

Report for the NTCT Working Group on “Toward Carbon Neutrality in East Asia”

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1. Japan’s initiatives toward achieving carbon neutrality

1.2. An Overview

Former Prime Minister Suga declared the achievement of carbon neutrality by 2050 in his policy speech of October 2020. Furthermore, at the urging of the Biden Administration in the US, a new 2030 emission reduction target (46% reduction against 2013 levels) was announced at the Climate Leaders’ Summit in April 2021. The basis for the 46% emissions reduction target is not known. If a straight line is drawn between zero emissions in 2050 and current emissions, however, there will be around 46% reduction in emissions by 2030 compared to 2013 levels (See Figure 1).

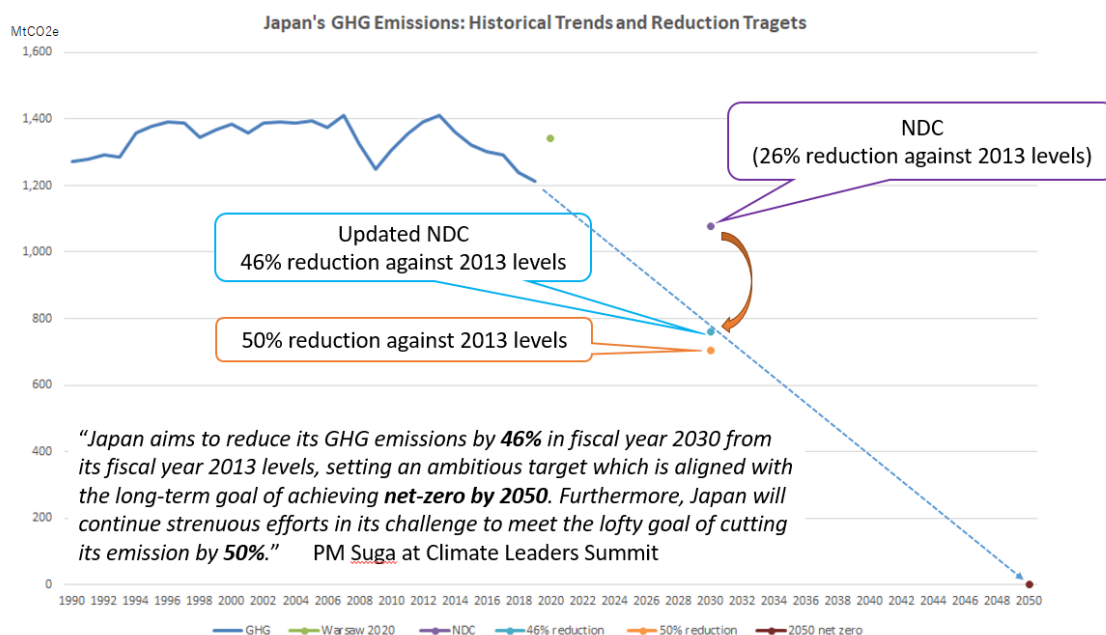


Figure 1 Japan’s GHG Emissions: Historical Trends and Reduction Targets

Source: Calculated by the author based on Greenhouse Gas Inventory Office (2021)

The Japanese government formulated five key policy documents that provide a policy direction to 46% reduction target, as well as a perspective toward the 2050 carbon neutrality. The five documents include: 1) the 6th Strategic Energy Plan; 2) the Plan for Global Warming

Countermeasures; 3) the Green Growth Strategy to achieve carbon neutrality by 2050; 4) the NDC; and, 5) the long-term low GHG emission development strategy (long-term strategy). Relations between these policy documents are summarised as Figure 2.

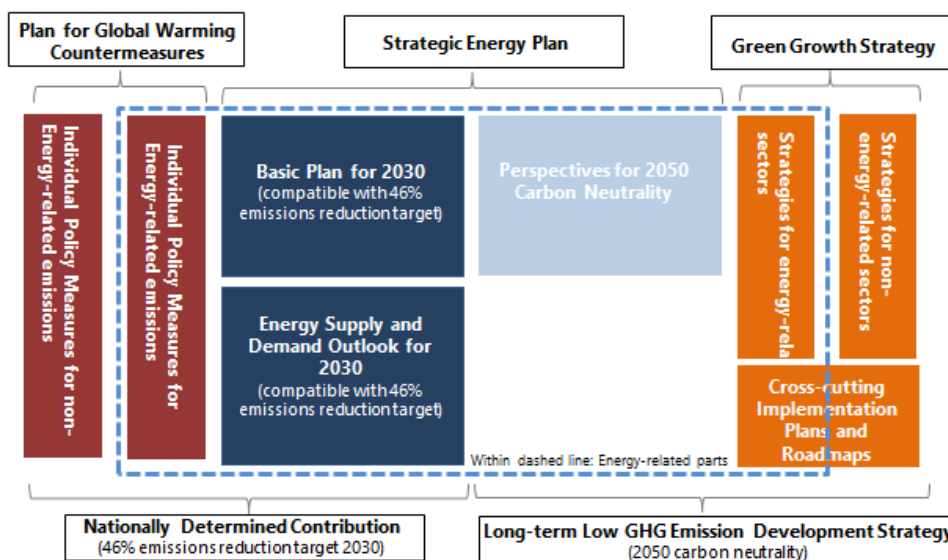


Figure 2 Relations between Key Climate and Energy-related Policy Documents in Japan

Source: Matsuo, N. and K. Tamura (2021) Understanding the 6th Strategic Energy Plan. IGES Working Paper

Since energy-related CO₂ accounts for 88% of the total GHG emissions in Japan, the Strategic Energy Plan is a key policy document for climate mitigation policy. The 6th Strategic Energy Plan includes a basic plan for 2030 and energy supply and demand outlook for 2030, both of which are compatible with 46% emissions reduction target. It also provides perspectives for 2050 carbon neutrality. The Plan for Global Warming Countermeasures provides specific policy measures to achieve the 46% reduction target in both energy and non-energy areas. The Green Growth Strategy identifies 14 key areas for achieving carbon neutrality provides roadmaps for 2050 in each of the 14 areas.

Based upon these domestic policy documents, NDC and the long-term strategy provide specific information on the 46% GHG emissions reduction target by 2030 and carbon neutrality by 2050, respectively, as international pledges.

It should also be noted that the commitment to carbon neutrality by 2050 was enshrined in law. In May 2021, the Act on Promotion of Global Warming Countermeasures was amended to stipulate the goals of the Paris Agreement and the government's declaration of carbon neutrality by 2050 as basic principles and position them in the law. The Act entered into force

in 1998 as the first climate-dedicated law in Japan, and serves as a framework legislation for climate change policy. By clearly setting out the direction and continuity of the policy, the amended Act aims to provide predictability to all actors, including citizens, local authorities and businesses, and to promote initiatives and innovation.

1.2 Perspectives toward Carbon Neutrality

In order to reach carbon neutrality by 2050, the 6th Strategic Energy Plan emphasises the importance of proceeding with multiple scenarios, rather than using a specific scenario (as in the 2030 Energy Supply and Demand Outlook, which the following session will discuss in this paper) as a concrete picture of energy supply and demand for 2050. This approach is reasonable in considering how to approach 30 years from now, when there is still a high degree of uncertainty.

However, the key questions of how to develop the multiple scenarios, how to compare them, how to choose between them, and how to change course (at certain milestones) are still not clear at all. There is no "methodology for the use of scenario analysis in future policy making". It is feared that if this is not done, multiple scenarios will be developed on an ad hoc basis.

The 6th Strategic Energy Plan provides comprehensive perspectives for carbon neutrality in 2050. First, it emphasizes thorough energy conservation and efficiency improvement. Second, it stresses the importance of decarbonising the power sector by exploring all technological options. That means, maximum use of renewable energy is seen as "top priority of a main power source." Simultaneously, it suggests decarbonising thermal power plants by carbon capture, utilization and storage (CCUS) and hydrogen/ammonia co-firing and 100% firing. In addition, somehow contradictorily, it states continuous use nuclear power at the necessary scale and develop new generation of reactors, while reducing dependence on nuclear as much as possible. Third, electrification in all the sectors is also identified as the essential approach. Fourthly, promotion of hydrogen-related technologies is emphasised. Hydrogen is expected to be applied for the "hard-to-abate" (i.e., "hard-to-electrify") sectors such as high temperature heat in the industrial sector, steelmaking, aviation and shipping, etc. Finally, direct air carbon capture and storage (DACCS), bioenergy with carbon capture and storage (BECCS) and reforestation are mentioned for offsetting residual emissions.

The 6th Strategic Energy Plan also highlights the importance of fostering Japanese companies' international competitiveness in a decarbonised world. It refers to the Green Growth Strategy that identified 14 areas where future growth would be expected through technological innovation and provided roadmaps for 2050 in each of the 14 areas. The 14 areas are:

- (1) **Offshore wind power, next-generation solar power and geothermal power:** Offshore wind power can be introduced in large quantities and at low cost, and is expected to have an economic spill-over effect. In the photovoltaic industry, the Plan highlights the practical application and creation of new markets for next-generation solar cells, including perovskite solar cells that can be installed on walls and other surfaces where existing solar cells have technical limitations. With regard to geothermal power generation, the Government will conduct surveys of the amount of resources in suitable areas for development, provide risk money to business operators, review the operation of regulations under the Natural Parks Law, the Hot Springs Law and other relevant laws and regulations, and promote local understanding.
- (2) **Hydrogen and fuel ammonia industries:** the Government will make efforts to reduce supply costs and increase demand.
- (3) **Automobile and storage battery industry:** In the automobile sector, aiming to make the entire supply chain carbon-neutral, comprehensive measures will be taken to promote electrification, including promotion of the introduction of electric vehicles and fuel cell vehicles, development of quick recharging facilities and hydrogen stations, development of next-generation battery technology and promotion of manufacturing sites, and support for automobile dealers, maintenance companies, service stations, etc., which support parts suppliers and local economies, along with energy decarbonisation.
- (4) **Carbon recycling and material industry:** Carbon recycling is a technology that makes effective use of CO₂ as a resource, and is an important cross-sectional field for the realization of a carbon-neutral society. CO₂ absorbing concrete, carbon recycling fuel (synthetic methane), carbon recycling chemicals (artificial photosynthesis).
- (5) **Housing and building industry and next-generation electricity management business:** Strengthening of regulatory measures such as the obligation to comply with energy-saving standards, including for housing; expansion of the spread of net zero energy houses (ZEH) and net zero energy buildings (ZEB); enhancement and reinforcement of measures for existing stock, including promotion of energy-saving renovation; review of certification standards for excellent long-term housing and the housing performance indication system; and extension of the service life of housing and buildings. In addition, the government is working to

improve the quality of life of homes and buildings. At the same time, the Government will promote energy management initiatives that contribute to the adjustment of electricity supply and demand in line with the amount of electricity generated by solar power generation systems, etc., using energy management systems for homes and buildings (HEMS and BEMS).

- (6) **Next generation heat energy industry:** It is important to decarbonise gas as a source of heat energy. In order to decarbonise gas, it is important to use the next generation heat energy such as synthetic methane synthesised from hydrogen and CO₂ (methanation) and direct use of hydrogen.
- (7) **Nuclear industry:** The development of technologies that contribute to further improving the safety, reliability and efficiency of light water reactors will be promoted. Steady promotion of fast reactor development using international collaboration, and demonstration of small modular reactor technology through international collaboration. Steady promotion of fusion research and development through international collaboration such as the ITER project.
- (8) **Semiconductor and information and communications industries:** Carbon neutrality will be realized by a society that is electrified and digitalized in all fields, including manufacturing, services, transportation, and infrastructure. Therefore, the semiconductor and information and communication industries, which are the foundation of digitalisation and electrification, are key to promoting green and digital at the same time. Promotion of energy demand efficiency and CO₂ reduction through digitalisation (Green by Digital) and energy saving and greening of the digital equipment and information and communication industry itself (Green of Digital)
- (9) **Shipbuilding industry:** The Government will promote technological development of zero-emission ships using alternative fuels such as hydrogen and ammonia, and start demonstration projects by 2025, aiming to achieve commercial operation ahead of the previous target of 2028, and to further promote the use of such ships by 2030.
- (10) **Logistics, human flow and civil infrastructure industry:** The government aims to achieve carbon neutrality in 2050 in the logistics, human flow, and civil engineering infrastructure industries through the formation of carbon-neutral ports for hydrogen imports, the introduction of smart transportation, the promotion of bicycle mobility, the promotion of green logistics, the promotion of

more efficient and lower-carbon transportation networks, bases, and transport, zero emissions in infrastructure and urban spaces, and comprehensive efforts to achieve carbon neutrality in construction.

- (11) **Food, agriculture, forestry and fisheries:** Based on the Green Food System Strategy (May 2021), the Government aim to achieve zero CO₂ emissions in agriculture, forestry and fisheries by 2050 by promoting the development of innovative technologies and production systems and their social implementation throughout the supply chain, from production, processing and distribution to consumption. Specifically, the Government will strongly promote the electrification and hydrogenation of agricultural and forestry machinery and fishing vessels, the reduction of greenhouse gas emissions from agriculture and livestock, sinks such as long-term, large-scale storage of carbon on agricultural land and in the oceans, and the reduction of food losses. In addition, in order to strengthen the CO₂ absorption and storage functions of forests and timber, the Government will promote the conversion of buildings to wooden structures, including the establishment of high-rise wooden technology, and will work to rejuvenate forests through thinning and reforestation using seedlings with excellent growth potential.
- (12) **Aircraft industry:** Aim to establish the technological superiority of Japan's aircraft manufacturing industry for low-carbon development in the aircraft sector, including electrification technology, hydrogen technology, sustainable aviation fuel (SAF) such as biojet fuel, and carbon fibre composite materials for airframes.
- (13) **Resource recycling related industries:** With regard to the "reduce, reuse, recycle and renewable" of wastes, technological development and social implementation are encouraged by legislation and planning. Technologies such as waste power generation, heat utilization and biogas utilization have already entered the commercial phase and are becoming more widespread and sophisticated.
- (14) **Lifestyle-related industry:** A combination of ZEH (Net Zero Energy House) and ZEB (Net Zero Energy Building), home appliances, hot water supply and other equipment, and electric vehicles as moving storage batteries will be implemented to promote total management of housing and transportation. To promote behavioural change through nudging and sharing, and to develop and demonstrate technologies to verify the effects of CO₂ reduction.

As pointed out earlier, the 6th Strategic Energy Plan does not provides a specific energy or

power generation mix for 2050. However, the Green Growth Strategy provides a power generation mix for 2050 as a reference. In that mix, renewable energy accounts for 50 to 60%, nuclear power, thermal power with CCUS, for 30 to 40%, and hydrogen and ammonia for 10%.

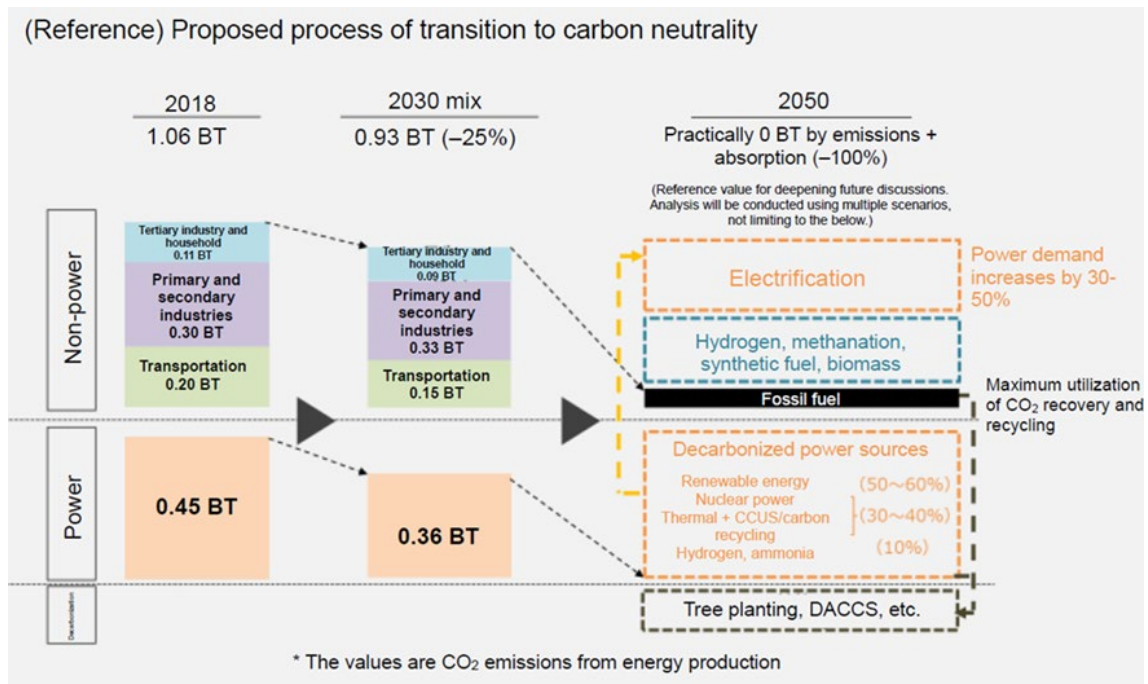


Figure 3 Proposed Process of Transition to Carbon Neutrality

Source: Government of Japan. 2021. Green Growth Strategy.

2. Cooperation among China, Japan and ROK for achieving carbon neutrality

2.1 How can stimulus recovery packages for COVID-19 disaster contribute to socio-economic and energy structural changes toward decarbonisation? If not, what are the challenges and how can they be overcome?

Governments of China, Japan and ROK should deliver green stimulus packages to recover from the COVID-19 pandemic with an aim to both facilitating transformation of economic, energy and social systems toward decarbonisation and ensuring just transition which allows such transformation to be made in a smooth and “no-one-left-behind” manner, including reskilling of workers, green job creation, and financial support for them. As Figure 4 shows, however, China, Japan and ROK are currently categorised as “missing opportunities,” since they have allocated more than 1% of GDP to recovery spending but less than 30% of the total

recovery spending was for a green recovery (i.e., potential impact on GHG emissions, air pollution, natural capital, quality of life and inequity).

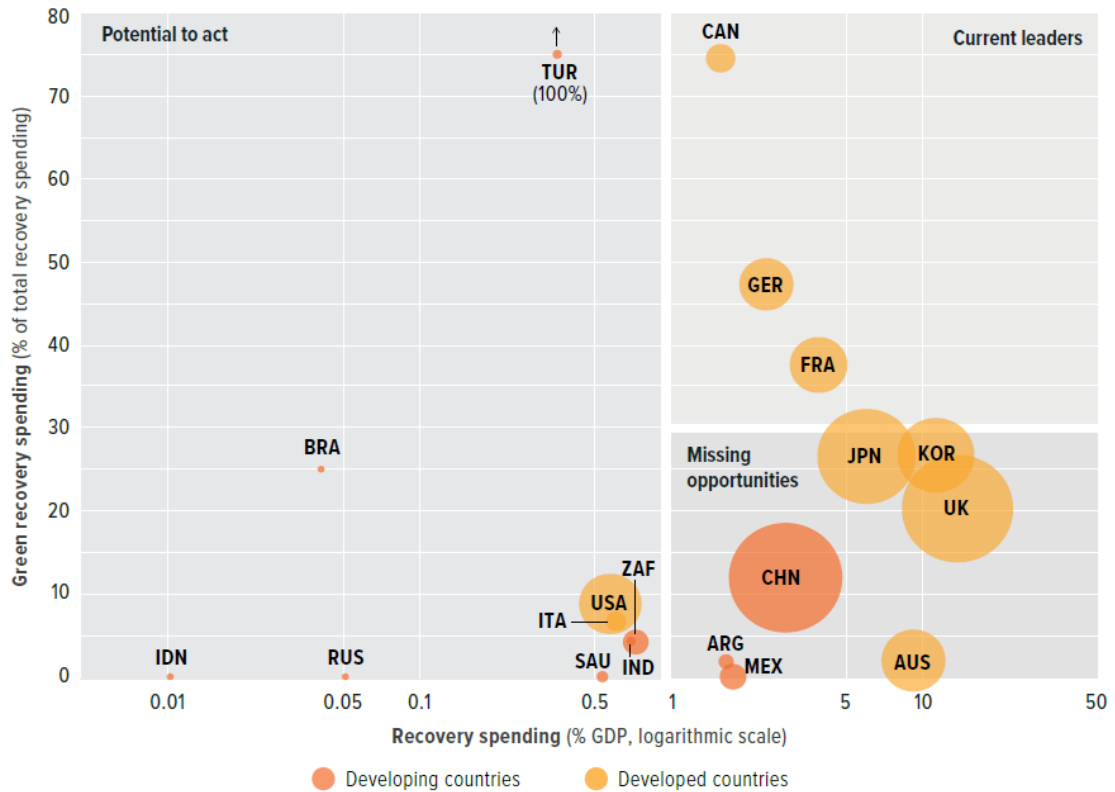


Figure 4 G20 Green Recovery Spending (January 2020-August 2021)

Source: Climate Transparency 2021.

Note: Bubble sizes represent total value of recovery spending.

This figure shows the three countries will be able to expand “green portion” further in the next recovery spending. In doing so, it is recommended to introduce “green strings” for recovery spending and reinforce policy regulations and incentives that align with near-term climate targets.

2.2 How can APT countries collaborate together at the regional level to commit and achieve carbon neutrality?

2.2.1 Mutual learning for developing strategies and roadmaps for achieving carbon neutrality

Having experience and expertise, China, Japan and ROK are in a good position to support

other Asian countries to develop their long-term strategies toward net-zero emissions. The Glasgow Climate Pact, which was adopted at COP26, urges those Parties that have not yet done so to submit long-term strategies towards “just transition to net zero emissions by or around mid-century.” The Glasgow Climate Pact also notes the importance of aligning NDCs with long-term strategies. In addition, rules for a 5-year cycle of NDC submission under the Paris Agreement were agreed at COP26. So, a series of subsequent NDCs need to be set as stepping stones toward net-zero emissions. National long-term emissions pathways toward net zero and

In addition to China, Japan and ROK, as of writing, India, Indonesia, Lao PDR, Malaysia, Singapore, Thailand, and Viet Nam have committed to net zero emissions. Not all of them have not develop long-term strategies. In addition, most of them have not revisited and enhanced their 2030 emissions reduction targets.

2.2.2 Mobilising finance for transition management (or a “just transition”) involving the private and public sectors

The three countries can and should more aggressively provide finance to support just transition from coal to renewable energy in developing countries in Asia. There are notable examples. At COP26, a financial package to accelerate South Africa’s transition away from coal was announced by France, Germany, the UK, the US and the EU. This \$8.5 billion package of grants and concessional finance over 3-5 years aims at speeding the retirement of coal plants and the deployment of renewable energy, while it also revitalises coal mining regions in South Africa by providing potential alternative job opportunities such as electric vehicle manufacturing and green hydrogen production¹.

Similarly, at COP26 Asian Development Bank (ADB), Indonesia, and the Philippine announced a new partnership to establish an Energy Transition Mechanism (ETM) with an aim to accelerating Southeast Asia’s clean energy transition.² Japan committed a grant of \$25 million to ETS. A full scale-up of ETM in Indonesia, the Philippines, and possibly Viet Nam—aiming to retire 50% of the coal fleet, which is approximately 30 GW, over the next 10 to 15 years—could cut 200 million tons of CO2 emissions per year.

Following these example, the three countries should mobilise the finance through public-

¹ https://ec.europa.eu/commission/presscorner/detail/en/IP_21_5768

² <https://www.adb.org/news/adb-indonesia-philippines-launch-partnership-set-energy-transition-mechanism>

private partnership to help decommissioning coal-fired power plants, providing alternative energy as well as jobs in Asian developing countries. The three countries have government-led financial arms and contributions to multilateral/regional development banks. Together with private sectors, such resources should be mobilised for rolling out renewables and also facilitate just transition.