



## ESG VIEWPOINT

### A deep dive on Japan's low carbon transition



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#### At a glance

- Recent policy announcements from the Japanese government are a positive signal of the government's decarbonisation ambitions
- There are several factors that make Japan's situation unique compared to other advanced economies
- Challenges remain regarding the country's decarbonisation pathway, creating significant uncertainty for investors
- Engagement to gain better insights into how companies are managing this uncertainty is vital. In 2022, we conducted 50 engagements with Japanese companies on climate-related risks.



## Japan's evolving policy environment

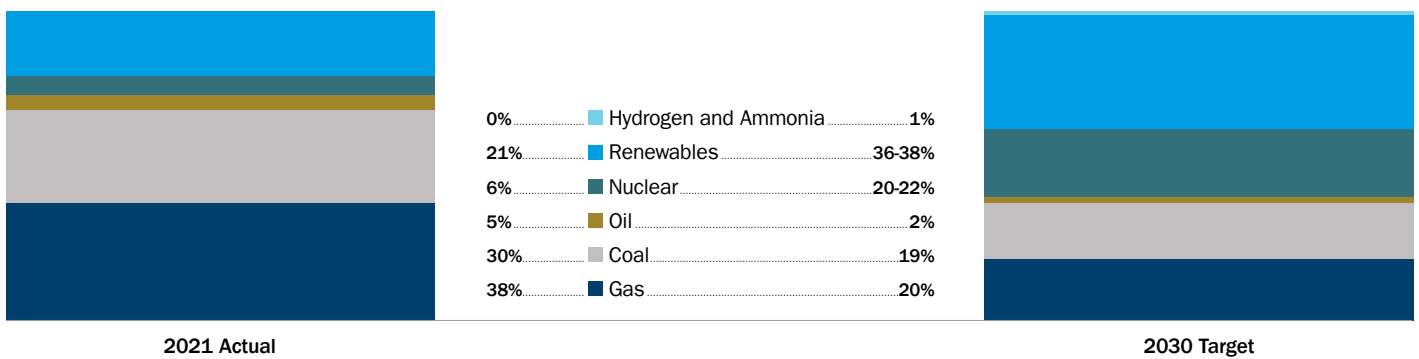
In October 2021, the Japanese government updated their Nationally Determined Contribution (NDC) under the Paris Agreement, setting more ambitious climate goals in line with their Green Growth Strategy.<sup>1</sup>

Japan is aiming to be carbon neutral by 2050 and wants to cut Greenhouse Gas Emissions (GHG) by 46% by 2030 (compared to 2013 levels), up from its previous target of a 26% reduction.

To support their green growth strategy, the government introduced their Sixth Strategic Energy Plan, with a key aim to

ensure safe and stable energy and electricity supply, realise low costs, whilst also seeking to achieve their climate goals. Through this plan, the government aims for renewables and nuclear generation to account for over 50% of power generation by 2030 and are also aiming to enhance energy efficiency and improve energy self-sufficiency.<sup>2</sup>

### Japan's annual electricity generation mix under the 6th strategic energy plan



Source: BNEF, Ministry of Economy, Trade, and Industry. Note: Years show Japan's fiscal year starting from April to March.

<sup>1</sup> METI (June 2021) [Green Growth Strategy Through Achieving Carbon Neutrality in 2050](#)

<sup>2</sup> METI (October 2021) [Outline of the 6th Strategic Energy Plan](#)



As recognised by the government in the energy plan, the power sector remains key to both the countries industrial competitiveness and their low carbon transition, with fossil fuels currently accounting for over 70% of the power generation mix, contributing to approximately 40% of the country's GHG emissions.

Through the G7, Japan have committed to a goal of achieving a predominantly decarbonised electricity sector by 2035, as well as accelerating the phase-out of domestic unabated coal power. Agreeing to these high-level goals on the global stage sends a positive signal of ambition. Reports of successful efforts to water down these pledges, though, raise questions over the alignment of their domestic strategy with these aims.<sup>4</sup>

However, earlier this year, the Japanese government approved the Basic Policy for the Realisation of the Green Transformation (GX), which included a host of more specific policies to achieve their carbon neutrality commitment. These included enhancing power infrastructure through strengthening cross-regional electricity transmission and distribution, building out renewables and nuclear capacity, and plans to introduce 'growth-orientated' carbon pricing through a voluntary emissions trading scheme and a carbon levy on fossil fuel imports in 2028.<sup>5</sup>

To finance this, there has been a significant policy push to promote transition finance. The government are looking to issue a JPY 20 trillion sovereign 'GX economy transition bond' in the next year, to catalyse an estimated JPY 150 trillion from the private sector by 2030. They have developed high-level transition finance guidelines and sectoral roadmaps,<sup>6</sup> while the Bank of Japan have introduced a range of prudential policies to foster the financing of emissions reductions.<sup>7</sup> This is starting to bear fruit, with several Japanese banks developing transition finance frameworks, and a proliferation of transition finance being raised by Japanese issuers since the development of these guidelines.<sup>8</sup>

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**Unique aspects of Japan's power sector transition**



**Uncertainty over future decarbonisation strategies**



**Engaging with Japanese companies, including electric utilities**



**Final thoughts – government policy providing impetus**

<sup>3</sup> G7 Germany (May 2022) [G7 Climate, Energy and Environment Ministers' Communiqué](#) and G7 Japan (April 2023) [Communiqué](#)

<sup>4</sup> Financial Times (April 2023) [G7 climate ministers challenge Japan's energy strategy](#)

<sup>5</sup> [https://www.enecho.meti.go.jp/en/category/special/article/detail\\_178.html](https://www.enecho.meti.go.jp/en/category/special/article/detail_178.html)

<sup>6</sup> Ministry of Economy, Trade and Industry, Ministry of Environment, and the Financial Services Agency [Transition Finance](#)

<sup>7</sup> July (2021) The Bank of Japan's Strategy on Climate Change [https://www.boj.or.jp/en/about/release\\_2021/rel210716b.htm](https://www.boj.or.jp/en/about/release_2021/rel210716b.htm)

<sup>8</sup> Capital Monitor (January 2023) [Why Japan embraces transition bonds](#)



## No ‘one-size fits all’ approach to decarbonisation – unique aspects of Japan’s power sector transition

While Japan have made good progress towards their emissions goals, with energy-related emissions falling by 20% from 2013 to 2020, the continued reliance on coal for power generation makes Japan an outlier compared to other advanced economies.<sup>9</sup>

The fact that Japan’s power consumption is expected to decrease to 2030, due to increased energy efficiency and an ageing population, also makes their decarbonisation journey unique.

As an island nation, Japan’s geography has significant implications for their power sector and decarbonisation efforts, placing an emphasis on security of supply. Limited domestic fossil fuel resources have meant that Japan is currently highly reliant on imported coal, oil and LNG for energy and power, which has worsened following the shutdown of nuclear generation in the aftermath of the Fukushima disaster in 2011.<sup>10</sup>

Meanwhile, a historically fragmented power sector, comprised of a series of regional vertically integrated power companies acting as monopolies, has resulted in limited investment into power generation, transmission, and distribution infrastructure. This is coupled with little inter-regional and international grid connections,

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limiting the stability and resiliency of the power grid to support growth in renewable generation, as well as to withstand natural disasters. The government’s efforts to phase in a series of measures to liberalise the power sector should improve competition and spur investment in infrastructure to support decarbonisation.<sup>11</sup>

<sup>9</sup> IEA (December 2021) [Japan](#)

<sup>10</sup> [https://www.enecho.meti.go.jp/en/category/special/article/detail\\_171.html](https://www.enecho.meti.go.jp/en/category/special/article/detail_171.html)

<sup>11</sup> IEA (2021) Japan 2021 – Energy Policy Review



## Uncertainty over future decarbonisation technologies

### ■ 'Advanced coal technologies'

A unique aspect of Japan's decarbonisation plan is the intended scale-up of 'advanced coal technologies' for baseload power generation, which includes retrofitting coal and gas-fired power plants to co-fire with ammonia and hydrogen. As part of their climate strategy, the government is aiming to develop a hydrogen and ammonia value chain, relying on importing these fuels to support a range of industries. Given Japan's relatively young and large thermal coal fleet, the 6th strategic energy plan has a goal of 1% of power generation coming from ammonia and hydrogen co-firing by 2030, estimating that this will be 10% by 2050.<sup>12</sup>

Some Japanese utilities are trialling this at 20% blending ratios, but there does not appear to be any example of 100% ammonia combustion for power generation. This raises questions over the technical and commercial feasibility of these technologies, with estimates that the levelized cost of electricity for 100% green ammonia combustion is expected to be approximately US \$170/MWh by 2050, significantly higher than other renewables. Bloomberg New Energy Finance estimate that this is 'unlikely to become an economically viable path for Japan to reduce power sector emissions'.<sup>13</sup>

These technologies are also promoted as being low or no emissions at the point of combustion when co-fired at high blending ratios, but the emissions reduction potential has also been heavily questioned. The production of hydrogen and ammonia, as well as the likely requirements for Japan to import these fuels, means there are significant associated upstream emissions, with both currently predominantly produced using conventional fossil fuel sources. Green hydrogen and ammonia could minimise upstream emissions, but the significant energy losses associated with converting renewable power into hydrogen or ammonia, to then be converted back to power, further raise efficiency and costs concerns.<sup>14</sup>

**As part of their climate strategy, the government is aiming to develop a hydrogen and ammonia value chain, relying on importing these fuels to support a range of industries**

<sup>12</sup> METI (June 2021) [Green Growth Strategy Through Achieving Carbon Neutrality in 2050](#)

<sup>13</sup> Bloomberg New Energy Finance (2022) [Japan's costly ammonia coal co-firing strategy](#)

<sup>14</sup> Transition Zero (2022) [Coal-de-sac: Advanced coal in Japan](#)



### ■ Carbon Capture, Utilisation and Storage (CCUS)

Several ‘advanced coal technologies’ will also rely on retrofitting power stations with CCUS technology. This will likely play a role in Japan’s decarbonisation, but there remains considerable uncertainty over the emissions reduction potential and the technical and commercial viability. In Japan’s context, there are also concerns over storage capacity, with some estimates that domestic storage sites could be depleted within a decade. As a result, several Japanese utilities are exploring offshore storage sites, adding to ongoing concerns over costs compared to alternatives, as well as raising concerns over potential leakage given the high frequency of seismic activity.

### ■ Renewables

As with other markets, there remain challenges in Japan associated with grid connection and permitting challenges, particularly for offshore wind given strong local fisheries regulation, as well as whether there is adequate human capital. The dense population and mountainous terrain, coupled with the deep ocean floor and topography, have often been highlighted as a limiting factor to the availability of viable renewables sites and thus a key barrier to scaling renewables capacity.

Despite this, analysis from Japan’s Ministry of Environment highlights that feasible sites for renewable generation are over double current electricity demand.<sup>15</sup> The IEA estimate technical offshore wind potential (largely floating offshore) to be approximately 9 times current electricity demand.<sup>16</sup> The enhanced

role of renewables in the power mix is supported by some recent studies which estimate that renewables could account for between 75 and 90% of the power mix, thus playing a far more prominent role than the current energy plan estimates.<sup>17</sup>

### ■ Nuclear Power

In a reversal of policies introduced following the Fukushima disaster, the government are now restarting previously idle nuclear reactors, extending their useful life, and looking to construct new reactors. This is subject to a significantly enhanced regulatory approval process, overseen by the independent Nuclear Regulation Authority. Ongoing concerns from local communities and broader public perception over safety, particularly considering the reaction to the recent release of treated water from Fukushima, add to uncertainty over the ability to scale up nuclear generation. However, recent surveys suggest a majority of the Japanese population are now in support of restarting nuclear reactors, in part due to the high energy prices following Russia’s invasion of Ukraine.<sup>18</sup>

**Ongoing concerns from local communities and broader public perception over safety add to uncertainty over the ability to scale up nuclear generation**

<sup>15</sup> Transition Zero (2022) [Coal-de-sac: The role of advanced coal technologies in decarbonising Japan’s electricity sector.](#)

<sup>16</sup> IEA (2019) [Offshore Wind Outlook 2019](#)

<sup>17</sup> Berkeley Lab (2023) [The 2035 Japan Report – Plummeting costs of solar, wind, and batteries can accelerate Japan’s clean and independent electricity future](#) and BNEF (2023) [New Energy Outlook Japan](#)

<sup>18</sup> Japan Times (March 2022) [Majority in Japan backs nuclear power for first time since Fukushima](#); World Nuclear News (February 2023) [Poll finds record support for Japanese reactor restarts](#)



## Columbia Threadneedle Investments' engagement efforts

The unique aspects of Japan's low carbon transition, and the uncertainty involved, makes active engagement with companies an important tool to understand how companies are managing climate-related risks and opportunities.

In 2022, we conducted over 140 engagements with Japanese companies across a range of material ESG issues. In 50 of these engagements, with 34 Japanese companies, we discussed the management of climate-related risks. We have continued much of this engagement into 2023.

We have engaged several Japanese electric utilities to understand how they have factored transition risks into business strategies. Through this engagement, we have encouraged verification of emissions reduction targets with the Science-based Targets Initiative. Given the uncertainty highlighted above, a key focus of our engagement has been to understand and request further disclosure regarding their decarbonisation strategy and how they are seeking an efficient and low-cost decarbonisation. We are particularly keen to understand how utilities are assessing the feasibility of the advanced coal technologies as well as their assumptions and strategies for carbon capture, utilisation, and storage, and whether they are taking full account of the upstream emissions associated with some of the solutions on the table. We have also explored how companies are managing community relations and building public trust, while scaling up nuclear and renewable energy.

We have also engaged with several Japanese banks regarding their management of climate risks. Many are active members of the Net Zero Banking Alliance, and significant proponents of transition finance. We have engaged with these banks to understand more about the scope and methodology for setting their financed emissions targets. More recently our engagement has shifted to focus on the implementation of these targets, particularly how they are engaging with their clients on their management on transition risks, and how they are assessing the credibility of their clients' transition strategies.

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## Our conclusions

We have seen significant movement in the past few years in Japan's climate strategy. Early discussions focused largely on the obstacles, which are significant; but the progression of government policy has led companies to accept the reality of the transition and look for solutions. Some of these solutions have risks, both technological and environmental, which are yet to be fully addressed, but the direction of travel is shifting. Our understanding of this unique transition story will help us to better identify the opportunities that arise as a result and ensure engagement dialogue with investee companies is effective. As Japan progresses towards their carbon neutrality goal, we will continue our engagement with Japanese companies to understand their management of climate-related risk and opportunities.




## Get to know the author



### Tom Barron, Senior Associate, Responsible Investment

Tom joined our Responsible Investment team in 2022. He focuses on research and engagement in emerging markets, focusing on APAC financials and utilities. He previously worked at Impax Asset Management, where he was a Sustainability & ESG analyst, involved in company ESG research and engagement, and prior to that worked within the stewardship team at the Principles for Responsible Investment. He holds a Bachelors degree from the University of Bristol and a Masters from King's College London. He holds the CFA UK Investment Management Certificate.

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