

# Energy self-sufficiency rates highlight the vulnerability of the transport sector

YANAGISAWA Akira

The Energy Data and Modelling Center, The Institute of Energy Economics, Japan

The situation in the Middle East deteriorated further following the attacks on Iran by the United States and Israel beginning in February 2026. The Strait of Hormuz was largely blockaded, threatening the stable supply of oil, liquefied natural gas (LNG) and other commodities, and exposing Japan's vulnerabilities.

Japan is poor in natural resources and, partly due to the decline in the use of nuclear following the Great East Japan Earthquake, relies heavily on imports for its energy supply. Its energy self-sufficiency rate stands at 16.3%, which is particularly low among advanced economies.

This energy self-sufficiency rate is the ratio of domestic production to primary energy supply, i.e. total consumption. The self-sufficiency rates for individual primary energy sources, such as crude oil, natural gas and hydro, can be calculated in the same way.

Whilst the initial concern this time was the surge in energy prices, ensuring a stable supply that meets demand is also a crucial issue—as seen with naphtha. With regard to primary energy sources, the extent of the impact of import disruptions can be inferred from their self-sufficiency rates. However, that of the energy sources actually consumed by end-users—which are largely secondary energy sources derived from the transformation of other energy sources—is difficult to assess using primary energy self-sufficiency rates alone. Therefore, we estimated the self-sufficiency rate of secondary energy sources based on the self-sufficiency rates

and composition of the energy sources used in energy transformation (Figure 1)<sup>1</sup>.

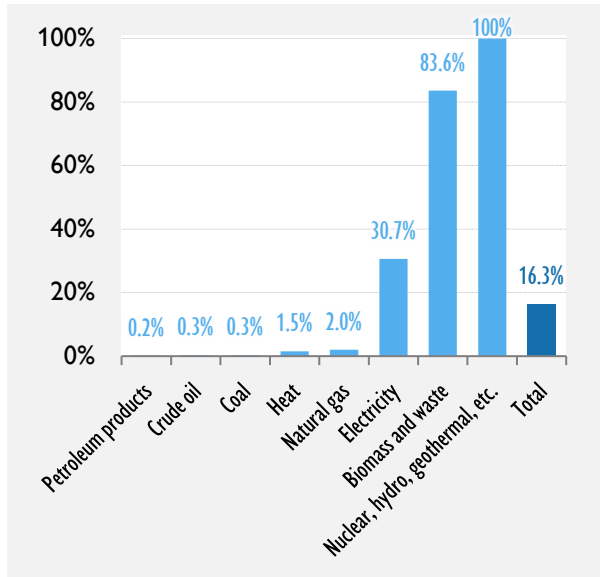
Most petroleum products are manufactured domestically. However, as they are produced by refining crude oil—of which the self-sufficiency rate stands at 0.3%, their self-sufficiency rate is similarly low. The rate for electricity stands at 30.7%, which is high when compared to fossil fuels. However, looking back at past figures, it is by no means at a level that could be described as sufficiently high (Figure 2).

The self-sufficiency rate for electricity is significantly influenced by changes in the energy supply-demand structure—namely, not only by changes in the self-sufficiency rates for input energy sources (which, with the exception of biomass, where imports have been increasing, have been gradual in recent years), but also by shifts in the power generation mix. Whilst it remained high during the period when hydro was the primary power source and thermal power secondary, it plummeted to 14% during the first oil crisis (FY1973). Following the promotion of alternative energy sources to substitute oil, the rate recovered to nearly 50% by around FY2000, but after the Great East Japan Earthquake, it plummeted once again to around 10% due to the scaling back of nuclear. Since the mid-2010s, the rate has been on a recovery trend due to the expansion of solar photovoltaics and the restart of nuclear power plants, but it remains at only around 30%.

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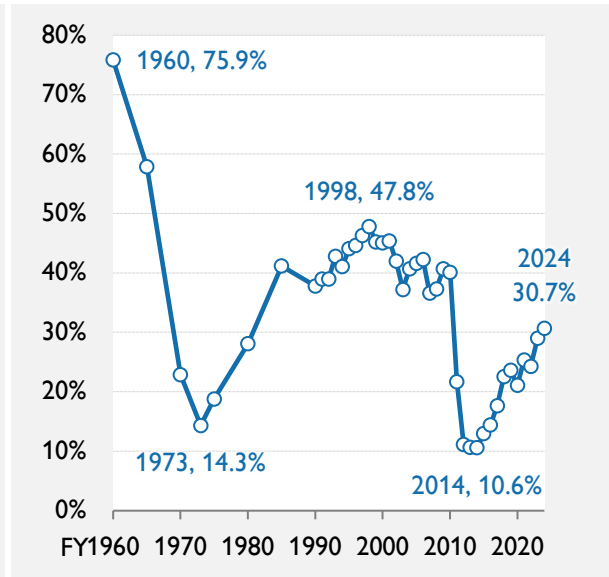
<sup>1</sup> In accordance with the sources of the data used in the calculations, energy sources were categorised as follows: coal, crude oil, petroleum products, natural gas, nuclear, hydro, 'geothermal, solar photovoltaics, etc.', biomass and waste, electricity and heat. Of these, petroleum products, electricity and heat were treated as secondary energy sources. By definition, the self-sufficiency rates for nuclear, hydro and geothermal, solar photovoltaics, etc. are 100%.

Figure 1 | Self-sufficiency rates by energy source (FY2024)



Source: Calculated from the Agency for Natural Resources and Energy 'Comprehensive Energy Statistics: Lower Calorific Value Edition (IEA-compliant tables)'

Figure 2 | Self-sufficiency rate for electricity



Source: Calculated from the Agency for Natural Resources and Energy 'Comprehensive Energy Statistics: Lower Calorific Value Edition (IEA-compliant tables)' and the International Energy Agency 'World Energy Balances'

Having calculated self-sufficiency rates for all energy sources, whether primary or secondary, we can now calculate self-sufficiency rates for each sector of final energy consumption (Figure 3). The self-sufficiency rate for total final energy consumption stands at 12.2%, which is lower than the 16.3% rate for primary energy supply. This is attributable to the existence of energy sources such as nuclear and geothermal, which are domestically produced but not used in the final consumption sector without huge transformation losses. By sector, whilst the rate is relatively high in the buildings sector (residential and commercial), where electricity accounts for a large proportion of used energy, the rates are extremely low in transport, excluding railways and in non-energy use, which are heavily reliant on oil.

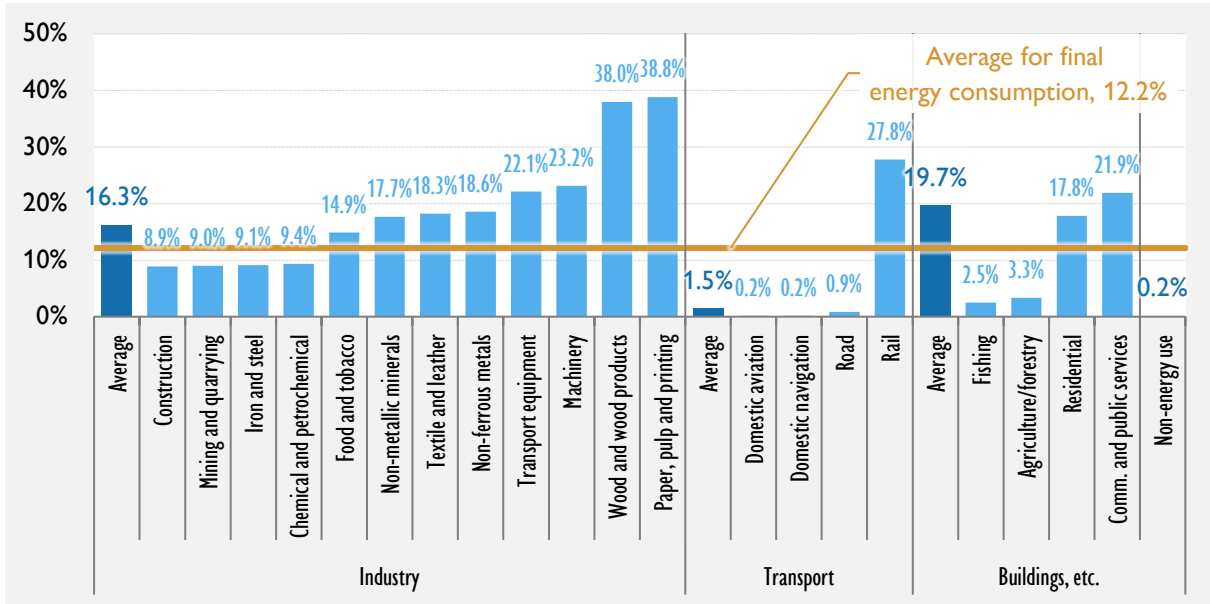
The low level of energy self-sufficiency in the transport sector poses a significant risk. This is because transport infrastructure underpins society and the economy. Furthermore, the fact that the sector provides services rather than goods can complicate matters. In the case of goods, it is possible to mitigate the impact of energy supply constraints by drawing on stocks both of the energy required for their supply and of the goods

themselves. Services, by contrast, cannot be stockpiled.

However, it would be rash to simply conclude that the solution lies in promoting the use of electricity—which has a relatively high self-sufficiency rate—in the transport sector. An increase in electricity demand that is not accompanied by an expansion of power generation by domestic energy sources, such as hydro, nuclear and solar photovoltaics, is unlikely to lead to a reduction in dependence on imports. Furthermore, an upward surge in demand for LNG, which acts as a balancer for electricity supply and demand—both in the short and medium term—could actually amplify risks due to the difficulty of maintaining long-term reserves.

The current utilisation of oil reserves and the securing of alternative supply sources are highly practical measures. Furthermore, curbing hoarding is essential, and depending on the circumstances, energy conservation can also be an important option. Whilst price subsidies as a measure to combat rising prices are meaningful from a political and social perspective, it is necessary to bear in mind the potential side effects, such as their counterproductive impact on efforts to energy conservation.

Figure 3 | Energy self-sufficiency rate by final energy consumption sector (FY2024)



Source: Calculated from the Agency for Natural Resources and Energy 'Comprehensive Energy Statistics: Lower Calorific Value Edition (IEA-compliant tables)'

Contact: [report@tky.ieej.or.jp](mailto:report@tky.ieej.or.jp)