

Long-term Energy Outlook as a Guideline for Securing a Stable Energy Supply

Ken Koyama, PhD
Chief Economist, Senior Managing Director
The Institute of Energy Economics, Japan

The environment surrounding the international energy landscape is becoming increasingly complex, making the future of energy more uncertain. Numerous uncertain factors have become major challenges for energy policies and business strategies. The uncertain factors include the destabilization of the international energy situation after the Ukraine crisis, fluid geopolitical situations in the Middle East and other regions, the importance and difficulty of promoting carbon neutrality initiatives, the complex impact on energy issues caused by the division of the world symbolized by the intensifying U.S.-China confrontation, and the impact on energy supply and demand brought about by the new information revolution such as the rapid spread of generative artificial intelligence and the significant expansion of datacenters. As the future is thus uncertain, long-term energy outlooks are growing increasingly important for preparing for and responding to the uncertain future.

Apart from energy, price hikes for rice, as Japan's staple food, have become a major daily life issue in Japan since the beginning of 2025. As for the cause of the rice price hikes that have developed into a social problem called the "Reiwa rice crisis," the government has expressed a new view that its policy or measures were based on a false perception that rice production was sufficient, because it mistook its rice demand outlook as indicating a failure to take into account rice demand from increasing inbound foreign tourists. In line with this view or analysis, the government has come up with a plan to change its policy to increase rice production in order to ensure a stable supply of rice. This symbolically indicates that how future demand should be anticipated is significant for a stable supply of rice (as well as of energy), which is important for livelihoods and the economy. This means that if a demand forecast is wrong, a stable supply will be jeopardized.

As noted above, there are various uncertainties regarding the future of energy in the world and in Japan, making it difficult to predict the future. Under these circumstances, the impact of the rapidly expanding use of generative AI and relevant datacenters on electricity demand has attracted global attention. It is a well-known fact that there are elements that are uncertain and cannot be fully interpreted in regard to an electricity demand increase under the progress of the new information revolution. While it is certain that the expansion of datacenters will boost electricity demand, datacenters' energy conservation or efficiency is likely to improve. In addition, the use of AI is expected to promote the efficiency of energy use, while the energy efficiency of AI is likely to improve. At present, therefore, it is extremely difficult to determine how much the net electricity demand increase would be. Even so, the fact that the common understanding that this new information revolution will lead to an increase in electricity demand has spread around the world and in Japan as well is of great significance for energy policy and business measures.

The most symbolic and important example of this can be seen in the change in the electricity demand outlook in Japan's Strategic Energy Plan. The Sixth Strategic Energy Plan, approved by the cabinet in October 2021, had projected that Japan's electricity generation as an electricity demand indicator would decrease by 9% from about 1,024 terawatt hours (TWh) in FY2019 to about 934 TWh

in FY2030. It had been understood that even if the impact of electrification for the promotion of decarbonization were taken into account, Japan's electricity demand would decline in the long term due to structural factors such as the maturing Japanese economy, slowing economic growth, and declining population. However, the Seventh Strategic Energy Plan approved by the cabinet in February 2025 projects that Japan's electricity generation will expand by 10-20% from about 1,000 TWh in FY2022 to about 1,100-1,200 TWh in FY2040. This change occurred in a period of less than the four years taken to update the Strategic Energy Plan. It is not difficult to imagine that the direction of the electricity demand outlook was changed by the impact of the new information revolution caused by the spread of AI and datacenters in this short period of time.

In fact, the demand projection change in volume is not so large. The difference between a 9% decrease and a 10-20% increase represents less than 20 percentage points. However, the change in the direction of the projection from a decrease to an increase is of great significance and closely related to the lead time required to develop supply capacity in response to demand changes.

It takes a long time to develop electricity and other energy-related infrastructure. Developing power sources and generation facilities and power grids, such as transmission and distribution networks in preparation for future power demand growth requires a lead time of more than 10 years, extending from planning and decision-making to construction, completion, and operation startup. In some cases, it takes an even longer period of time. The reality of electricity supply equipment development indicates that if a new energy outlook forecasts future electricity demand to increase instead of decreasing as projected in an earlier outlook, measures to respond to the future increase must be materialized immediately. If such measures are delayed in a manner to cause a situation where electricity supply growth fails to catch up with demand growth, Japan's energy security may be gravely affected.

With the awareness of the expected future increase in electricity demand, the Seventh Strategic Energy Plan has given top priority to securing a stable supply of energy, mainly electricity. Various measures have been presented to that end. One of the most noteworthy points in this respect seems to have been the clarification of the policy of making the maximum use of nuclear energy along with renewable energy. Since the Fourth Strategic Energy Plan, the first one after the Great East Japan Earthquake and the Fukushima nuclear plant accident in March 2011, the policy of reducing dependence on nuclear power as much as possible had been maintained. This year, however, the government changed its policy to make the maximum use of nuclear energy on the premise of its secured safety in light of the major changes in the energy situation surrounding Japan. Using nuclear energy, including the existing nuclear reactors, after securing their safety and gaining national understanding, is extremely important for promoting a stable electricity supply, electricity cost cuts, and the reduction of CO₂ emissions. From a longer-term perspective, the government has also recognized the importance of initiatives to build new nuclear power plants to secure a stable supply of electricity and maintain and ensure the necessary human resources and supply chains.

Of course, not only the enhanced use of nuclear power, but also overall efforts to secure sufficient and necessary power sources, as indicated by auctions for decarbonized power sources, will become increasingly important. It is also crucial to overcome various challenges for the significant expansion of renewable energy, which is expected to grow into a mainstay power source. The enhancement of electric grids to meet the development of new power source locations for the expansion of renewable energy is also an important factor in achieving a stable supply of electricity. As well as the development of electricity infrastructure such as power generators, the procurement of sufficient power generation fuels at competitive prices is important for realizing a stable supply of

electricity. In this regard, a stable supply of liquefied natural gas may be one of the most important policy issues indicated in the Seventh Strategic Energy Plan.

The basis for the need for the abovementioned measures to secure a stable supply of electricity is an electricity demand outlook. In order to secure a sufficient and stable electricity supply, it is becoming increasingly important to have a demand outlook based on objective, scientific, and realistic analysis, while assuming uncertainties.

Contact: report@tky.iej.or.jp

The back issues are available at the following URL.

http://eneken.iej.or.jp/en/special_bulletin.html