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What Decarbonisation Means for the Japanese Economy

18 March 2022

- While there are concerns that decarbonisation efforts could stifle economic growth, incentives of better energy security and improved balance of foreign trade are in play for Japan, given that the country relies on imports for the majority of its fossil fuel needs.
- Decarbonisation also has positive implications for the Japanese economy, which is facing a declining and ageing population, by simultaneously increasing labour productivity as well as carbon productivity.
- We believe that Japan is highly competitive in energy-related technologies, which are set to play a major role in decarbonisation. The development and commercialisation of such technologies will both contribute to decarbonisation in Japan and meet relevant global demand.

Yuko Iizuka, Economist

“ Uncertainty surrounding decarbonisation policies”

While major countries are pursuing decarbonisation policies to achieve carbon neutrality by 2050, some see a high degree of uncertainty as to whether decarbonisation efforts, with a runway of almost 30 years going forward, will proceed smoothly.

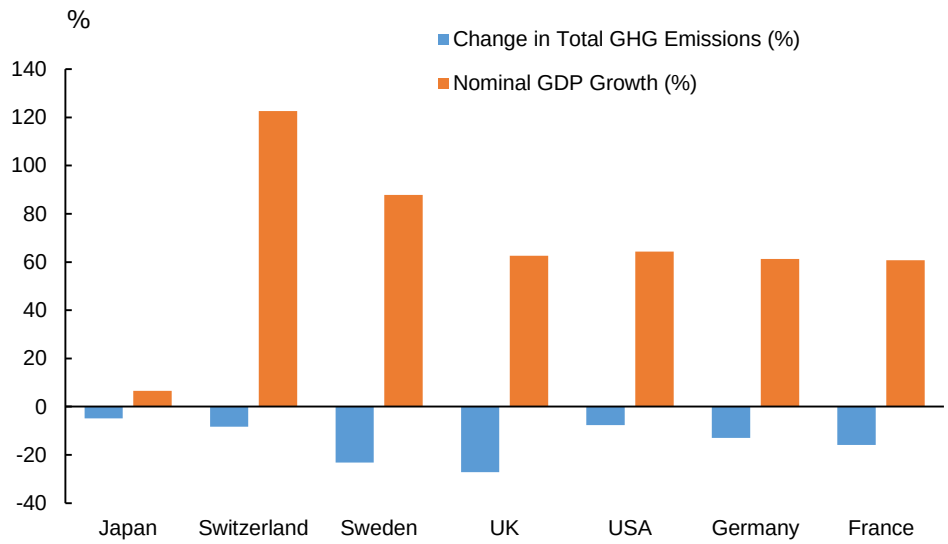
For example, too sudden of a switch to renewable energy could destabilise energy supplies and erode support for decarbonisation. Historically speaking, in the US it has not been easy to maintain and implement environmental measures even for a relatively pro-environmental administration. We consider that even in developed countries that are currently active in green investment, there is no guarantee that the relevant investment will be sustainable. Furthermore, the fact that the resources needed for renewable energy are unevenly distributed in regions with high levels of geopolitical risk, such as China, might also be a drag on progress.

As such, there have long been concerns that decarbonisation efforts could hamper economic growth through high levels of uncertainty, increased costs and reduced economic activity. Let us explore some of the historical relationships between economic growth and decarbonisation.

Data from the Ministry of the Environment comparing the rate of change in total greenhouse gas (GHG) emissions and nominal GDP growth between 2002 and 2015 suggests that countries with higher GDP per capita than Japan achieved higher reduction rates and economic growth rates than Japan (Figure 1).

"Decarbonisation and economic growth"

Figure 1: Nominal GDP Growth and Change in Total GHG Emissions



Note: The graph compares Japan with OECD countries that exceeded Japan in term of GDP per capita between 2002, when Japan signed the Kyoto Protocol, and 2015.
Source: Ministry of Environment of Japan

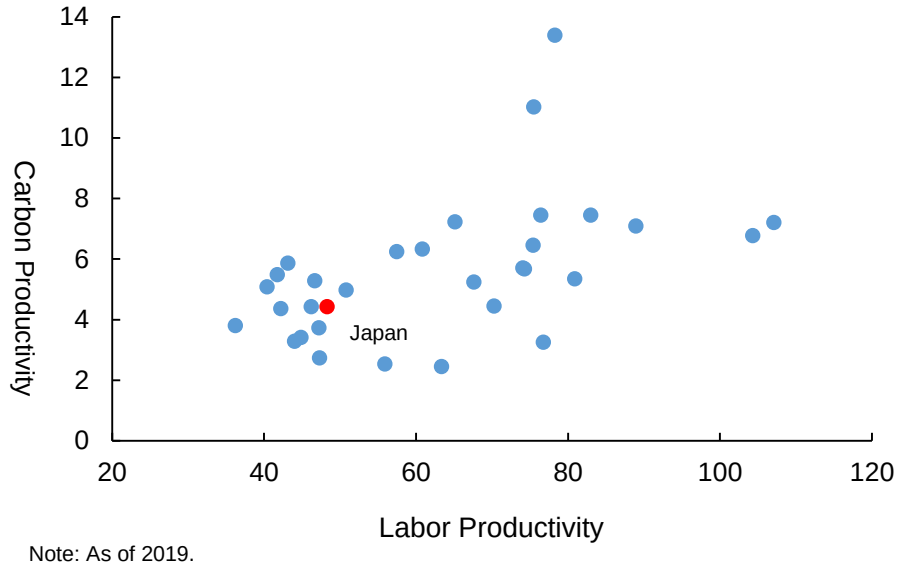
Quantitative analysis by various research institutes using economic modelling shows that decarbonisation and economic growth are compatible. These studies suggested that, (1) the early retirement of the current stock of conventional technologies, use of tax revenues from carbon pricing to encourage investment and the appropriate replacement with highly efficient energy-saving technologies will have a positive effect on GDP, (2) Changes in consumption behaviour and society (digitalisation, more efficient mobility, circular economy, etc.) will facilitate the realisation of a decarbonised society, and (3) the reduced dependence on fossil fuels will lead to a significant reduction in the import costs of crude oil, covering the necessary investments for decarbonisation. It should be noted that the model simplifies certain assumptions relative to the real world. However, we consider that these results present two key takeaways for investors to consider: 1. decarbonisation does not necessarily impede economic growth and perhaps more interestingly; 2. for Japan, which relies almost entirely on fossil fuel imports, it could lead to enhanced energy security and an improved balance of trade with the rest of the world.

We believe that decarbonisation has other implications for Japan's declining and ageing economy in addition to climate change mitigation and this presents a set of incentives for the country to sustainably address decarbonisation in the long term.

"Implications of decarbonisation for the Japanese economy"

Amid a declining population, the effectiveness of low-margin business models, which rely on increasing sales volume, also peaks, and there is a need to move away from the low-cost, low-price model that underpins it. One way to overcome growth constraints in a society with a declining population is to increase the value added, the numerator of labour productivity, while at the same time curbing labour input, the denominator, through efficiency improvements. This is largely consistent with the roadmap for transition from an energy-consuming economy, where carbon inputs increase in order to expand quantity, to an energy efficient economy. Additionally, whilst we are not suggesting this is indicative of a causal relationship, it has also been observed that countries with higher labour productivity have higher carbon productivity (Figure 2).

Figure 2: Labour Productivity and Carbon Productivity



Note: As of 2019.
Carbon Productivity is defined as the nominal GDP at PPP (thousand USD) per CO2 (tonns).
Labour Productivity is defined as the nominal GDP at PPP (USD) per labour hour.
Source: OECD, UNFCCC

To give an example, the compact city concept has long been a topic of discussion in response to declining and ageing populations, and it has been pointed out that in areas with high population densities in urbanised areas, the concentration of shops and facilities and the efficiency of movement can (1) reduce CO2 emissions and (2) increase labour productivity in the service sector and elsewhere.

It is also important to take the viewpoint that decarbonisation is not only about reducing CO2 emissions, but also about overcoming the growth constraints of a declining population and increasing economic convenience.

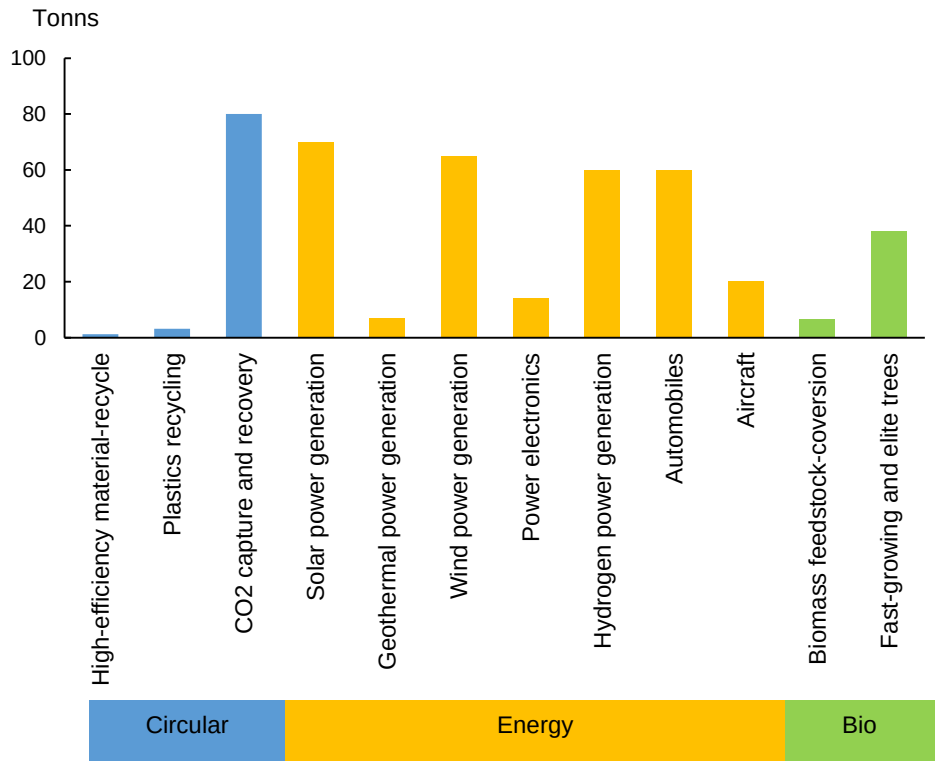
The results of the economic modelling described above suggest that, in addition to transforming social systems such as digitalisation, tax revenues from carbon pricing and other sources should be redirected to investments in highly efficient decarbonised technologies. We believe that intangible asset investments (e.g. intellectual property) are expected to play a greater role in digitalisation and energy-related technologies.

"Ground-breaking innovation is key"

To combat global warming, the government formulated the Innovative Environmental Innovation Strategy in January 2020, leading to the subsequent Green Growth Strategy, which sets out 14 key areas and establishes a ¥2 trillion fund at the National Industrial Technology Development Organisation (NEDO) to provide continuous support for 10 years.

The strategy estimates the global CO2 reduction potential for each technology theme. For example, CO2 capture and storage, such as carbon dioxide capture and storage (CCS), has been shown to have the potential to reduce CO2 emissions by 8 billion tonnes per year, while lightweight and highly efficient solar power generation has the potential to reduce CO2 emissions by 7 billion tonnes per year (Figure 3). Global CO2 emissions in 2018 were approximately 33.5 billion tonnes, of which Japan accounted for approximately 3% or 1 billion tonnes, so these technologies development and commercialisation will not only contribute to decarbonisation in Japan, but is also expected to be in global demand.

Figure 3: Estimate of Potential of CO2 Emission Reduction



Range of estimate: The whole world
Source: Cabinet Office

Among the eight countries surveyed on the 14 key industrial areas, Japan's IP competitiveness is estimated to be the highest in some areas including hydrogen, automobiles & rechargeable batteries, semiconductors, information & communications, food, agriculture, forestry and fisheries. Japan also seems to be doing well in other areas (Figure 4). As can be seen from the variety of export items, Japan's strength lies in its broad manufacturing base.

Figure 4: Japan`s Patent Competitiveness

Energy				Transport & Manufacturing		
Offshore wind	Fuel ammonia	Hydrogen	Nuclear Power	Automobiles & rechargeable batteries	Semiconductors, information & communications	Ships
2nd	3rd	1st	4th	1st	1st	3rd
Transport & Manufacturing				Household & Office		
Logistics, human flows, civil infrastructure	Food, agriculture, forestry and fisheries	Aircraft	Carbon recycling	Houses,buildings, next-generation solar energy	Resource recycling	Life cycle
4th	1st	4th	3rd	2nd	4th	3rd

Note: The survey covers total patent assets during the period of 2010 to 2019 and spans the countries of Japan, United States, China, Korea, Taiwan, United Kingdom, Germany, France. Total patent assets is calculated by considering the number of citations, views, exclusivity and patent's remaining life.
Source: Agency for Natural Resources and Energy

We believe that to ensure that Japan does not lag behind other countries in the diffusion stage despite its superior technology, the Japanese government need to take a long-term view, providing solid support from the basic research stage to the validation stage, and set appropriate framework and implement deregulation in the diffusion stage.

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