Special Bulletin

A Japanese Perspective on the International Energy Landscape (699) July 25, 2024

Interest Growing in Roles of Nuclear Energy under New Situation

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

As the global energy transition progresses with the aim of balancing enhanced energy security and decarbonization, interest is increasing significantly in innovations and various energy and technology options, such as the widespread use of CO_2-free hydrogen. In this context, nuclear energy is also coming into the spotlight anew, with interest growing greatly in the roles of nuclear energy. While the abovementioned energy transition is being promoted, the new information revolution symbolized by the rapid expansion of the use of generative AI, the spread of data centers, and the growth of semiconductor production has led to a significant increase in demand for electricity such as stable zero-emission power, contributing to growing interest in nuclear energy. In the following, I summarize my views on the new situations in Japan and other countries, as well as the growing interest in and hope for nuclear energy under such situations.

I think that an important tidal change in global trends surrounding nuclear power was indicated by a statement made in October 2021 by European Commission President Ursula von der Leyen to the effect that nuclear as a stable source of energy is necessary for the European Union. Since nuclear energy is a politically and socially sensitive issue, it is basically up to each EU member state to decide what position to take on it. Accordingly, France makes great use of nuclear energy, while Germany aims to phase it out. At a time when countries in Europe began to consider introducing energy subsidies in the face of general energy price hikes, the statement by the European Commission president attracted global attention. Following the statement, France in November 2021 announced plans to build new nuclear reactors. Then, the United Kingdom followed suit. After the Ukraine war broke out, France and the United Kingdom released specific nuclear plant construction plans.

On the other hand, energy price hikes and supply instability caused by the Ukraine crisis reminded the world of the importance of energy security. As energy security came to be reaffirmed as a top priority in energy policy, the use of coal-fired power generation was strengthened even in Europe as the countermeasure for the crisis, at the cost of increasing CO_2 emissions. Indications then were that Europe was giving greater priority to energy security than to decarbonization at a time of crisis. However, the EU adopted the REPowerEU plan to enhance energy security by phasing out its dependence on Russian fossil energy sources and to promote decarbonization over the medium to short term. Attempts to promote both energy security and decarbonization have become widespread worldwide.

In this regard, the importance of nuclear energy as a stable power source with zero emissions and as a quasi-domestic energy source contributing to improving energy self-sufficiency has become even more strongly recognized. In a sense, this trend has spread worldwide. In Japan, Prime Minister Fumio Kishida has taken the initiative to promote the restart of idled nuclear reactors, extend the operation of lifetime of existing nuclear reactors, build new nuclear power plants, and develop new reactors. This is because Japan, which has many idled nuclear reactors even after restarting 12 reactors,

can be expected to contribute very efficiently to cutting CO_2 emissions, limiting electricity costs, and improving energy self-sufficiency to meet its energy security, environmental conservation, and economic efficiency goals, by making effective use of existing nuclear reactors while securing their safety and national understanding.

In addition to the effective use of existing reactors as mentioned above, many plans to build new nuclear reactors have emerged in Europe and other countries. It is also important that the United States, Canada, Europe, and others have begun to enhance various concrete initiatives for new nuclear energy options, as indicated by growing interest in the development of small modular reactors.

Amid these developments, the progress in the new information revolution and its impact have recently attracted global interest with respect to stable electricity supply and nuclear energy. The rapid spread and expanding use of generative artificial intelligence are rapidly attracting attention as a factor that will be combined with the accompanying significant expansion of data centers, growing demand for semiconductors, and the subsequent expansion of semiconductor manufacturing bases to cause an electricity demand surge in addition to a structural electricity demand increase attributable to progress in decarbonization.

Given greater energy efficiency through the expanding use of generative AI and energy-saving efforts for data centers, there are various views about how the new information revolution would boost electricity demand on a net basis. No definite view exists now. Clearly, however, there is growing awareness of the need to reconsider conventional assumptions and envision a future increase in electricity demand in countries around the world.

Moreover, the increase in demand for electricity due to the information revolution is characterized by extremely high expectations for stable and high-quality zero-emission power sources. As mentioned above, there are measures to strengthen energy conservation, but in terms of expanding the supply of zero-emission electricity, renewable energy is of course also expected, and this is where expectations and interest in nuclear power will increase. In particular, if nuclear power, which has the characteristics of a stable power source, is to provide a competitive power supply from the perspective of the entire power system, it will emerge as an even more effective countermeasure. In addition, there is also interest in the idea of locating SMRs in close proximity to the demand side such as data centers and supplying electricity in comparison with options such as expanding renewable energy sources in areas with suitable natural conditions and supplying them through the strengthening of the power grid. Responding to the increase in electricity demand due to the new information revolution is still a future problem with various uncertainties, and various countermeasures and options are on the table, and nuclear power is clearly one of them.

In Japan, discussions are underway at the advisory council for the formulation of the Seventh Strategic Energy Plan. Since the discussions at the time of the formulation of the current Sixth Plan were implemented in the midst of the acceleration of the trend toward carbon neutrality, the discussion has tended to focus too much on the issue of decarbonization. However, in the formulation of this basic plan, in addition to the issue of further deepening the reduction of GHG emissions, it is necessary to respond to a completely new international situation, such as the emphasis on energy security since the outbreak of the Ukraine crisis, the increasingly complex geopolitical situation, and the division of the world as represented by the US-China confrontation. In addition, it is necessary to respond to the new situation in Japan, such as the possibility of an increase in electricity demand due to the progress of the new information revolution mentioned above, and the importance of securing a stable supply of electricity

In light of these points, it is necessary for Japan to scrutinize the current domestic and foreign energy situation and to discuss and compile a comprehensive and overarching policy response. In this context, from the perspective of contributing to the 3Es, it is certain that the effective use of nuclear power after ensuring safety and gaining the understanding of the public will be the most important issue. While there is no doubt that the effective use of existing reactors is an extremely important priority, it is important to remember that from a long-term and strategic perspective, it is imperative to provide a concrete path for new construction and expansion and support for new technologies in order to maintain the nuclear supply chain and maintain and secure human resources. It is essential for Japan to discuss strategic formulation to enable the response to important new developments that are progressing at home and abroad.

Contact: report@tky.ieej.or.jp
The back issues are available at the following URL.
http://eneken.ieej.or.jp/en/special_bulletin.html