

Japan Policy Briefing

- 7th Strategic Energy Plan
- Climate Plan/NDC
- GX 2040 Vision



Agenda

1

Decisions and process

2

Summaries

- 7th Strategic Energy Plan
- Climate Plan/NDC
- GX 2040 Vision



Japanese Cabinet decisions on Feb. 18, 2025

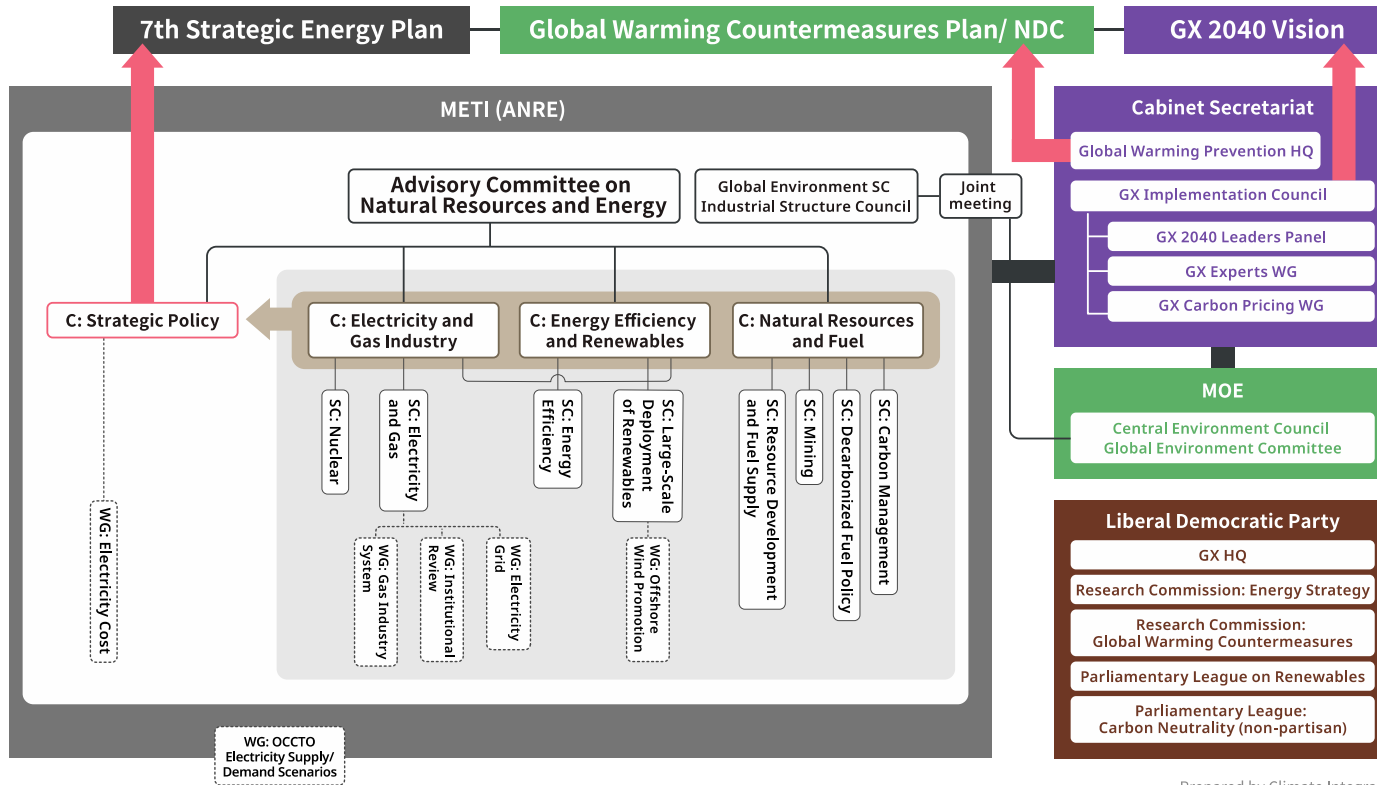
Item	7th Strategic Energy Plan (SEP) (85 pages)	Global Warming Countermeasures Plan (Climate Plan/NDC) (133 pages)	GX 2040 Vision (GX Promotion Strategy) (51 pages)
Minister in charge	Minister of Economy, Trade and Industry	Prime Minister	Minister of Economy, Trade and Industry
Law	Basic Act on Energy Policy Review at least every 3 yrs	Act on Promotion of Global Warming Countermeasures Review at least every 3 yrs	Act on Promoting Smooth Transition to Decarbonized Growth-Oriented Economic Structure (“GX Promotion Act”) (GX: Green Transformation)
Summary	Basic plan on energy supply and demand (revision of 6th SEP, of Oct. 2021)	Plan to tackle climate change (revision of previous plan, of Oct. 2021)	Plan for smooth transition to economic structure to achieve decarbonization and growth (revision of GX Promotion Strategy, of July 2023)
Content	<ul style="list-style-type: none"> • Main platform for energy-related policies • Sets policies toward 2040 • Since 2011 Fukushima nuclear accident, the focus has been on electricity supply 	<ul style="list-style-type: none"> • Targets for GHG emission reductions and removals • Includes roles and measures for national and local govts, businesses, citizens 	<ul style="list-style-type: none"> • Aligns energy and industrial policies for economic growth and industrial competitiveness • Articulates integrated policies for GX industrial structure, GX industry location, and energy from long-term perspective

*Climate Plan includes Nationally-Determined Contribution (NDC) under the Paris Agreement. Japanese government submitted NDC to UNFCCC Secretariat on Feb 18, 2025.

Source: Prepared by Climate Integrate

Advisory committee structure

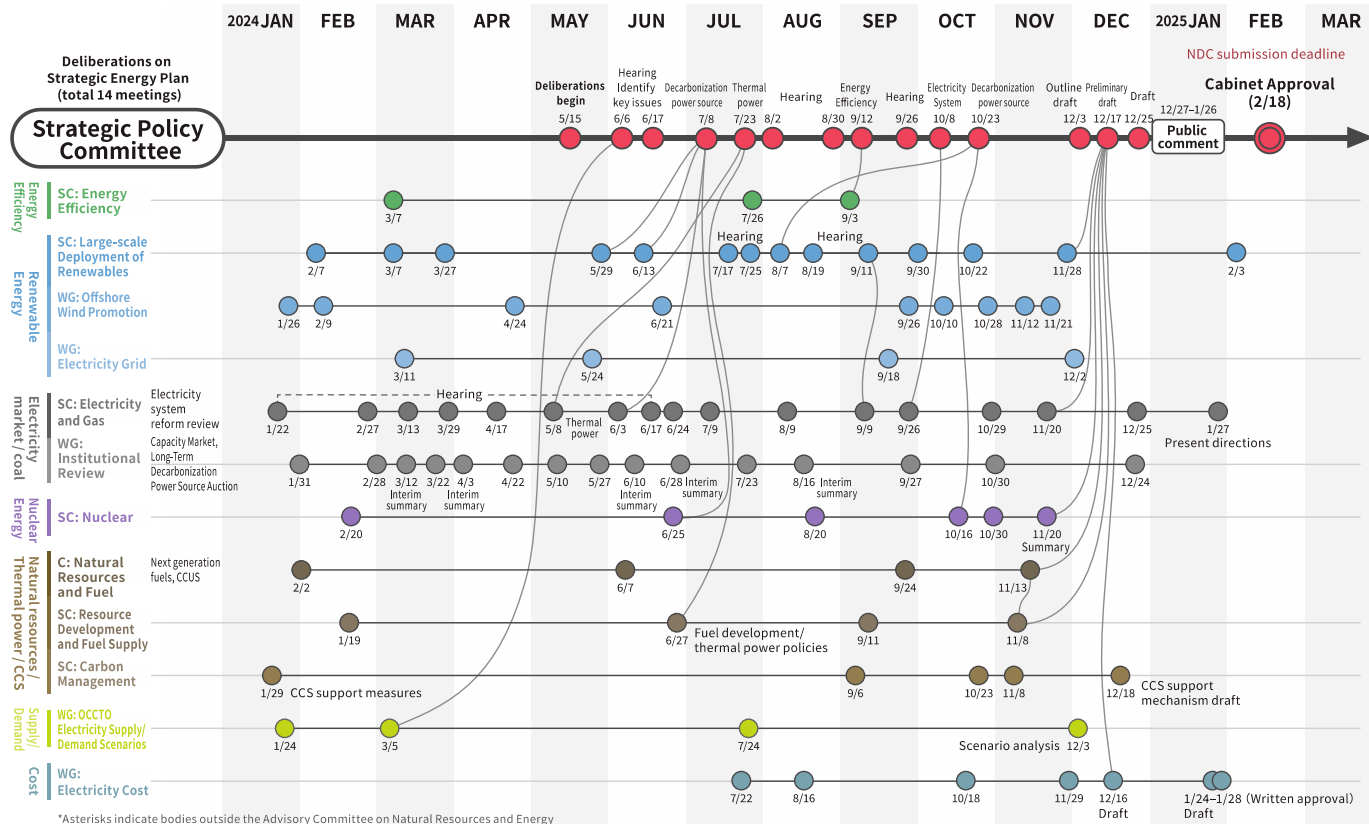
7th SEP, Global Warming Countermeasures Plan (Climate Plan) / NDC, GX 2040 Vision



■ SEP: Strategic Energy Plan, C: Committee, SC: Subcommittee, MOE: Ministry of Environment, METI: Ministry of Economy, Trade and Industry, ANRE: Agency for Natural Resources and Energy, WG: Working Group

Prepared by Climate Integrate

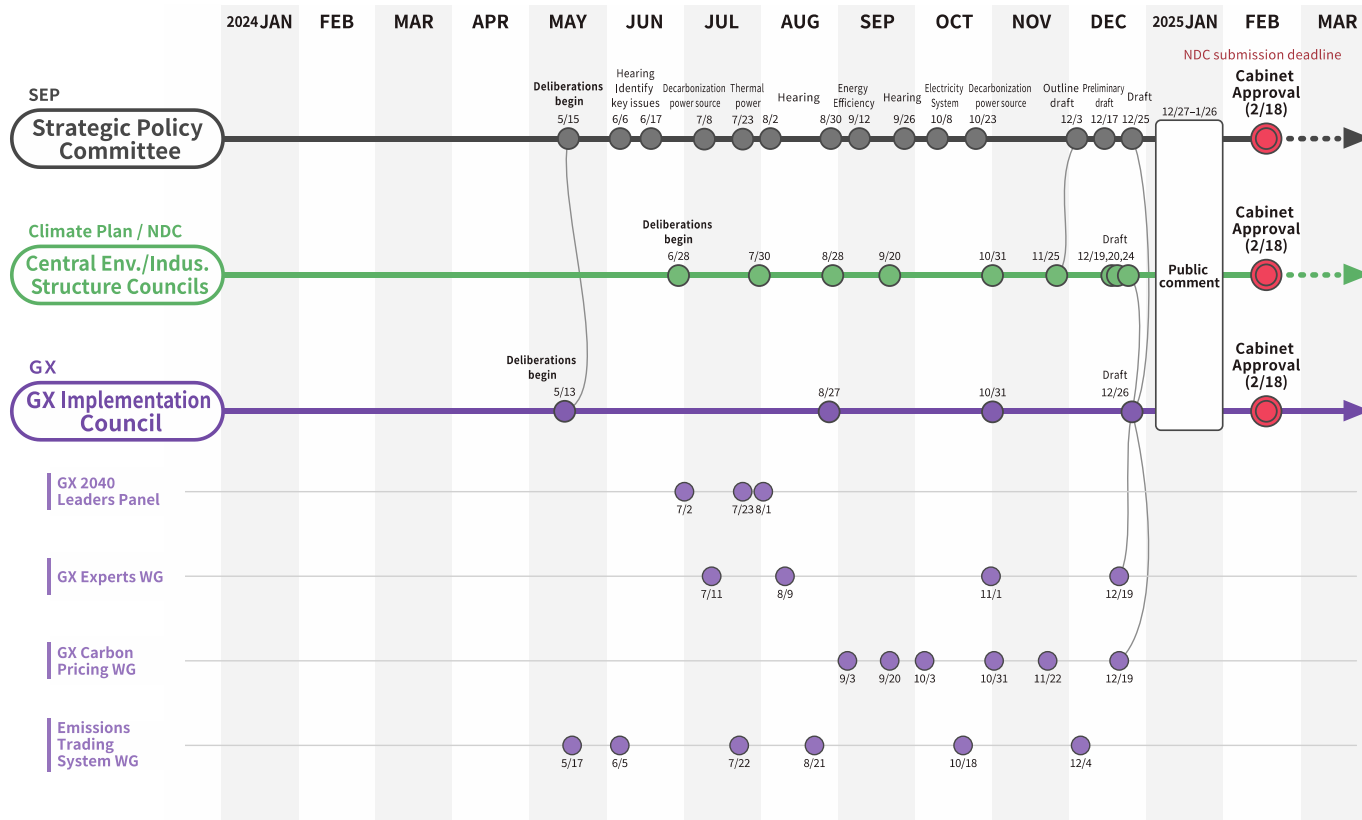
Flow of discussions for 7th Strategic Energy Plan



*Asterisks indicate bodies outside the Advisory Committee on Natural Resources and Energy
 ■ SEP: Strategic Energy Plan, C: Committee, SC: Subcommittee, WG: Working Group

Prepared by Climate Integrate

Flow of discussions for 7th SEP, Climate Plan/NDC, GX 2040 Vision



Prepared by Climate Integrate

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7th Strategic Energy Plan – (1) Summary

- **Notable changes from 6th SEP related to energy policy**

Economic and security requirements following events such as 1) Russia’s invasion of Ukraine, 2) Increase in electricity demand for Green Transformation (GX) and Digital Transformation (DX), 3) Maintaining climate ambition while taking realistic measures, 4) Alignment of energy policy and industrial policy

- **Key points of 7th SEP**

S+3E with emphasis on stable supply	Continues with the “S+3E” principle (Safety + Energy security + Economic efficiency + Environmental sustainability) with an emphasis on stable supply of electricity.
Electricity demand increase projected	After a declining trend since FY2007, power demand now expected to increase due to electrification and growth of data centers and semiconductor factories.
No reliance on single source of electricity, fuel	Promote all energy sources. Renewable energy (RE) will be major source of power generation. Reverse the policy of reducing nuclear dependence, even promoting replacement with new reactors on operators’ sites. Continue the use of thermal power, especially liquefied natural gas (LNG).
Alignment with industrial policy	Minimize cost increases associated with decarbonization, in order to enhance economic growth and industrial competitiveness. For energy-intensive manufacturing industries, it is crucial to supply energy at globally competitive prices.
Multiple scenarios and risk case analysis	Analyzed 5 scenarios: (1) RE expansion, (2) hydrogen and new fuels, (3) CCS utilization, (4) diffusion and utilization of innovative technologies (1) to (3), and (5) technological progress. Case (5) has upside risk for emissions, where social cost of decarbonization is capped to curb high costs if innovative technologies do not meet expectations.
Energy supply and demand outlook	Outlook adopts backcasting approach based on 73% GHG emission reduction target. Apart from scenarios, intention is to present energy policy directions. Outlook may change depending on assumptions. Considering risk cases, the plan covers all possible measures to secure stable electricity supply, including long-term LNG contracts.

Source : Prepared by Climate Integrate

7th Strategic Energy Plan – (2) Energy supply and demand outlook

Energy supply/demand outlook as policy direction

- Final energy consumption to drop by 2040 (-25% vs FY2013)
- Presents power generation mix in 2040 based on an outlook of increased electricity demand
- Lacks detail on decarbonization plans in heating & fuel sectors

Energy supply and demand outlook

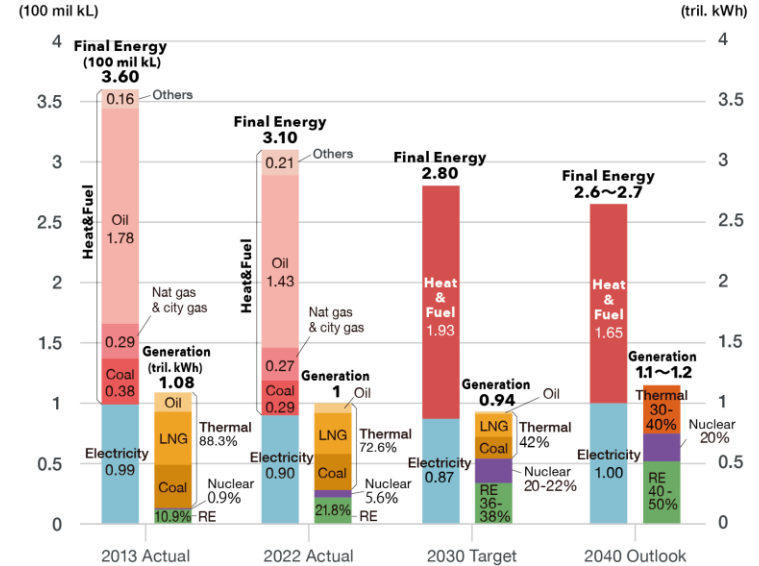
	2013 Actual	2022 Actual	2030 Target (*1)	2040	
				Outlook	Tech progress
Final energy consumption (100 mil kL)	3.6	3.1	2.8	2.6-2.7	2.7
Primary energy supply (100 mil kL)	5.4	4.7	4.3	4.2-4.4	4.3
Energy self-sufficiency	6.5%	12.6%	30%	30~40%	-
Electricity demand (tril. kWh)	0.99	0.90	0.87	0.9-1.1	1.0
Electricity output (tril. kWh)	1.08	1.00	0.94	1.1-1.2	1.1
Energy-related CO ₂ emissions (MtCO ₂) (*2)	1,240	960	680	360~370	540

*1. Based on 6th SEP. Under 7th SEP, gov't forecasts demand increase, but did not update outlook for 2030.

*2. This is the figure after subtracting energy-related CO₂ capture and storage of 60~120 MtCO₂.

Source: Prepared by Climate Integrate based on "Energy outlook for for 2030" and "Energy outlook for 2040"

Final energy consumption & electricity generation



* Figure for 2030 is based on 6th SEP

* tril. kWh = 1,000 TWh

Source: Prepared by Climate Integrate based on 2030 Energy Supply and Demand Outlook, and 2040 Energy Supply and Demand Outlook.

7th Strategic Energy Plan – (3) Power generation mix

Policy

- Deploy RE to the greatest extent possible as major power source to achieve both energy security and decarbonization.
- At the same time, aim for balanced power generation mix that does not overly rely on any one power or fuel source.

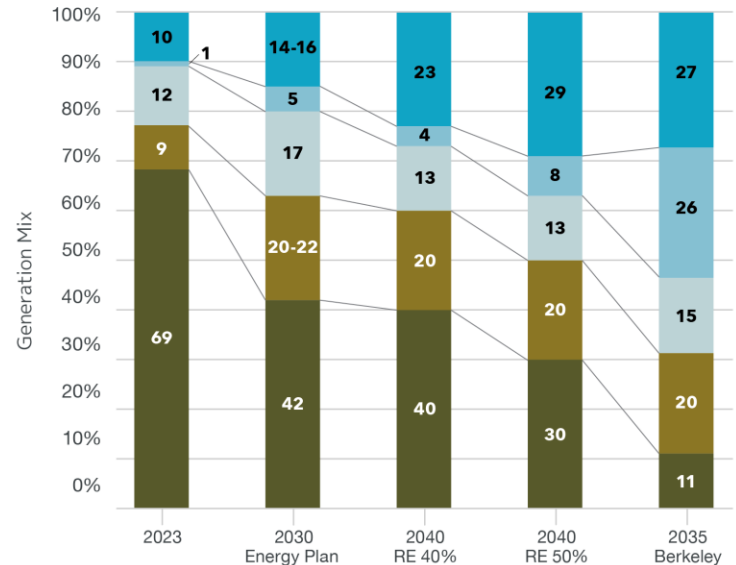
Power generation mix: current and targets

	Current (2023)	2030 Targets	2040 Outlook
Thermal power	68.6% Coal 28.4% LNG 32.9% Oil 7.2%	42% Coal 19% LNG 20% Oil 2% Ammonia/Hydrogen 1%	30–40% (no breakdown provided)
Renewables	22.9% Solar 9.8% Wind 1.1% Hydro 7.6% Geothermal 0.3% Biomass 4.1%	36–38% Solar 14–16% Wind 5% Hydro 11% Geothermal 1% Biomass 5%	40–50% Solar 23–29% Wind 4–8% Hydro 8–10% Geothermal 1–2% Biomass 5–6%
Nuclear	8.5%	20–22%	20%

Source: Prepared by Climate Integrate based on Comprehensive Energy Statistics, 6th and 7th Strategic Energy Plans



Power generation mix scenarios



■ Solar
 ■ Wind
 ■ RE (excl. Solar&Wind)
 ■ Nuclear
 ■ Thermal (incl. Hydrogen&Ammonia)

Source: Prepared by Climate Integrate



7th Strategic Energy Plan – (4) Electricity sources

Source	Summary (outlook for 2040)	Key points and issues
Renewable energy (RE)	<ul style="list-style-type: none"> • Share: 40–50% • Principle to give RE highest priority (6th SEP) has been deleted • Added target for perovskite photovoltaics (20 GW in 2040) • Offshore wind target of 30–45 GW "in the pipeline" (no change from 6th SEP). This is not the same as starting operation. 	<ul style="list-style-type: none"> • This is only a small increase from the 2030 target of 36–38%. RE share is low despite high potential (esp. wind). • No outlook is provided for installed capacity for each technology type (despite having been clearly stated in 6th SEP), making projections and investment difficult
Nuclear	<ul style="list-style-type: none"> • Share: 20% • Intention to reduce reliance on nuclear to the extent possible (6th SEP) has been deleted • Promotes next-generation nuclear reactors to replace existing reactors on operator's premises • Maximizes use of nuclear as a power source to contribute to security and decarbonization 	<ul style="list-style-type: none"> • 7th SEP reverses government policy to reduce nuclear power dependence after Fukushima disaster. Nuclear reactor restarts are now expected to accelerate. • A new reactor takes about 20 yrs to plan and build, so new starts are unlikely before 2040. Too slow to meet decarbonization needs.
Thermal	<ul style="list-style-type: none"> • Share: 30–40% • 7th SEP promotes LNG as a "realistic" transition fuel. Seeks to ensure long-term LNG contracts. Promotes new LNG-fired plant construction or replacement of old plants through long-term decarbonization electricity auctions • Promote "fade-out" of inefficient coal-fired power plants 	<ul style="list-style-type: none"> • No breakdown of LNG, coal, oil, hydrogen/ammonia co-firing, CCS (despite having been clearly stated in 6th SEP) • Continued reliance on fossil fuels through support for LNG supply and LNG-fired plants • Voluntary efforts to "fade out" inefficient coal power • No plan for phasing out coal power

Source: Prepared by Climate Integrate

Climate Plan/NDC – (1) GHG emission reduction targets

GHG emission reduction targets (FY2035, FY2040)

FY	Reduction targets (from FY2013)	Emissions (Mt-CO ₂)*
2013	Base year	1,410
2022	-	1,080
2030	-46 (to -50%)	760
2035	-60%	570
2040	-73%	380
2050	Net zero	0

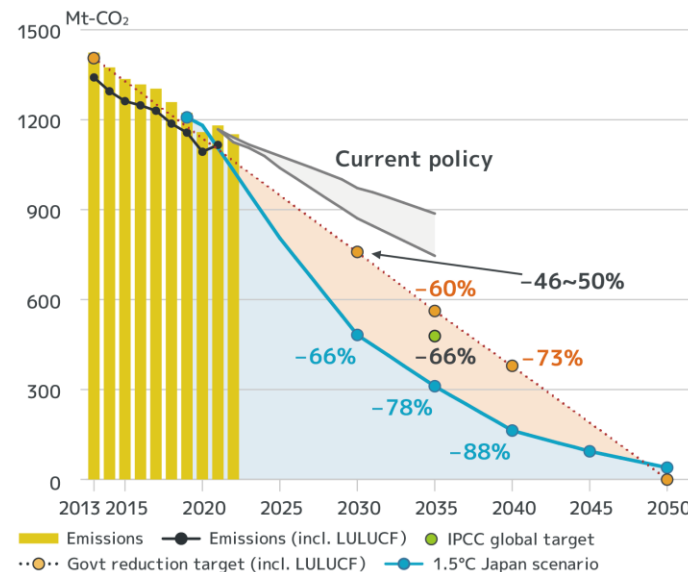
Prepared by Climate Integrate based on the Climate Plan, GHG inventory data



Alignment with 1.5°C goal

- 7th SEP says it is an “ambitious target consistent with 1.5°C target”
- 2035 target (60% reduction): This is weaker than IPCC’s 1.5°C global scenario (66% reduction) (median)
- Climate Action Tracker estimated that to be consistent with the Paris Agreement’s 1.5°C scenario Japan should achieve 78% reduction (2035) and 88% reduction (2040)
- Many voices called for more ambitious targets, but the draft targets were adopted unchanged.

Japan GHG emissions and pathway to net zero (base year 2013)



* GHG inventory data (excl. LULUCF)

* Source: Prepared by Climate Integrate from IPCC 6th Assessment Report, Climate Action Tracker (CAT)



Climate Plan/NDC – (2) Targets, measures

• Targets (by GHG, by sector)

- FY2040 targets (none for FY2035) stated in 7th SEP
- Reduction for industrial sector (-57 to -61%) is less than other sectors
- Intent to use approx. 200 Mt-CO2 international credits

• Measures, policies

- Measures and policies are listed by GHG, by industry
- Appendices list individual measures and expected emission reduction amounts

• Examples

- Energy transformation
 - Maximize use of decarbonized electricity sources (RE, nuclear)
 - Use of LNG as transition energy source
 - Use of hydrogen, CCUS in hard-to-decarbonize sectors
- Regional, lifestyle
 - "Decarbonization Leading Areas" (100 or more regions by 2030)
- Industry, commercial, transportation, etc.
 - Support for upgrades, energy saving measures for small businesses
- Cross-sectoral
 - Growth-oriented carbon pricing
 - Transition to circular economy

Targets & estimates for emissions & removals (by GHG)

[Unit: Mt CO₂]

	2013 actual	2030 (from 2013 levels)	2040 (from 2013 levels)
GHG emissions/removals	1,407	760 (-46%)	380 (-73%)
Energy-related CO ₂	1,235	677 (-45%)	Approx. 360~370 (-70 to 71%)
Industry	463	289 (-38%)	Approx. 180~200 (-57 to 61%)
Commercial and others	235	115 (-51%)	Approx. 40~60 (-74 to 83%)
Residential	209	71 (-66%)	Approx. 40~60 (-71 to 81%)
Transport	224	146 (-35%)	Approx. 40~80 (-64 to 82%)
Energy transformation	106	56 (-47%)	Approx. 10~20 (-81 to 91%)
Non-energy-related CO ₂	82.2	70.0 (-15%)	Approx. 59 (-29%)
CH ₄	32.7	29.1 (-11%)	Approx. 25 (-25%)
N ₂ O	19.9	16.5 (-17%)	Approx. 14 (-31%)
F-gases	37.2	20.9 (-44%)	Approx. 11 (-72%)
Removals	-	-47.7 (-)	Approx. -84 (-)
Joint Crediting Mechanisms (JCM)	-	Aim to acquire 100 Mt-CO ₂ credits by 2030 to be counted toward Japan's NDC	Aim to acquire 200 Mt-CO ₂ credit by 2040 to be counted toward Japan's NDC

Source: Prepared by Climate Integrate based on Climate Plan

GX 2040 Vision (GX Promotion Strategy)

• What is GX?

- A strategy to transform entire industrial and social structures centering around fossil energy sources, into ones based on clean energy”

• What is GX 2040 Vision?

- It presents a long-term direction to increase predictability for GX investment
- Contributes to global decarbonization efforts, particularly in Asia (AZEC)

• Growth-oriented carbon pricing

- Emissions trading system (ETS) (launches FY2026)
 - For emitters of 100,000 t-CO₂ (direct emissions) or more
 - Allocates emission allowances to companies at no cost based on government guidelines
 - Sets maximum and minimum prices
 - Auctions for power companies launch in FY2033
- Fossil fuel levy (launches FY2028)
 - To be used for GX Bond redemptions
 - Measures to be introduced to avoid double-charging as targeted businesses are also subject to petroleum/coal tax and paid auctions

GX 2040 Vision

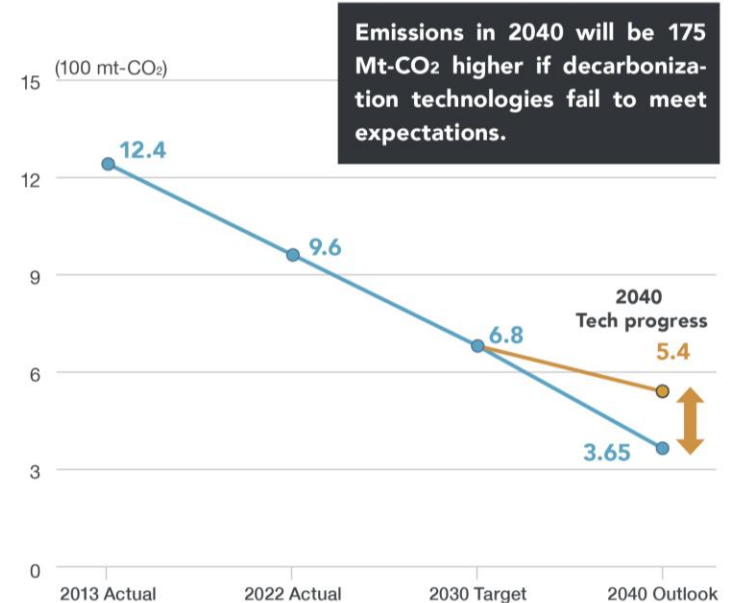
GX industrial structure	<ul style="list-style-type: none"> • GX business creation using innovative technologies • Upgrade complete supply chain from materials to products with use of decarbonized energy and digital transformation (DX)
GX industrial location	<ul style="list-style-type: none"> • Co-locate energy demand with energy supply • Consider incentives for companies using AI and robots to use decarbonized electricity, and for municipalities to develop decarbonized power sources
Realistic transition & contribution to global decarbonization	<ul style="list-style-type: none"> • Pursue transition realistically. Relative energy price gap with other countries needs to be addressed to maintain and develop domestic industries • Implement AZEC action plan and expand transition financing to pursue realistic transition for green transformation in Asian countries
Sector-by-sector initiatives	<ul style="list-style-type: none"> • Accelerate GX initiatives in energy, industrial, other sectors
Growth-oriented carbon pricing	<ul style="list-style-type: none"> • 20 tril. yen upfront investment using GX Bonds • Carbon pricing (full-scale operation of ETS from FY26, fossil fuel levy from FY28) • Use new financial mechanisms (e.g., debt guarantees by GX Promotion Organization)
Just transition	<ul style="list-style-type: none"> • Promote labor mobility into new industries • Support employment continuity in supply chain as they transition to GX industrial structure
Reviews	<ul style="list-style-type: none"> • Progress reports to GX Implementation Council. Plans are to be revised as necessary.

Source: Prepared by Climate Integrate based on GX 2040 vision

Concluding remarks (1)

- **Slow speed of energy transition**
 - Wording leaves all options on the table: “Use all available technologies”
 - Too much focus on nuclear and LNG, lack of speed for transition to RE
- **Uncertain decarbonization pathway**
 - Questionable ambition for GHG targets (2035), considering 1.5°C and Japan's responsibility as a developed country
 - LNG is used as a backup if decarbonization technologies fail to deliver, but that would mean increased CO2 emissions (see graph)
- **Lack of basis for emission reduction data and measures**
 - No coverage of current status relative to 2030 targets presented, no discussion of enhanced measures.
 - Lack of 2035 data, measures, power generation mix
- **Continued heavy reliance on fossil fuels**
 - High reliance on fossil fuels in 2040, posing energy security risk
 - Energy self-sufficiency remains low at 30–40% in 2040
- **Thermal power (fossil fuels) still at 30–40% share in 2040**
 - Thermal power reliance remains high due to weak measures to reduce coal power and a push for LNG as transition electricity source
 - No breakdowns provided for ammonia co-firing or 100% firing, CCS.

Energy-related CO₂ emissions outlook



Source: Prepared by Climate Integrate based on 2030 Energy Supply and Demand Outlook, and 2040 Energy Supply and Demand Outlook.

Concluding remarks (2)

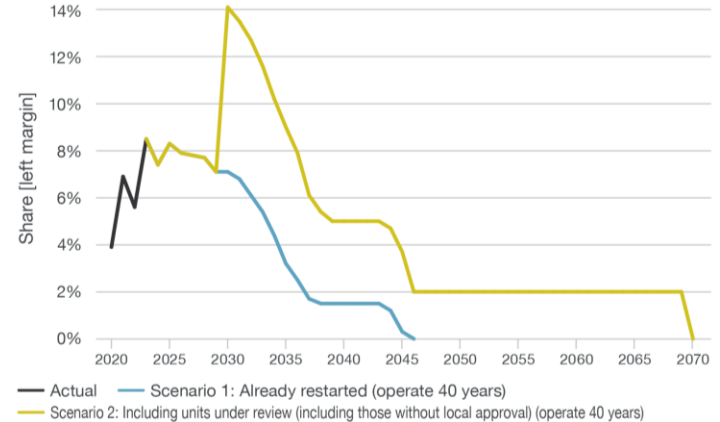
- **Nuclear power: High expectations, low probability**
 - Even with maximum outcomes, nuclear is estimated at approx. 7 - 14% of electricity mix, well below 20% target
 - Lead time to replace old with new reactors is 20 years
 - If thermal power is used to cover shortfall, decarbonization is delayed
- **International consensus vs Japan's policy**
 - Gaps between int'l agreement and Japan's policy

International consensus vs Japan's policy

Fossil fuels	Japan	Phase-out of excessive reliance on fossil fuels
	G7·COP29	Phase-out of fossil fuels
Coal power	Japan	Fade-out of inefficient coal (voluntary measures)
	G7	Phase-out of unabated coal (1st half of 2030s, 1.5°C-aligned)
Power system	Japan	2035: RE 40–50%, thermal 30–40%, nuclear 20%
	G7	2035: Fully or predominantly decarbonized power sector
Hydrogen, ammonia	Japan	Hydrogen/ammonia co- or 100%-firing in thermal power
	G7	Hydrogen/ammonia in hard-to-abate sectors

Source: Prepared by Climate Integrate

Outlook for nuclear power share of electricity mix (Climate Integrate estimate)



Note: Climate Integrate estimates are based on these assumptions.

* Operating period: In principle 40 years, but extension to 60 years has been approved for 8 units (as of July 2024).

* Utilization rates: 75% for 40 years after start, then 65% to 50th year, and 55% to 60th year.

* Electricity generation: Steady increase from actual in FY2023 to 1,150 TWh (midpoint of government projection of 1,100 to 1,200 TWh) in FY2040, then flat after FY2040.

Source: Prepared by Climate Integrate based on Comprehensive Energy Statistics (ANRE), etc., with assistance from Manabu Utagawa (NAIST).

- **Net zero: Wishful thinking, not a solid plan**

- Lack of grand design for carbon neutrality
- Carbon neutrality measures may fail due to technical, cost, and safety challenges limiting results with nuclear, ammonia, hydrogen, CCS

- **Next steps**

- Monitor policy/goal achievements through transparent and fair processes (including objective external assessments) and revise as necessary
- Accelerate electrification and RE deployment
 - Rooftop solar, agrivoltaics
 - Floating offshore wind: Early passage of EEZ bill, ambitious targets
- Develop domestic RE supply chain
- Accelerate policy inducements on electricity demand and supply sides with better grid flexibility, fee systems, demand response
- Design carbon pricing and provide sufficient incentives to encourage energy efficiency improvements and shift to RE on both supply and demand sides
- Assess investment risk and reconsider LNG and innovative tech and continued fossil fuel reliance

Change is Possible

Thank you!

