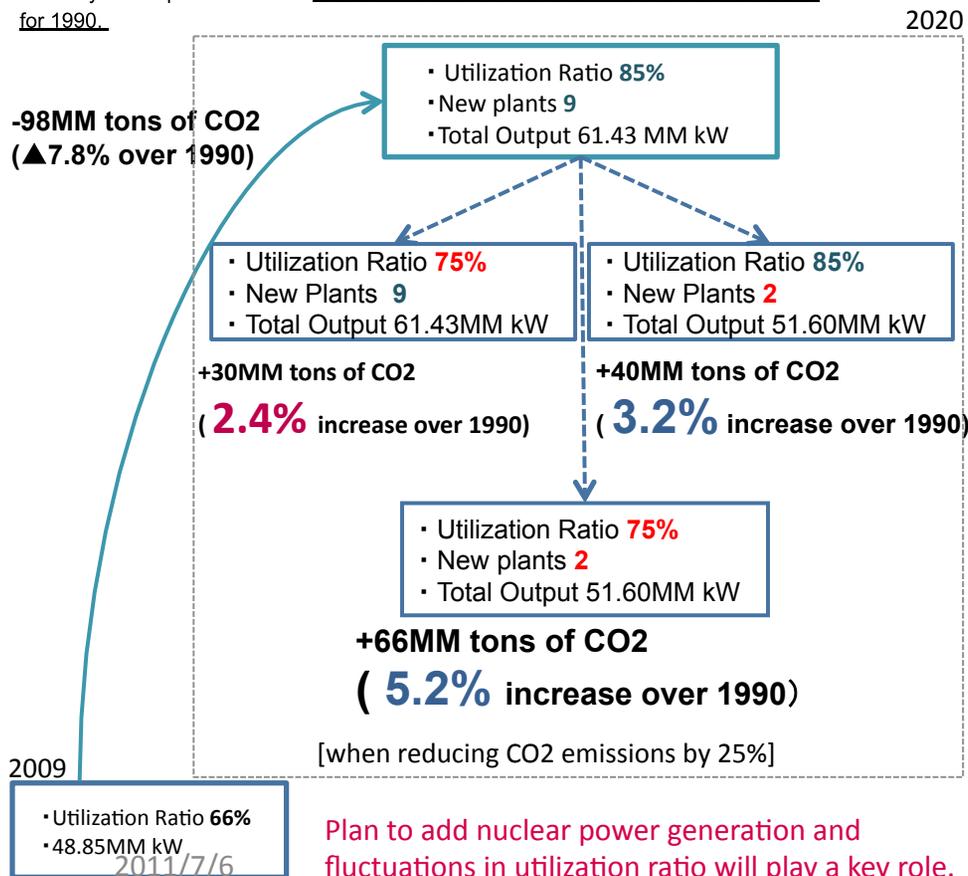
Plan	Nuclear	Renewables	CCS
HHH	High	High	High
LHH	Low	High	High
HLH	High	Low	High
HHL	High	High	Low

Short-term effects on Nuclear power: CO2 emissions in 2020

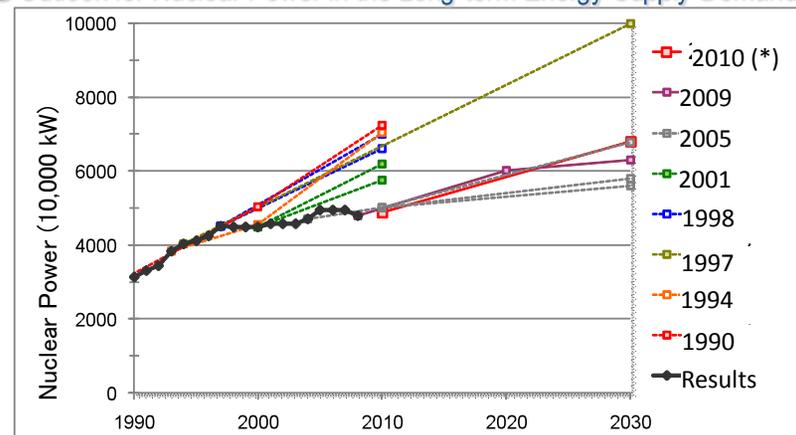
- As for nuclear power, a draft proposal has been included to add 9 new plants by 2020 and achieve a utilization ratio of 85% (has averaged 75% since 1990).
- Each new reactor will reduce Japan's CO2 emissions by approximately 5 million tons, while every 1% increase in the utilization ratio of new plants will lead to a 3 million ton reduction.

Relationship between the Plan for Additional Nuclear Power Capacity and CO2 Emissions

CO2 emissions will rise 66 million tons if Japan's nuclear power utilization ratio remains at 75% and only 2 new plants are built. This would mean a 5.2% increase over the benchmark for 1990.

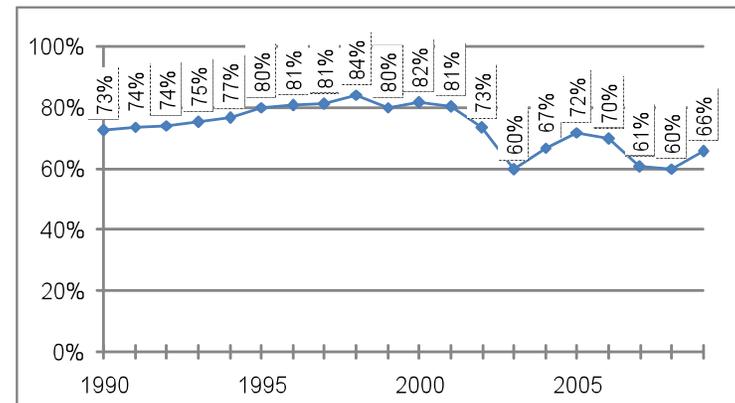


Outlook for Nuclear Power in the Long-term Energy Supply-Demand Forecast



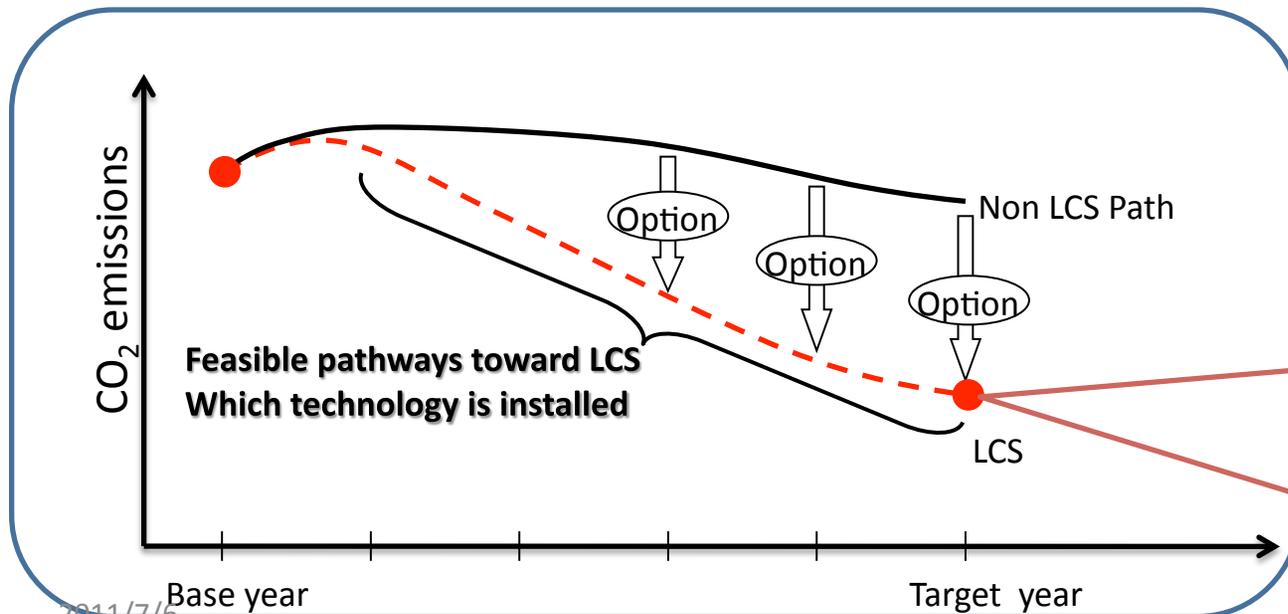
(*) Years appearing in the legend indicate years for which the Advisory Committee on Energy and Natural Resources has formulated a long-term forecast for the energy supply-demand balance

Utilization Ratio of Nuclear Power Plants

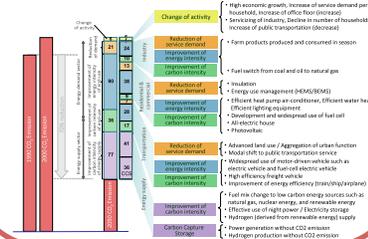


Methodology: AIM/Backcasting Model

- Model evaluates interim CO2 pathways, energy/technology mix and optimal investment timing towards LCS based on backcasting approach.
- Conditions such as industrial structure, energy mix in base year (2005) and target year (2050) are given.

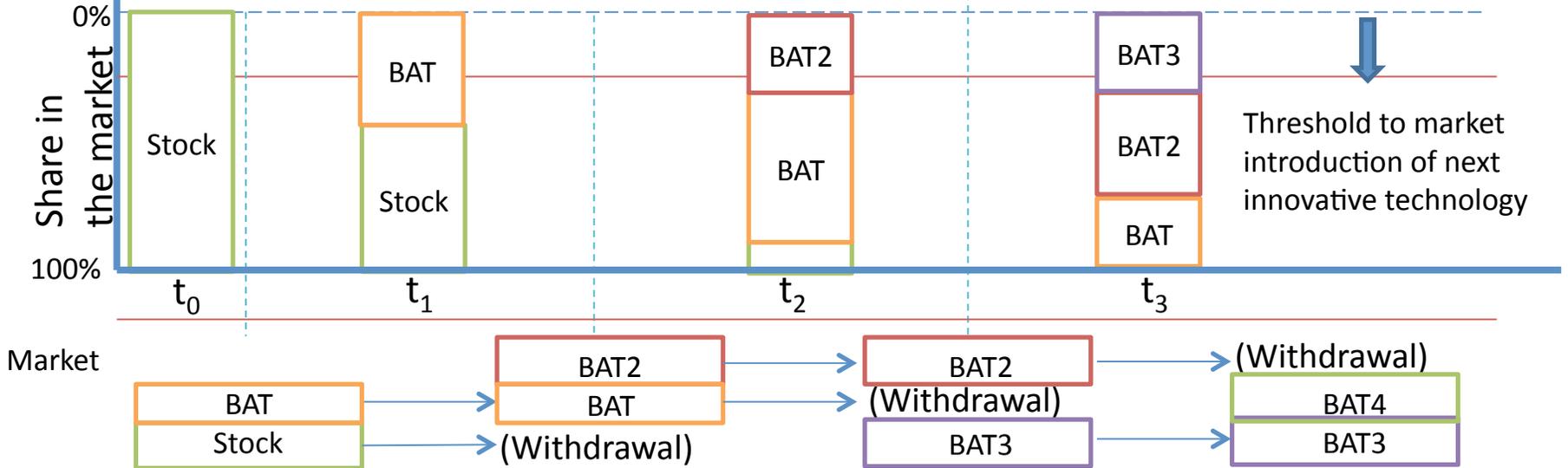


Vision A	Vision B
Vivid, Technology-driven	Slow, Natural-oriented
Urban/Personal	Decentralized/Community
Technology breakthrough Centralized production /recycle	Self-sufficient Produce locally, consume locally
Comfortable and Convenient	Social and Cultural Values
2%/yr GDP per capita growth	1%/yr GDP per capita growth

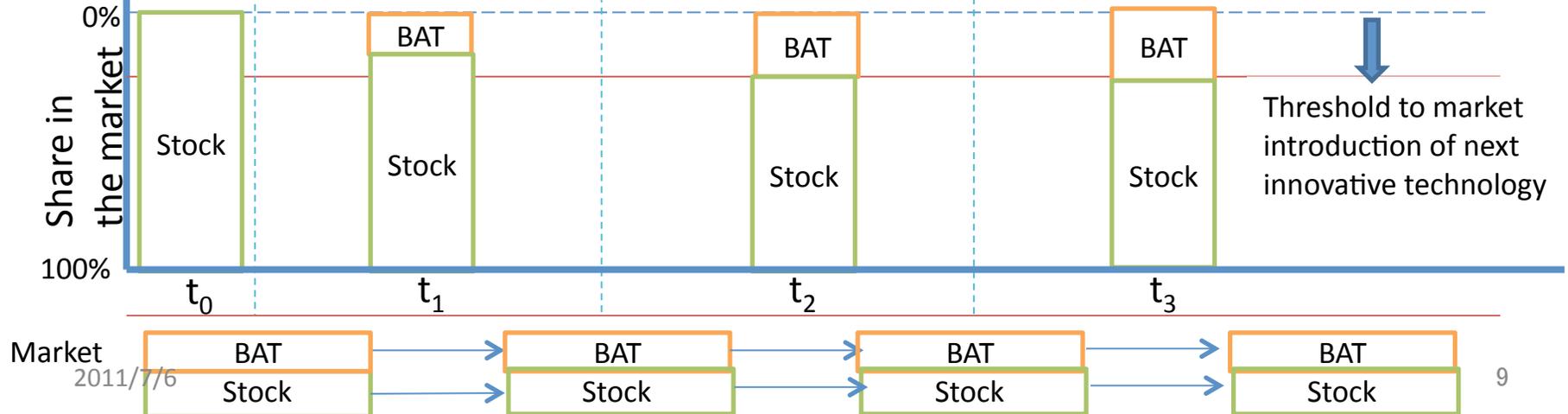


Feature of the AIM/Backcasting Model: Modeling technology diffusion process in the market based on consumer's preference

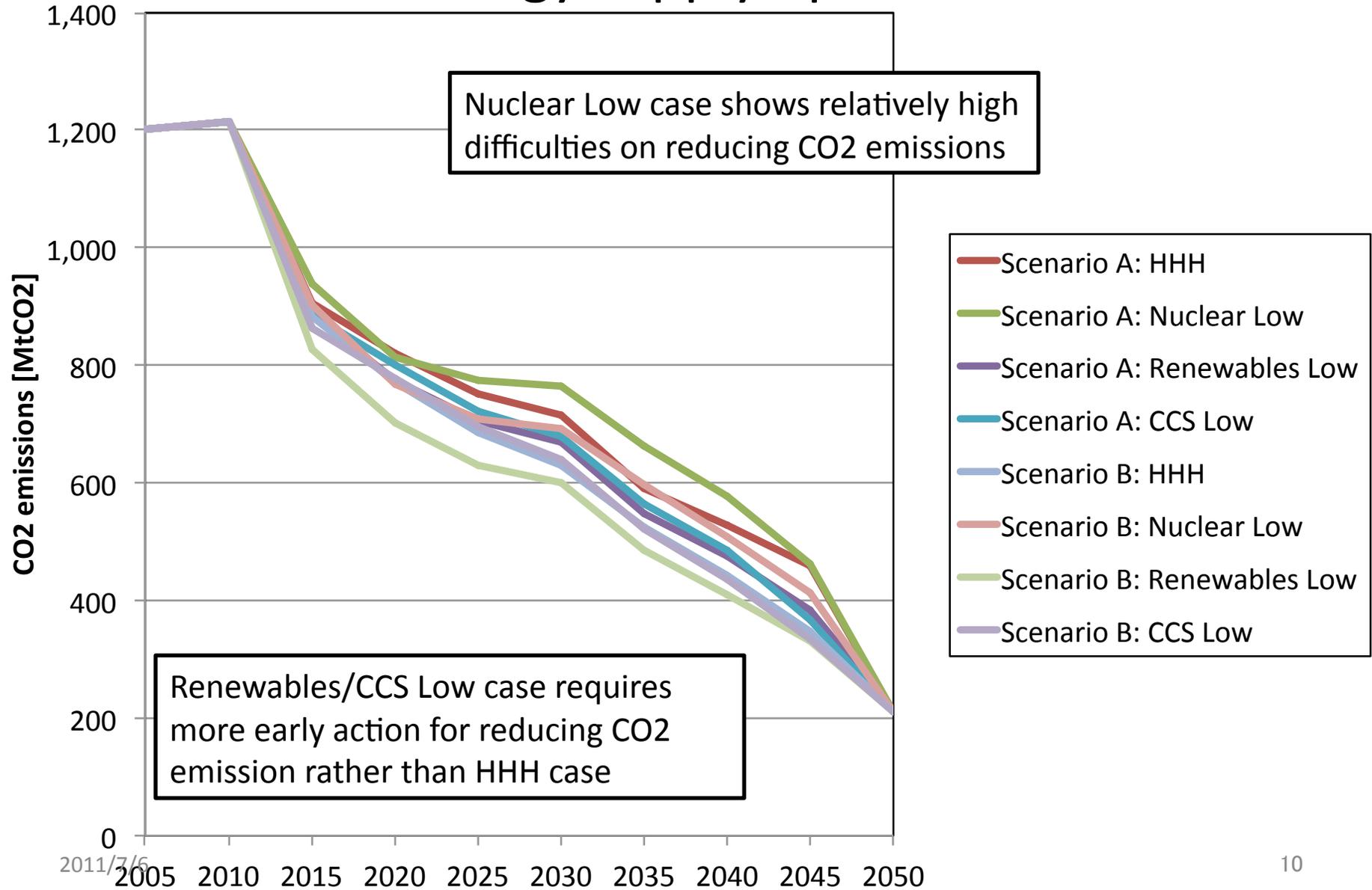
- Consumer shows positive stand for efficient technology



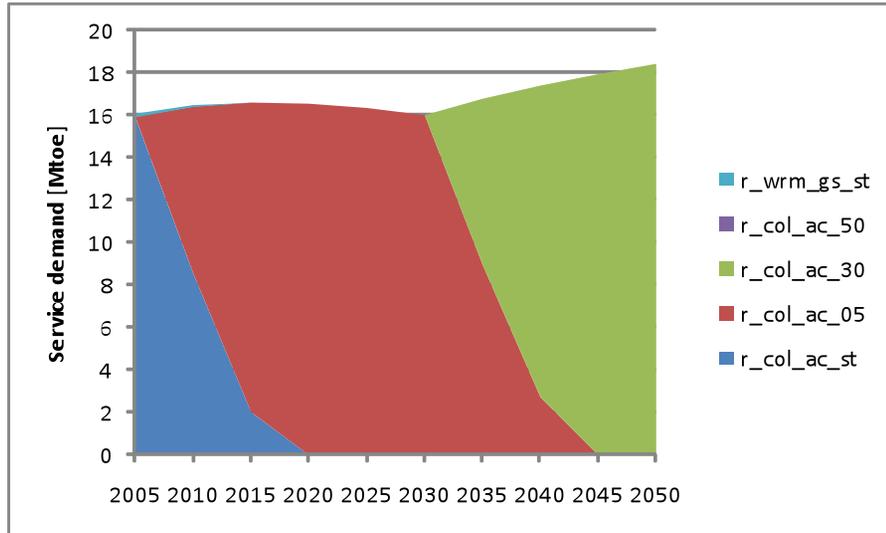
- Consumer does not prefer efficient technology so much.



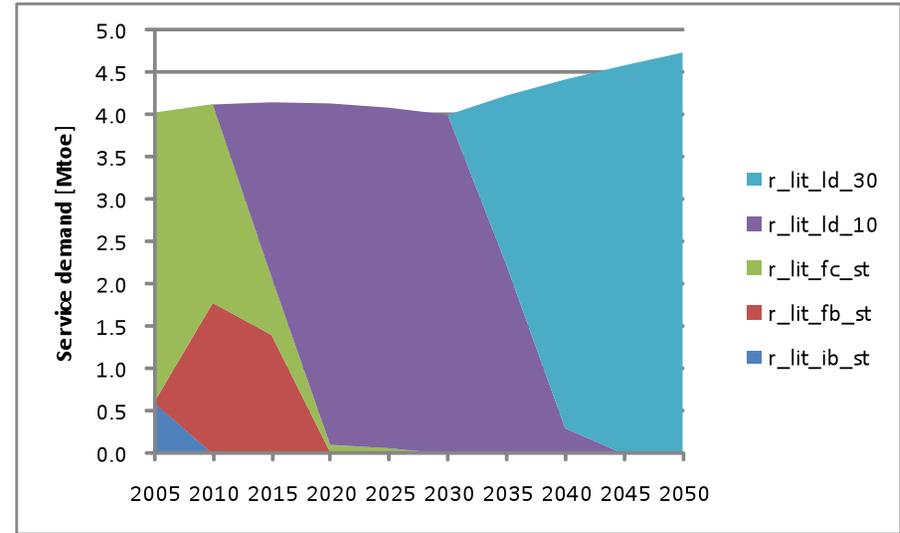
Japan Low-Carbon Society is feasible even if one of energy supply option lost



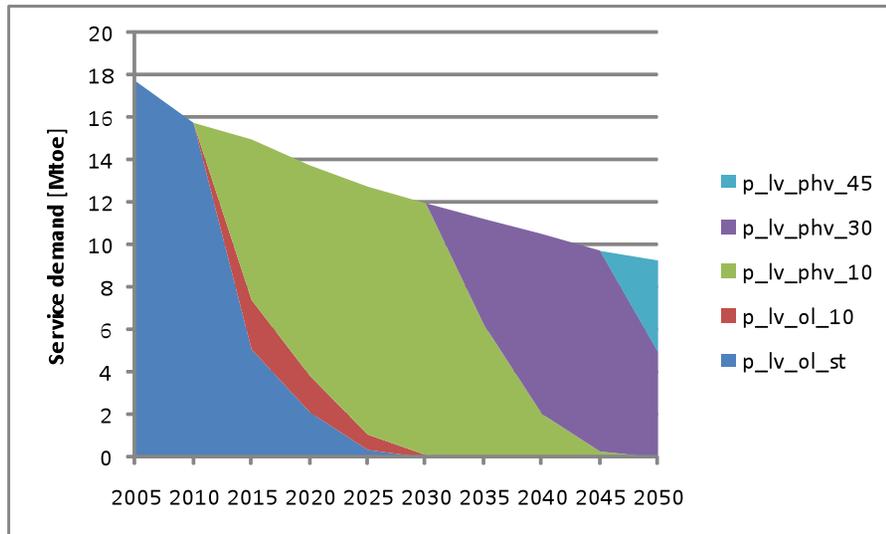
Example of Technology Mix in Scenario A (HHH)



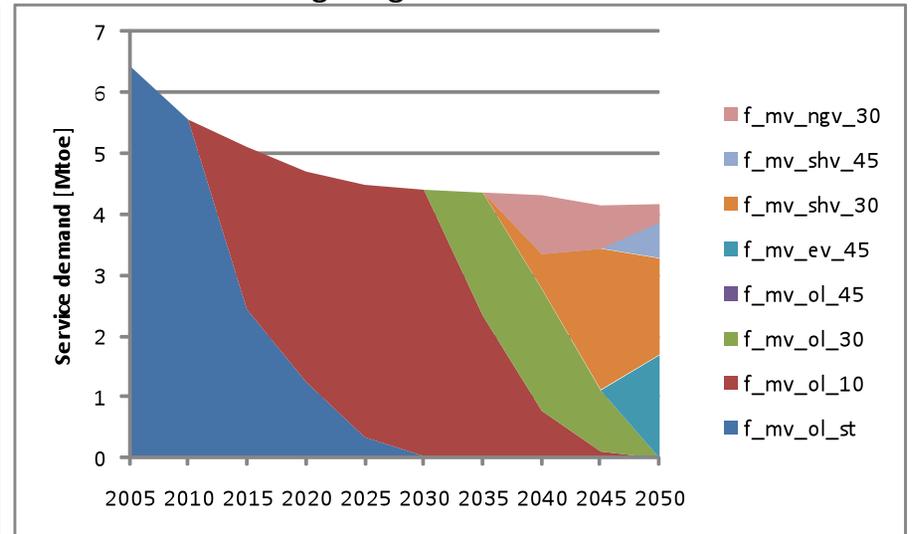
Warm Demand in the Residential Sector



Lighting Demand in the Residential Sector

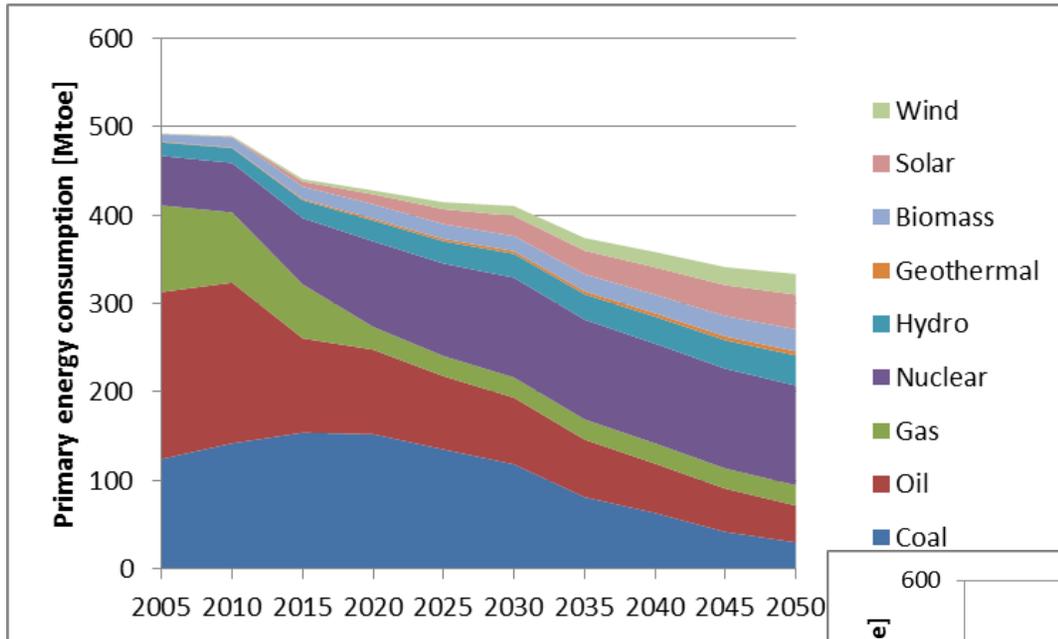


Passenger Transportation



Freight Transportation

Energy mix for Scenario A

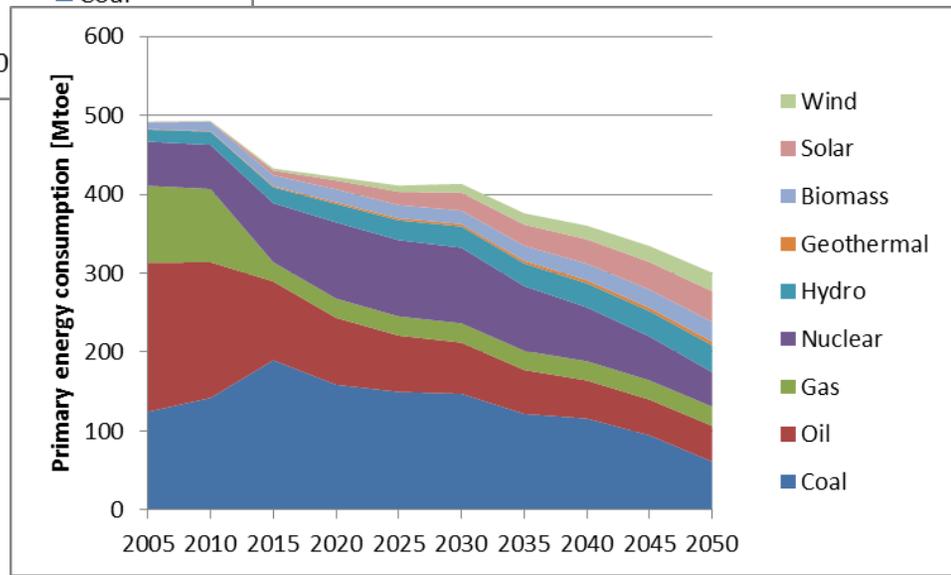


Nuclear High (HHH)

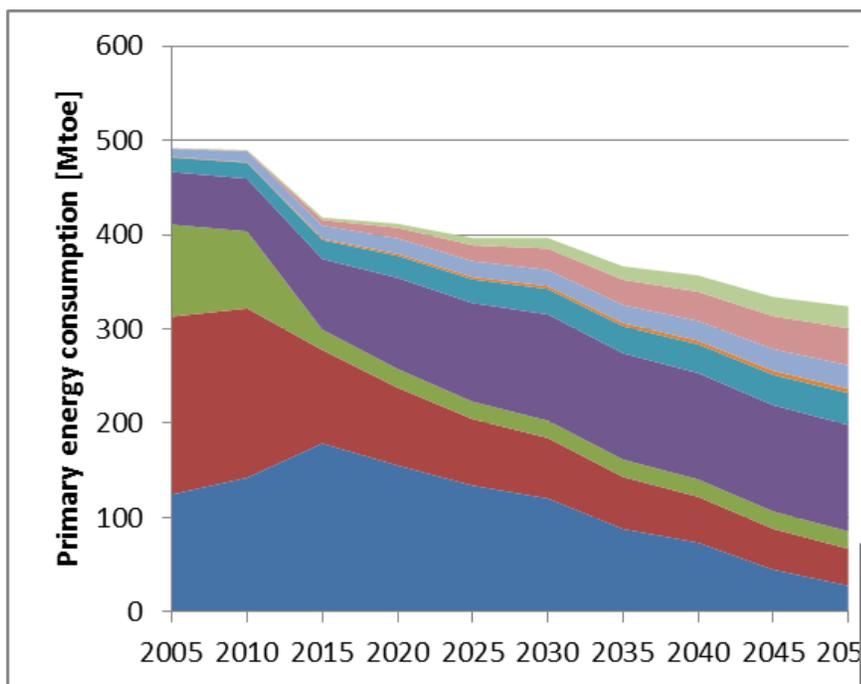
Share of Renewables in 2020
 13.4% with Hydro
 8.0% without Hydro

Share of renewables in 2020
 13.6% with Hydro
 8.1% without Hydro

Nuclear Low

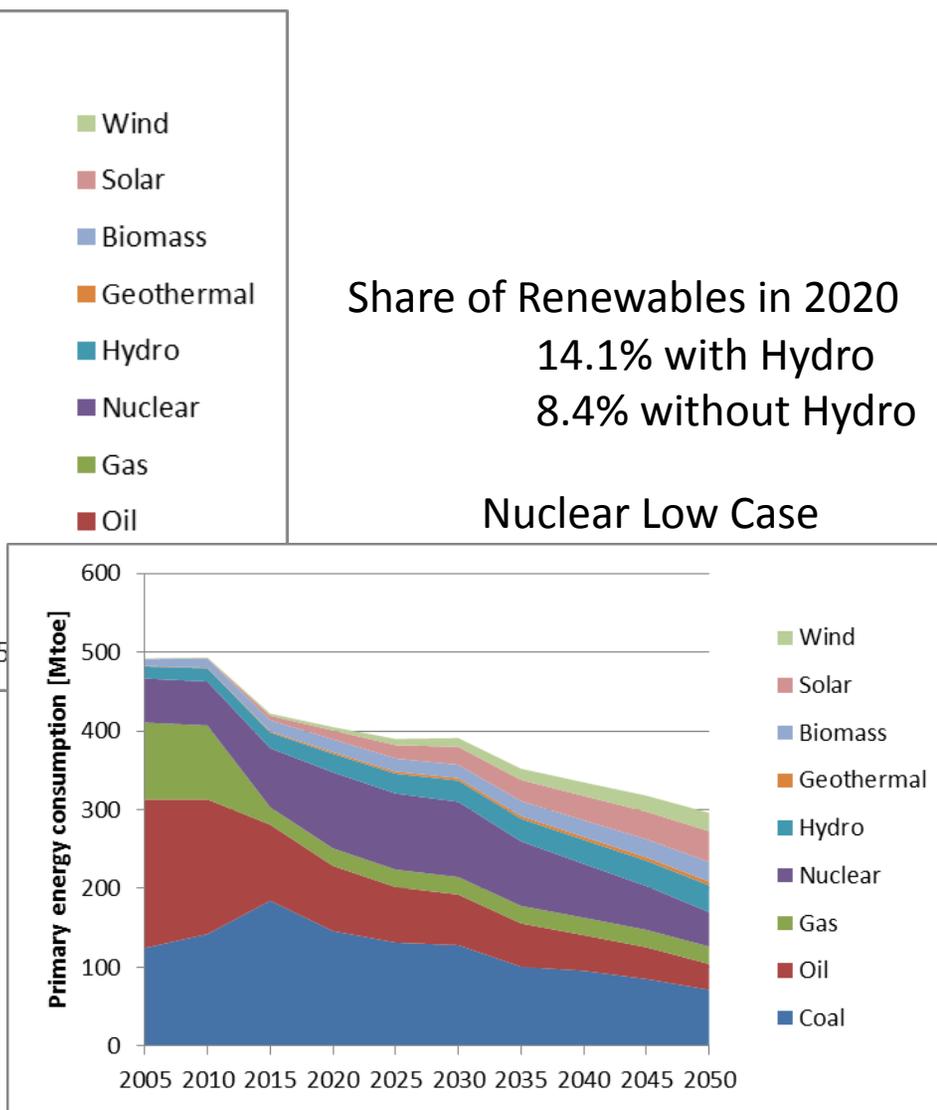


Energy mix for Scenario B



Nuclear High case (HHH)

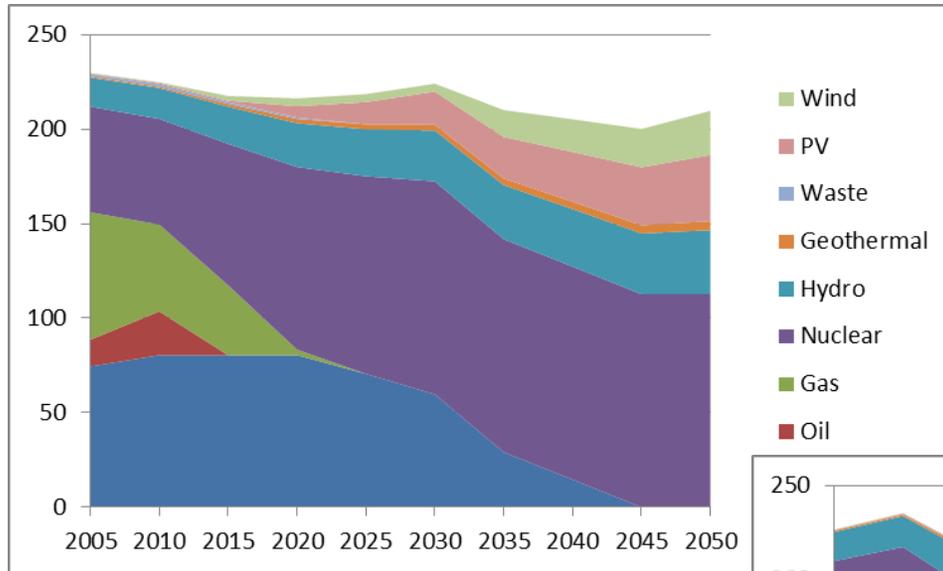
Share of Renewables
 13.9% with Hydro
 8.4% without Hydro



Share of Renewables in 2020
 14.1% with Hydro
 8.4% without Hydro

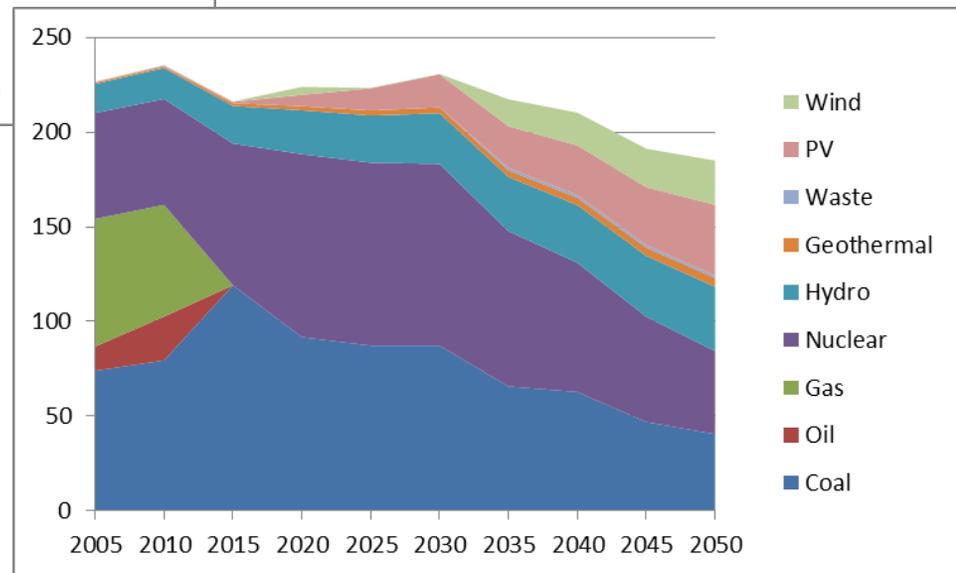
Nuclear Low Case

Energy mix in the power sector in Scenario A

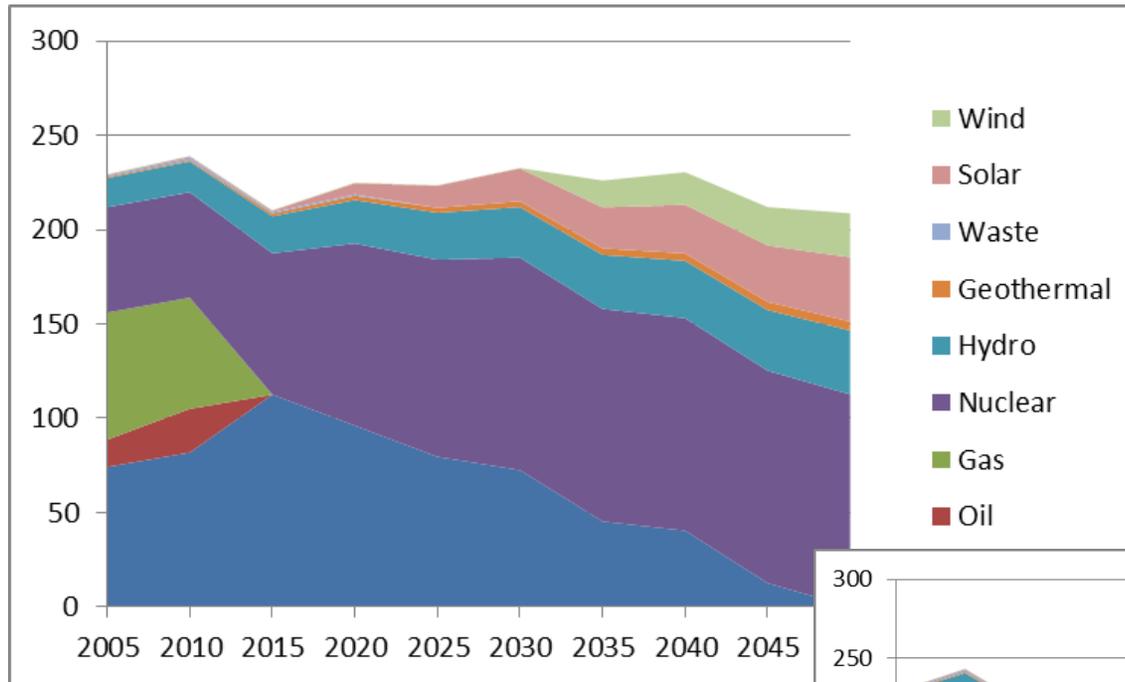


Nuclear High case (HHH)

Nuclear Low Case

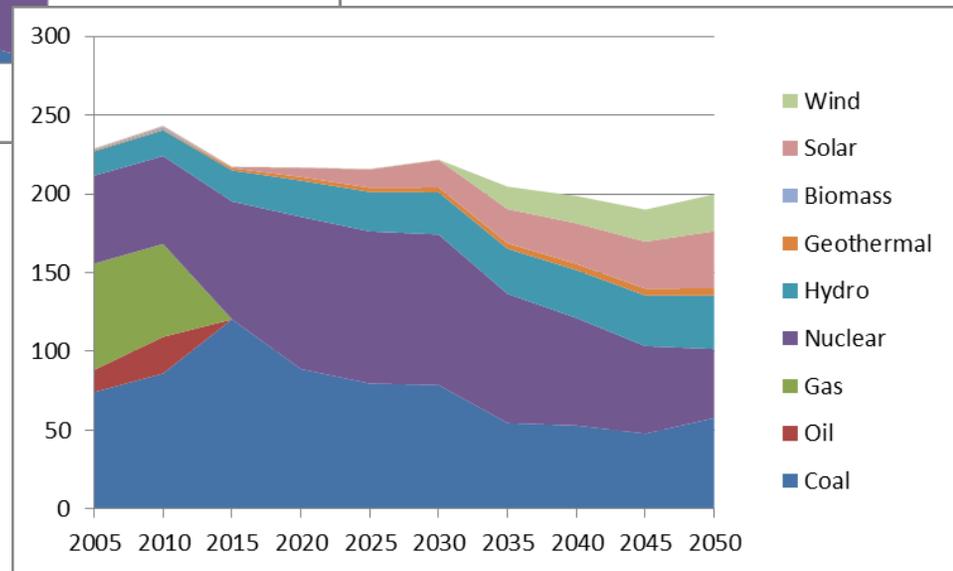


Energy mix in the power sector in Scenario B



Nuclear High Case (HHH)

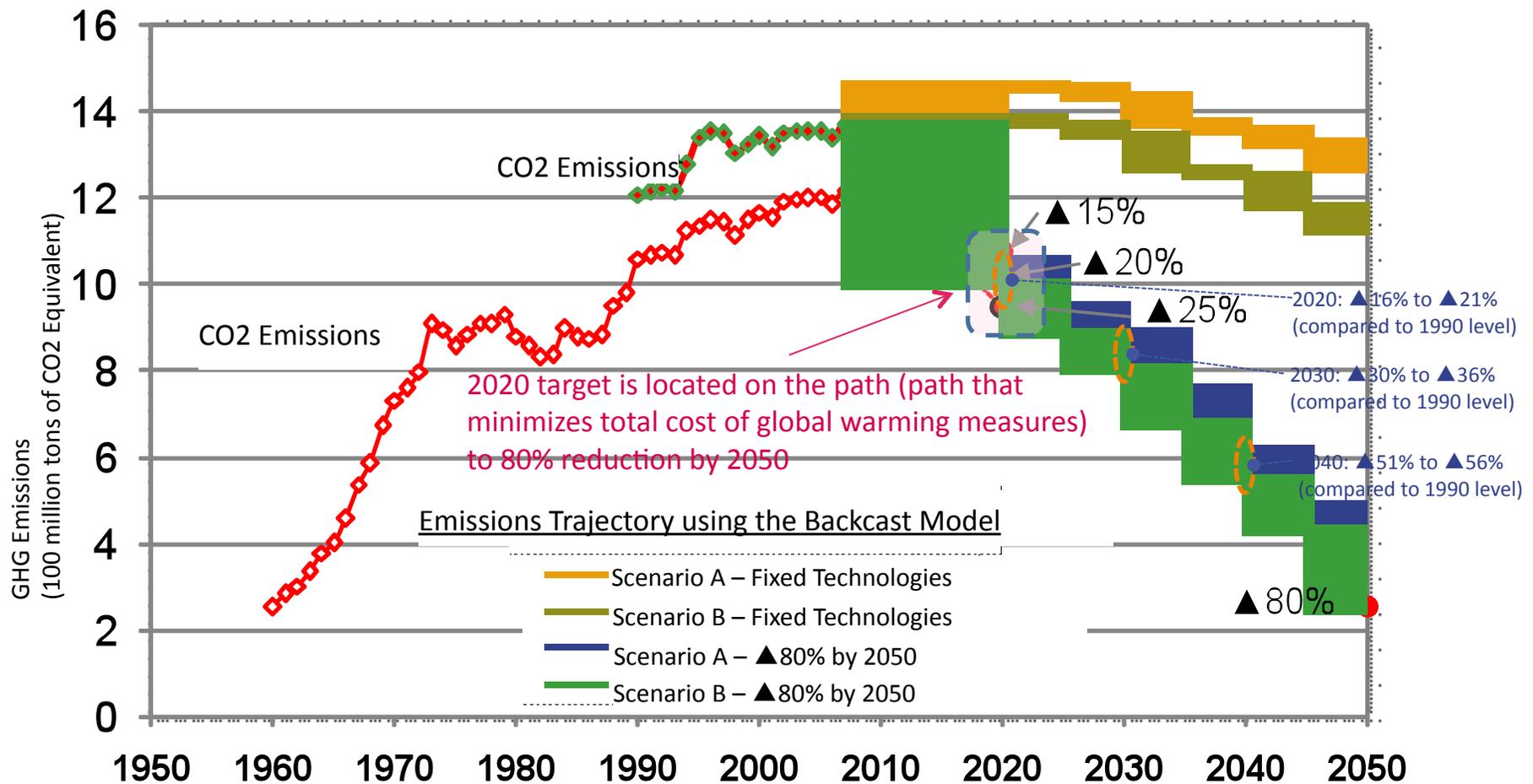
Nuclear Low Case



Roadmap for Achieving LCS:

At least two energy-supply option is realized, LCS in Japan is feasible

The CO2 reduction amount in 2020 for scenario A is 16% compared to 1990. For scenario B, the reduction is 21%. Although the optimal path to achieve the 80% reduction by 2050 varies for each scenario, both indicate that the 80% reduction by 2050 is entirely feasible if a ▲15% to ▲25% is realized in 2020.



2011/7/6

Source: NIES backcast model estimates