

Background Briefing: The Economic Cost to Japan of Delayed Transition to Net Zero

Based on data released by the NGFS –
a global group of 141 central banks and
financial regulators

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Executive Summary

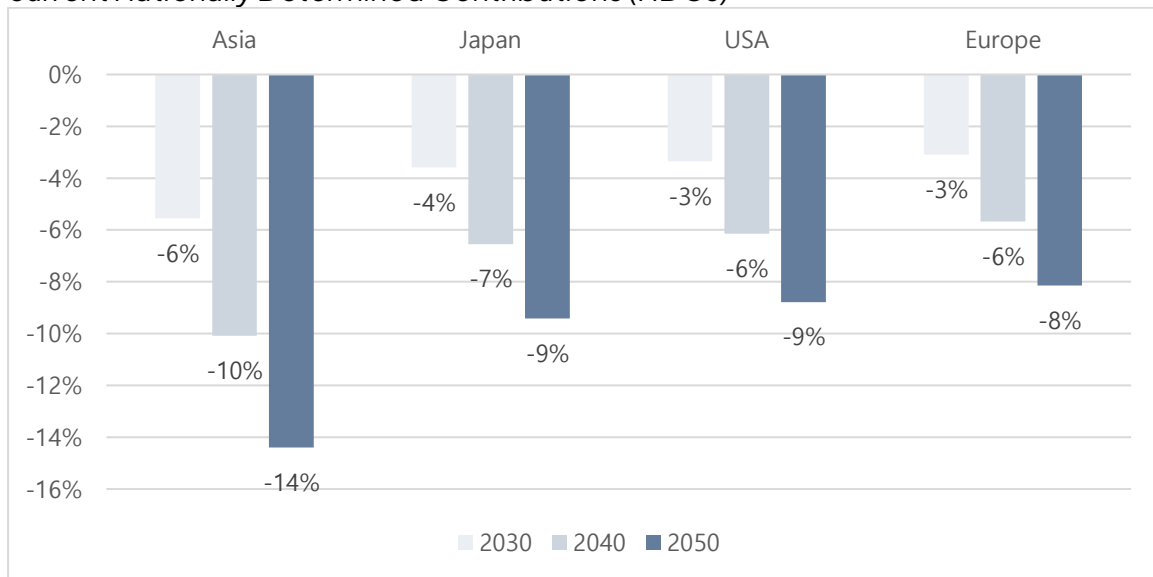
Climate damage would deliver an almost 10 percent annual hit to Japan’s Gross Domestic Product (GDP) if current global climate policy trajectories continue, according to new economic modelling.

Physical impacts are set to wipe out JPY 952 trillion (US\$9.2 trillion) from Japan’s economy between now and 2050, translating to hundreds of thousands of yen being lost by Japanese households annually.

Impacts to Japan are forecasted to be higher than those for the U.S. and Europe. Asia - home to seven out of Japan’s top 10 trading partners - is amongst the world’s most climate change-exposed regions.

This reveals the significant economic risks posed by inadequate climate ambition and the proposed “linear” trajectory to net zero. To safeguard its future, Japan must pursue an ambitious science-based transition pathways for transition that is supported by the necessary supporting climate policy.

Figure 1. Change in GDP due to climate damages in Japan and regionally under current Nationally Determined Contributions (NDCs)



About the NGFS Data

The analysis is derived from new data released by the Network for Greening the Financial System (NGFS) – a group of 141 central banks including Bank of England, Bank of Japan, European Central Bank, People’s Bank of China, Reserve Bank of Australia, Reserve Bank of India and US Federal Reserve. It calculates the broad economic effects of climate change, namely from costs associated with extreme weather and indirect effects on labor, capital, land and natural productivity.

Impacts and Economic Costs of a Delayed Transition to Renewables

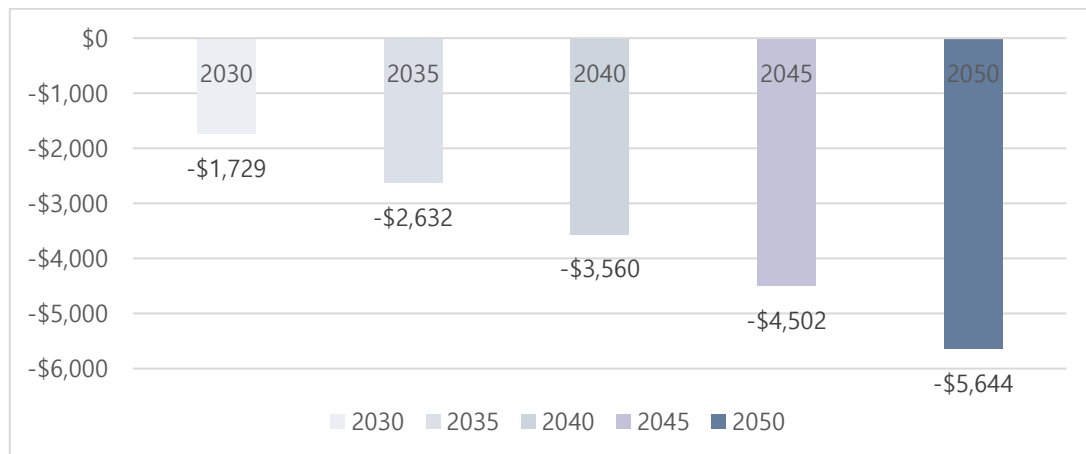
Climate change is already inflicting economic damage on Japan and its key trading partners. In August this year, Japan’s manufacturing production decreased by 3.3% due to the impacts of typhoons,¹ which are forecasted to bring more damage due to climate change.² During the summer, Japan experienced widespread rice shortages, which were partly attributed to extreme heat.³ High sea surface temperatures resulting in record-breaking rainfall have also triggered severe floods and landslides – trends that the Meteorological Agency projects will continue in the coming years.⁴

Moreover, the data shows that with the current policy trajectory, larger, more devastating impacts will compound in the coming years and decades, reducing Japan’s annual GDP by JPY 20.5 trillion (US\$201 billion) by 2030, and further by JPY 40.1 trillion (US\$397 billion) in 2040 and JPY 64 trillion (US\$612 billion) in losses by 2050 under the current NDCs scenario. The costs of mitigation and recovering from climate-related damage and disruption will correspondingly increase as well.

Living standards are also impacted, with per capita annual income falling by approximately JPY 175,000 (US\$1,700) by 2030 and nearly JPY 600,000 (US\$6,000) by 2050, considering physical climate risk impacts.⁵

The total gross domestic income losses from climate damages are projected at just over JPY 970 trillion (US\$9.4 trillion) between now and 2050.

Figure 2. Change in gross domestic income per capita in Japan due to physical climate damages under current NDCs



¹ Shinichi Yamaguchi, [Natural Disasters as Economic Risks: August Production Falls 3.3%, Consumer Spending Pressured](#) (translation), September 30, 2024.

² Tomoko Otake, [How Climate Change Made Shanshan More Likely and More Devastating](#), August 30, 2024.

³ Nikkei, [Rice Policy Struggles with Heatwaves: Shortages and Increased Tourists Compound Issues](#) (translation), August 27, 2024.

⁴ Yoshitaka Uchijo, [Earthquake-hit Noto region experiences record-breaking heavy rains; high sea surface temperatures offshore cause extreme rainfall; prepare for "complex disasters"](#) (translation), September 27, 2024.

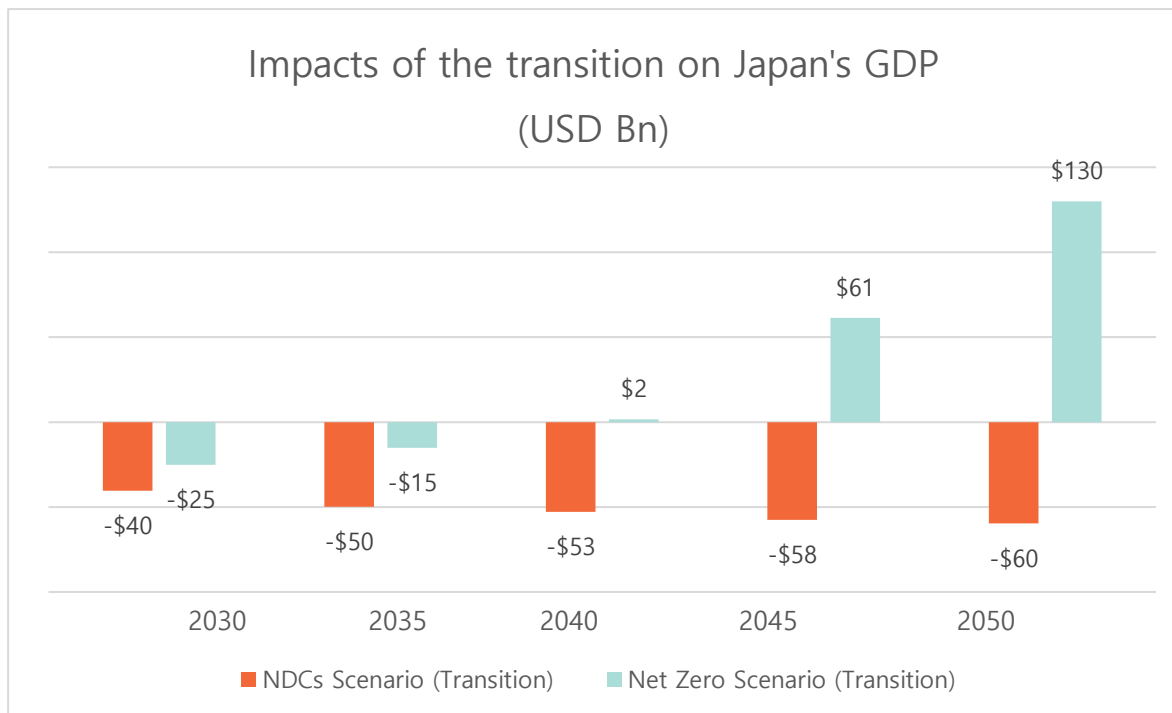
⁵ Population information from the GCAM 6.0 NGFS Model as shown in the IAM dataset

Japan's Transition Opportunity

Japan's economy has considerable opportunities in a local and global transition to net zero. Japan has historically been a technology and innovation leader and has immense potential to be a global transition technology leader, including in battery technology, electrification, energy efficiency, and offshore wind technology.

Transition within the Net Zero Scenario would bring positive impacts to GDP by 2050, relative to the baseline scenario. They would reach approximately JPY 13.6 trillion (US\$130 billion) annually by 2050.

Figure 3. Change in Japan's GDP, NDCs Scenario (transition) vs Net Zero Scenario (transition), excluding climate damages (physical) 2017 PPP, USD Bn



Japan Policy Implications

A Net Zero Scenario-aligned climate target and implementation of supportive policies will accelerate the pace and scale of Japanese and global transition, avoiding additional physical climate impacts and higher-than-necessary transition costs. The benefits in Japan would be billions of dollars annually, rising to approximately JPY 40 trillion (US\$380 billion) saved a year by 2050 in comparison to the NGFS's NDCs Scenario.

The IPCC's modelling suggests that, to minimize climate-related economic damage, Japan's contribution should be an emissions reduction of at least 60% by 2035, compared to 2019 levels.⁶

Japan is at a critical juncture. It will soon determine upcoming decarbonization targets through its next NDC submission and energy mix targets in the 7th Strategic Energy Plan.

Given that economic efficiency is a key component of Japan's "S+3E" energy policy objectives, the economic impacts of climate change must also be considered as policymakers set Japan's policy direction and transition trajectory.

⁶ Climate Change 2023: Synthesis Report. Contribution of Working Groups I, II and III to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change [Core Writing Team, H. Lee and J. Romero (eds.)]. IPCC, Geneva, Switzerland, pp. 35-115, doi: 10.59327/IPCC/AR6-9789291691647

Methodology and Scenario Descriptions:

The analysis is derived from new data released by the Network for Greening the Financial System (NGFS) – a group of 141 central banks including Bank of England, Bank of Japan, European Central Bank, People’s Bank of China, Reserve Bank of Australia, Reserve Bank of India and US Federal Reserve. It calculates the broad economic effects of climate change, namely from costs associated with extreme weather and indirect effects on labor, capital, land and natural productivity.

- These are global economic scenarios. The NDCs and Net Zero results are based on a comparison between a hypothetical scenario where climate change does not exist (baseline scenario), e.g. how the economy would change if it was not ‘shocked’ by climate damages or additional emissions reductions policies.
- The NDCs Scenario
 - considers the NDCs submitted to the UNFCCC as of March 2024.
 - includes all pledged policies even if the required policies to fulfill such pledges have yet to be implemented.
 - Under this scenario, global warming is projected to reach 2.3°C by 2100.
 - It does not include countries’ Net Zero emissions targets.
- The Net Zero scenario limits global warming to 1.5°C with limited overshoot. It models
 - stringent climate policies and innovation,
 - reaching global net zero CO₂ emissions around 2050, and
 - is in line with the objectives of the Paris Agreement.
- Modeled climate impacts stem from
 - increased temperatures, a rise in sea levels and changes in rainfall, which may affect labor, capital, land and natural capital in specific areas.
 - Other impacts include extreme weather events, which can lead to business disruption and damage to property, reduction of agricultural yields and/or labor productivity.

These events can impair asset value and increase underwriting risks for insurers, leading to higher premiums and the possibility of withdrawal of insurance coverage in some regions.

- For the currency conversion rates in this brief, AIGCC used a conservative estimate ranging from 1 USD = 102 JPY to 1 USD = 105 JPY across 2024 to 2050, based on an approximation of the NGFS’s conversion rate of 1 USD = 105 JPY between 2024 and 2050.

The models used most likely underestimate the risks from physical impacts due to the models’ inability to account for the risk of “tipping points” and large-scale climate impacts affecting different regions of the world simultaneously. Also, climate damage estimates are based on a mid-range estimate of climate damages to economies.



Again, this is a conservative assumption based on our current understanding of the climate system as climate models have consistently underestimated the pace of human-induced change in the climate system.

ABOUT AIGCC

The [Asia Investor Group on Climate Change](#) (AIGCC) is an initiative to create awareness and encourage action among Asia's asset owners and financial institutions about the risks and opportunities associated with climate change and low carbon investing. AIGCC provides capacity and a trusted forum for investors active in Asia to share best practice and to collaborate on investment activity, credit analysis, risk management, engagement and policy related to climate change.

With a strong international profile, the AIGCC network also engages with government pension and sovereign wealth funds, family offices, and endowments, AIGCC represents the Asian investor perspective in the evolving global discussions on climate change and the transition to a net zero emissions economy.