

Energy Highlights

The Road to Carbon Neutrality

The Future of Sustainable Energy
According to the Executive Officer
in Charge of Nuclear Energy
Business

Yasunori Inada

The Vice President and Executive Officer
and CEO of Nuclear Energy Business Unit



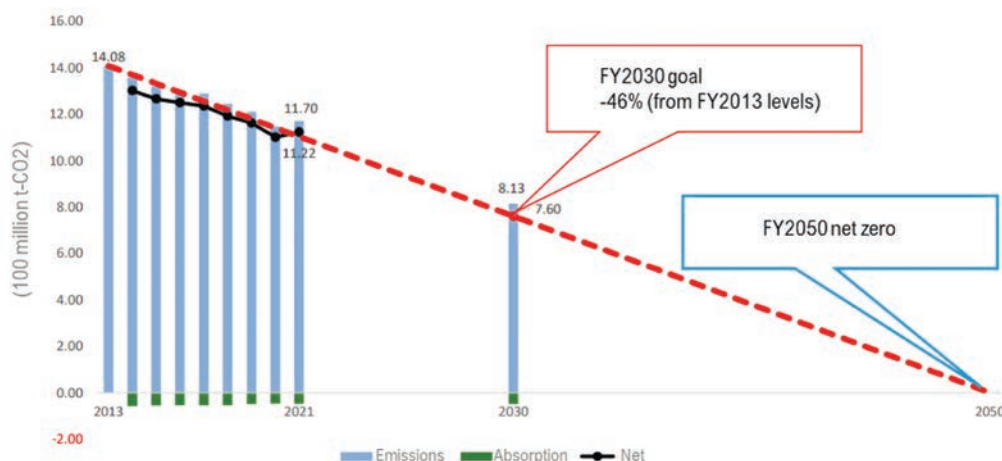
With the climate change problem growing more serious globally, public expectations for nuclear energy are rising as the world moves towards the achievement of carbon neutrality by 2050. In addition to playing a role in improving global energy security and serving as a base-load power source, nuclear energy works together with renewable energy, playing an essential role in ensuring a stable power supply. Yasunori Inada, the Vice President and Executive Officer and CEO of Nuclear Energy Business Unit leading the nuclear energy business of the Hitachi Group, talks about the business vision, initiatives and future prospects in light of the expectations for and global trends in nuclear energy in recent years as energy-related geopolitical risks have surfaced in various parts of the world.

■ Issues Surrounding Energy Market and Expectations for Nuclear Energy

—How will the energy market have to change to

achieve the carbon neutrality of society?

I think that the 28th Conference of the Parties to the UN Framework Convention on Climate Change (COP 28)



Japan's progress toward its 2030 target and carbon neutrality in 2050

(Source) Excerpt from the materials for a meeting of the Ministry of the Environment's Global Environment Committee (held on June 26, 2023)

held last year was a good representation of global trends in the energy sector. Based on the information collected and the technology evaluated to date, it was pointed out that globally, the world's progress toward the goal of keeping the global temperature rise to 1.5 °C, set in the Paris Agreement (COP 21/2015), has been delayed. In response, COP 28 participants published two joint declarations to triple the global electricity-generating capacity for both renewable energy and nuclear energy by 2050.

It was the first COP consensus document in which not only renewable energy, but also nuclear energy was officially specified as a solution to climate change. Nuclear energy is an energy source that does not emit CO₂ during the generation of electricity. In addition, it can supply a large amount of stable power both night and day, without being affected by weather conditions. Therefore, it is seen as a promising base-load power source.

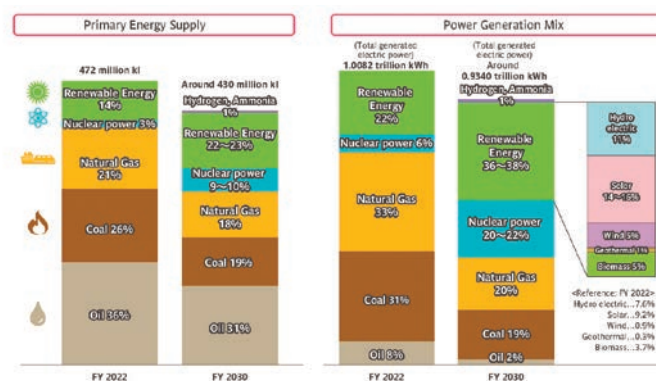
Additionally, demand for electricity has been growing remarkably in the IT field, which is calling for carbon neutral energy sources. It is estimated that the electricity consumption of data centers will grow rapidly if the utilization of data, including generative artificial intelligence (AI) which has been a hot topic of late, continues to increase at this rate. Therefore, it is understood that nuclear energy is essential for supplying a large amount of electricity to enable data centers to operate stably without emitting CO₂. Recently, the number of requests from IT firms around the world for the construction of data centers with small modular reactors which can be installed even in places where the area of

the site is small is increasing.

While the global situation has been changing greatly since the COVID-19 pandemic, the severity of the climate change problem has been increasing every year. While changes in the energy market are accelerating toward the achievement of a carbon-neutral society, the roles of nuclear energy are attracting new attention, and realistic ways of using nuclear energy are being explored.

—From a geopolitical perspective energy security must be ensured, in addition to the achievement of carbon neutrality. What is your view on the tasks that Japan must accomplish for energy security?

The increase in energy prices, which began in response to the Russian invasion of Ukraine, has reminded the world of the task of ensuring energy security, that is, maintaining a stable supply of energy in each country. Japan in particular is a resource-poor country that is dependent on imported fossil fuels. Because many nuclear power plants have been shut down since the Great East Japan Earthquake in 2011, more than 70% of energy generation is from thermal power plants, and the energy self-sufficiency rate, which used to be 20%, is no higher than 13% at present. In addition, since Japan is an island country, exchanging electricity with neighboring countries via cross-border power grids is impossible, which is different from Europe. Accordingly, Japan is extremely vulnerable to the impact of conflicts or the similar problems which may occur elsewhere in the world. I think I am not the only one who is deeply concerned about this reality.



The figure shows the outlook for energy supply and demand in FY 2030

(Source) "Comprehensive Energy Statistics of Japan"; 2022 preliminary figures published by the Agency for Natural Resources

*The sum of the values shown may not be 100% in some cases for a reason of round values

*Renewable energy here, including geothermal power, wind power, and solar power, but not hydroelectric power, includes unused energy

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To improve Japan's energy security, it is important to reduce its dependence on thermal power generation and diversify the sources of its energy. I think that, to overcome this situation, we need to begin operating nuclear power plants again in Japan to increase their output, which is only 6% of the power generated at present, to a certain ratio while also moving ahead with the introduction of renewable energy. Increasing these percentages directly contributes to carbon neutrality. Further, in addition to energy diversity, their distribution, that is, having diverse energy sources distributed across the nation, is also important. If large-scale energy sources, such as thermal and nuclear power plants, are positioned in each region as a base and a certain amount of the energy demanded in each region can be generated from local renewable energy, such as solar or wind power, a stable power supply can be maintained even in an emergency, such as one of the increasingly serious natural disasters. This will increase Japan's resilience.

■ Initiatives for Effective Use of Nuclear Energy by the Next Generation

—While the environment surrounding energy is changing, what are your feelings about the changes in the public opinion regarding the use of nuclear energy?

According to opinion polls, the number of people who have positive opinions about nuclear energy are increasing, mainly among young people. We feel this change in recruitment. The number of students applying to Hitachi's nuclear energy department has increased 1.6 times from the previous year. On the whole, the number of people who understand the significance and features of nuclear energy and those who think seriously about the future of Japan and the energy problem seems to be increasing, mainly among the younger generations. I think this is the successful result of steady awareness-raising activities by people involved in the industry including ourselves, in addition to the diversification of information media.

Of course, more than a few people have negative feelings about nuclear energy. This is not surprising because we experienced the great risks involved in nuclear energy in a visible way with the accident in Fukushima. As I have told you, however, there are risks in energy selection which are hard to realize in everyday life, such as risks generated by the increase in global warming that would be a result of failing to achieve carbon neutrality, as well as the risks created by the stagnation of the power supply. All of these risks threaten our livelihood and they could be fatal.

I believe that the increase in the number of people with positive opinions about the use of nuclear energy, mainly among young people, signifies their mature awareness of these diverse risks and their willingness



Yasunori Inada, the Vice President and Executive Officer and CEO of Nuclear Energy Business Unit



Rendering of BWRX-300

to make choices for the future while accepting a certain level of risk.

In recent years, we have experienced the impact of the situation in Ukraine in the form of rising electricity prices. There is a clear difference in electricity prices between western and eastern Japan, which is attributed to the different nuclear power plant operating rates. I think this experience is serving as a catalyst encouraging people to think about the energy issue as a visible problem.

—Based on what you have told us, what role do you think Hitachi's nuclear energy business plays in supporting the energy infrastructure of Japan and the world?

Our top priority is the decommissioning of TEPCO's Fukushima Daiichi Nuclear Power Station. I think the entire industry must work as one to complete this mission. Hitachi has been working actively on technology development and onsite work needed for specific tasks, including the removal of fuel debris, the handling of treated water, and the decontamination and environmental improvement of the plant premises.

Our second role is to contribute to the improvement of Japan's energy security. As I said, it is important to increase the output from nuclear power plants to a certain ratio. Our role in this is fully supporting electric power companies toward the resumption of operations. We have been working together with the individual electric power companies for many years, aiming to comply with the new regulatory standards in Japan that reflect the lessons learned from the Fukushima accident. As a result, the resumption of operations is finally coming into sight now. I hope that resumption of operations will enable electric power companies to invest in more efficient technologies, resulting in a

virtuous circle toward the solution of the energy problem in Japan.

Finally, we contribute to the realization of a carbon-neutral society. To fulfill the globally growing demand for nuclear energy, we are developing highly innovative advanced boiling water reactor (HI-ABWR) and small modular reactor (SMR) by leveraging the technologies and experience that we have cultivated over many years.

In particular, demand for small modular reactors has been growing overseas due to their lower cost, shorter construction period and high investment predictability. The BWRX-300 is a small light-water reactor that we are developing with GE Hitachi Nuclear Energy, a joint venture with GE Vernova of the US. Construction of the first unit is planned in Canada, and we plan to receive orders for tens of units. If these reactors begin operating smoothly, we can contribute to the stable energy supply in countries overseas, which will increase the motivation of our young employees. Hitachi is also working on technology development on an ongoing basis in view of the next generation, including the development of a fast reactor and the establishment of a nuclear fuel cycle. In particular, the work of our highly motivated young human resources contributing to society in the future would make me happy.

■ Contributing to the Future through Collaborative Creation Based on Trust

—In closing, what tasks do the nuclear energy industry as a whole have to do toward this future and what are Hitachi's aspirations?

First and foremost, the development of the human resources who support nuclear energy industry is a pressing task. After the Great East Japan Earthquake, the construction and operation of nuclear power plants was suspended, and the situation has remained almost unchanged to date. This has resulted in an increase in employees of electric power companies who have never operated a nuclear power plant and employees of plant manufacturers who have never constructed or maintained a nuclear power plant. If this situation does not change, technologies and the knowledge of construction, operation, and maintenance is lost, even if the momentum for the use of nuclear energy increases,

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the human resources to support it could be absent.

This is a pressing task that confronts the entire nuclear energy industry.

To achieve this task, we are digitalizing knowledge by applying metaverse technologies and other technologies in collaboration with overseas partners. Having said that, nuclear energy is a comprehensive engineering science where experience counts at the end of the day. There are many things that you cannot understand without onsite experience. It is important to pass down technologies and knowledge while the people with experience in construction and operation are with us. Resuming the operation of plants and the construction of new plants is very meaningful from the perspective of human resource development.

Moreover, trust is the most important part of moving the nuclear energy business forward. Playing a significant role in society and people's lives carries with it a certain amount of responsibility. This business cannot operate without the trust of not only our customers but also the

people in the community and our partners. We also have the mission of continuing to share neutral and correct information widely in an easy-to-understand manner, which is even more important because we are a manufacturer with knowledge of the technologies. At Hitachi, we have been working since our founding to make society better with constant technological innovations, guided by our mission of contributing to society through the development of superior, original technology and products. The nuclear energy department, which overcomes issues one by one for sustainable energy in the future together with diverse partners including electric power companies, is also an important business for Hitachi's embodiment of its mission. We will continue to contribute to the realization of a carbon-neutral society in the future by globally engaging in collaborative creation based on trust, driven by the spirit that we have inherited from our predecessors.



1992 Joined Hitachi, Ltd.
2017 General Manager of Nuclear Engineering Procurement Division, Hitachi-GE Nuclear Energy, Ltd.
2019 Vice President and Director, Hitachi Plant Construction, Ltd.
2020 President and Representative Director, Hitachi Plant Construction, Ltd.
Assumed current role in 2023.

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• This article is published on Hitachi's energy portal site.

https://www.hitachi.com/products/energy/portal/case_studies/case_029.html



HITACHI
Inspire the Next

If we change the start, we can start the change.

SILENT INNOVATION.

Every day, transmission lines supply the world's energy. From our daily lives to global manufacturing, it all starts here.

That's why our Power Grids, Energy Solutions, and Nuclear Energy business units are committed to innovation. And now, it's why we strive to make our energy systems carbon neutral.

It may be a quiet change. But it's a big change, because it brings us closer to our goal: A sustainable future for all.

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Green Energy & Mobility



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