

Chapter 4

Conclusion and Recommendations

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Chapter 4

Conclusion and Recommendations

1. Analysis

As this research has revealed, SMRs can be a new solution for world energy demand that cannot be satisfied by conventional large-scale nuclear reactors. The technical features of SMRs would be suitable for the general demand in the world today because (1) low-carbon energy is required, especially since the Paris Agreement of 2016, (2) advanced safety features have become important after the Fukushima Daiichi accident, and (3) modularised small-scale generation capacity is suitable for developing countries in terms of electrical grid capacity and financial capacity. Therefore, many countries in the world recently have shown interest in investing in SMRs, as clarified in Chapters 2. In addition to those motivations, the Russian invasion in Ukraine, which began in February 2022, may highlight the value of nuclear energy, including SMRs, in energy security and independence. In fact, the UK published its Energy Security Strategy in April 2022 and has announced that it will boost construction of nuclear power plants and increase investment in SMR deployment.

Such interest in SMRs has encouraged discussions all over the world, as described in Chapter 3. Many experts have pointed out the advantages of SMRs at international conferences and in reports. Some organisations, such as PwC (2021) referenced in Chapter 3, have published concrete and quantitative studies on the benefits of SMR deployment. However, it is important to note that there are many problems to be solved and not all experts are favourable towards SMRs. The Nautilus Institute (2017) showed a critical view of SMR deployment in Indonesia. Government authorities and electric power utilities in countries that are considering deploying SMRs should promote further studies and make their decisions taking various viewpoints into account. Discussions with regulatory authorities are also important for vendors because they can identify safety issues in reactor designs. Through such discussions, vendors should submit the required information and explain how their reactors can satisfy the regulatory requirements, otherwise their applications for approval must be rejected. The letter from NRC to Oklo (2022)

referenced in Chapter 3 clearly shows the importance of such interaction between vendors and regulatory bodies.

At the same time, SMR vendors should accelerate their efforts for technology development and deployment. You can see the concepts of SMRs referred to even in documents or articles published around 30 years ago (e.g. IAEA (1996)), which means SMRs have been researched and developed for a long period but have not been deployed for commercial use yet. Keeping in mind the fact that customers finally decide whether to purchase a product or not, it is crucial to make an attractive proposal for customers. To this end, the IEEJ makes the following policy proposals.

2. Policy Proposals

1) For the leading countries of SMR development:

For these countries, it is recommended that they should continue and accelerate their current development and deployment projects for SMRs. The timescales for their projects should be clarified, and they should make efforts to follow the schedules. If they take too much time, potential customers around the world will lose interest in SMRs. At the same time, it is important to provide enough data so that potential customers can consider closely whether SMRs are suitable for their plans.

There should also be international efforts to harmonise the regulatory requirements for SMRs around the world, since regulatory harmonisation is a crucial method for promoting the mass production of reactor modules and accelerating deployment all over the world. Finally, to expand the potential global SMR market, international cooperation with potential newcomer countries should be promoted in the fields of energy planning, feasibility studies, infrastructure development, and so on.

2) For SMR vendors:

As stated in Section 0, SMR technologies have long been developed by vendors and research institutes, but no commercial reactors have been deployed until present. Now that China and Russia have started construction of their SMRs, vendors in Western countries should follow them. At the same time, their products should be attractive for their customers (electric power utilities, in most cases).

Concurrently, it is crucial for vendors to pass the review process of the regulatory authorities and get design approval for the commercial deployment of SMRs. For a smooth and flexible review process, it is important to have intensive discussions with the regulatory body. If the regulator shows clear instructions to solve safety issues, the vendor should follow them and submit the required documents as soon as possible.

SMR vendors in the leading countries should also promote discussions in Asian or African countries that are considering the deployment of SMRs. To this end, it is important for vendors to clarify the technological features and specifications of their products to help potential customers in their decision-making processes.

- 3) For countries in Asia or Africa considering the deployment of SMRs who need stable and reliable clean energy but currently have small grid systems:

First, these countries should clarify their future energy plans and their needs for nuclear energy to attract the interest of exporter countries of SMRs, as this can lead to cooperation agreements and joint feasibility studies. This is the very beginning of a nuclear energy programme. At the same time, they should develop attractive business environments for vendors and investors. Besides these efforts, if they want to deploy SMRs (or even large-scale reactors), they should develop and improve infrastructure for the utilisation of nuclear energy, including the regulatory schemes that are necessary for the deployment of SMRs. Cooperation with countries that have experience in operating nuclear power plants and with international organisations like the IAEA would be very helpful for this step. Finally, it is also important to conduct open discussions in their countries about the future utilisation of nuclear energy, including SMRs, to improve public understanding and acceptance of nuclear energy.