

Executive Summary

In Asia, which began to develop nuclear power generation in the 1960s, several countries are considering the introduction of nuclear power. East Asia Summit (EAS) countries that have been using nuclear power are China, India, Japan, and the Republic of Korea.

When neighbouring countries use nuclear power or begin generating nuclear power, no country can avoid involvement in potential problems such as information sharing in the event of a nuclear accident, or the transportation of radioactive waste. Hence, delivering information about nuclear power to people in a timely fashion, eliminating information asymmetry, and improving public acceptance of nuclear power generation by both hosting and neighbouring communities are important issues.

This research offers policy recommendations for improving the public acceptance of nuclear power in Asia based on a direct exchange of views between opinion leaders in Euro-American countries, since 2018. For many years, there have been entities that successfully communicated with and served as a bridge between residents and business operators in areas where nuclear power facilities are located.

Whilst local opinion leaders have spoken about their experiences on the public acceptance of nuclear power at many workshops and international symposiums, these workshops held in Japan were unique in that they involved researchers from Asian countries as well. By listening directly to discussions between opinion leaders in countries that have introduced nuclear power, such as in Europe and Japan, policy researchers and advisers from ERIA countries were able to grasp the issues surrounding the impending arrival of nuclear power facilities in their own country or neighbouring countries and can make the necessary preparations.

Before convening the workshops, a representative from the Institute of Energy Economics, Japan visited opinion leaders from the European countries to gain a better understanding of the background of each opinion leader and thereby draw their views out more effectively. This preliminary exchange of views helped workshop participants focus on the major issues of this research and contributed significantly to the policy proposals of the workshops and to the acceptance of the recommendations.

In Japan the number of plants operating as of the end of May 2019 is nine, with 16 plants still under review or preparing for a restart though 54 nuclear power plants were in operation before the nuclear accident at Fukushima Daiichi nuclear power plant. Following the Fukushima accident, permanent shutdown was decided at 17 nuclear power plants (including Genkai 2 and 1F1-6) and was being considered at four plants (Fukushima Daini Units 1–4).

Maizuru City in Kyoto Prefecture and Omaezaki City in Shizuoka Prefecture were selected as the venues for the workshops in January 2019. Maizuru City is the sole neighbouring

municipality in Japan that has a Precautionary Action Zone (PAZ), meaning this municipality has to prepare early evacuation plans in case of a radioactive disaster. Omaezaki City is a hosting municipality of the Hamaoka Nuclear Power Plant, which is the sole power site that suspended its operations at the request of the government.

For regions and countries that have no nuclear power plants but neighbour a town (country) that has one, the example of Kyoto Prefecture and Maizuru City can provide insights in the field of evacuation planning and resident briefings. Changes in the Japanese government's energy policies following the accident in Fukushima in 2011 completely altered the way of life in the region that previously lived in harmony with the nuclear plant. The approaches adopted by the town that relies heavily on nuclear power should provide a helpful reference for future discussions on the introduction or discontinuation of energy facilities in Asia.

Nuclear Power Status in Southeast Asia

As member states of the Association of Southeast Asian Nations (ASEAN) attempt to reduce their fossil fuel consumption in the face of rising electricity demand, they have come to view more positively the introduction of nuclear generation under certain conditions. However, especially after the Fukushima Daiichi nuclear power plant accident, a surge of public anxiety and the ensuing difficulty in securing societal agreement for nuclear power has led many governments to consider suspending installation of new nuclear facilities.

Despite the heightened public anxiety, nuclear energy remains an important option for the ASEAN+6 countries (the 10 members of ASEAN plus Australia, China, India, Japan, Republic of Korea, and New Zealand), due to insufficient renewable resources (Nian and Chou, 2014) and the increasing effects of pollution from coal (Koplitz et al., 2017). Once there is political willingness and public support, several ASEAN countries, including Malaysia, the Philippines, Thailand, and Viet Nam, are likely to proceed with their nuclear power programmes. Nuclear power generation can provide these countries with energy security, and thus the ability to tolerate high gas prices, and a solution to environmental problems such as climate change.

ASEAN countries have mainly expressed intentions to develop full-scale reactors for baseload electricity supply. For example, Viet Nam had planned the Ninh Thuan 1 Nuclear Power Plant (four 1,200 megawatts electric (MWe) water–water energetic reactor pressurised water reactors) and Ninh Thuan 2 Nuclear Power Plant (four 1,100 MWe reactors) (WNA, 2017). The Philippines maintains a mothballed nuclear plant (a 621 MWe Westinghouse pressurised water reactor) (WNA, 2018), though Russia and the Philippines signed a cooperation agreement which included an audit and assessment of the technical condition of the mothballed Bataan plant, "including the option of its rehabilitation" in November 2017 (WNN, 2017).

Economic issues could be solved by obtaining financial assistance from vendors or their corresponding governments (China, Japan, Republic of Korea, and Russian Federation), or by reducing costs by using innovative technologies (e.g. the development of generation IV

reactors). However, innovation in the fields of finance and technology cannot reduce public anxiety.

In addition to the Philippines and Viet Nam, other Energy Research Institute Network (ERIN) countries have sustained an interest in nuclear power. However, public acceptance is still a major issue in these countries too.

Indonesia. Three research reactors have been in operation since 1964, 1979, 1987, and an experimental reactor has been planned since 2013. In March 2015, the government issued a white paper on national energy development policy up to 2050. It expects nuclear power to provide 5 gigawatts of electrical output by 2025. However, the National Energy General Plan to 2050, which was signed by the president in January 2017, excludes major nuclear capacity, and anticipates large increases in oil, gas, and renewable energy. Although nuclear power development has been under consideration since the early 1990s, a steady focus has been lacking (WNA, 2018). Several countries are attracted to become partners of Indonesia to contribute in the development of small-scale reactors. (WNA, 2019)

Malaysia. The Malaysian Nuclear Agency has operated the Puspiti Triga research reactor since 1982. In early 2010, the government had a budget of US\$7 billion to build a nuclear power plant, and in May 2010 the Ministry of Energy, Green Technology and Water was told to find a suitable site so the first unit could be built and in operation by 2021. Five locations on the Malaysian Peninsula were identified. The next steps were to appoint consultants to prepare a feasibility study, develop the regulatory framework and soft infrastructure, and gain the public's understanding. In 2014, the minister responsible for the Malaysia Nuclear Power Corporation announced a feasibility study, including public acceptance, for building a nuclear power plant to start operation in about 2024 (WNA, 2018).

Myanmar. The Government of Myanmar considered purchasing a research reactor (10–15-megawatt thermal light water reactor) from Russia in the early 2000s, but the plan was postponed in 2002 for economic and political reasons. In 2007, the two countries signed an agreement on the construction of a nuclear research centre with a 10-megawatt thermal light water reactor in central Myanmar (Khlopkov and Konukhov, 2011). In the same year, the two countries signed a memorandum of understanding to cooperate on nuclear technology for peaceful purposes (Myanmar Times, 2016) and signed a preliminary agreement to cooperate in the peaceful uses of nuclear energy (WNA, 2019).

Singapore. No official plans have been made for nuclear power development because of siting constraints on the island (WNA, 2018). However, nuclear safety research programmes have been conducted since 2014.

Thailand. Thailand has had an operating research reactor since 1977. In 2008, feasibility studies conducted by the Electricity Generating Authority of Thailand listed five possible sites for the project, and the engineering firm Burns and Roe was commissioned to undertake a 20-month study to recommend siting, technology, and reactor size for the first plant. Public

information and community consultation were identified as very high priority areas for attention. However, after the Fukushima accident, the plans were put on hold. The government's 2015 power development plan had two 1,000 MWe nuclear power plants coming on line in 2035–2036, but no site was mentioned (WNA, 2018). But the description concerning nuclear was removed from the latest 2018 power development plan (JRI 2019).

The status of other countries of which representatives participated in the workshops is as follows.

Cambodia. The government signed a nuclear cooperation agreement with Rosatom, a Russian corporation specialising in nuclear energy, and signed a memorandum of understanding with the China National Nuclear Corporation (CNNC) on cooperation in the peaceful use of nuclear energy. In 2016, Cambodia's Ministry of Industry, Mines and Energy held discussions with CNNC on building a nuclear power plant.

Lao People's Democratic Republic (Lao PDR). The government signed a memorandum of cooperation in the field of nuclear energy for peaceful purposes with Rosatom. In the framework of the memorandum, Rosatom and Lao PDR plan to cooperate in the design, construction, and operation of nuclear power plants and research reactors. In August 2015, it was reported that Rosatom and Lao PDR were in negotiations to set up the country's first nuclear power plant. The talks concerned Russia building two 1000 MWe nuclear power reactors in Lao PDR on a build–operate–transfer basis.

Mongolia. Russia is examining the feasibility of building nuclear power plants in Mongolia. The Nuclear Energy Agency has tentative plans for developing nuclear power, using either Korean smart reactors or Toshiba 4S types, from 2021. Three sites under consideration are Ulaanbaatar, western Mongolia, and Dornod province (WNA, 2017).

In view of these circumstances, the ERIN countries have set up an initiative to share and study the decades of European country experience of nuclear energy to see what information has been exchanged with the host communities. This body of knowledge is expected to help ERIN countries in their efforts to introduce nuclear power.

Purpose of the workshops

When seeking to improve public acceptance, it is important to hold international symposiums with experts from all over the world. It would also be effective to invite regional leaders and opinion leaders from the municipalities hosting nuclear facilities in European countries with experience of using nuclear energy, to workshops to gather and analyse their experiences and formulate policy proposals. The preparation of policy proposals is urgent because of the time it takes to introduce, construct, and commission nuclear power plants.

Many workshops and international symposiums have been held by local opinion leaders speaking about their experiences. However, this event is innovative in that it involves researchers in Asian countries as well. By listening to discussions between opinion leaders in

countries that have introduced nuclear power, such as European countries and Japan, policy researchers from Asia can gain a realistic grasp of the implications of nuclear power facilities in their own country or neighbouring countries and can make the necessary preparations. The policy researchers from ERIN countries who participated in these workshops are expected to take the outcomes and the policy recommendations back to their home countries and put them to use to improve understanding and acceptance of nuclear power.

In addition, these workshops developed a model for better public acceptance of nuclear power that can be adapted and applied to other low-carbon energy technologies, such as wind power, hydropower, and electricity grid management. It is also expected that this method will contribute to finding solutions for issues where public acceptance is difficult to obtain.

Workshops and discussions

This project involved discussions amongst policy researchers and advisers in the Southeast and East Asian and Energy Research Institute Network (ERIN) countries and experts from countries of the Organisation for Economic Co-operation and Development (OECD).

Opinion leaders (e.g. local mayors and civil movement activists in regions hosting nuclear power plants) from four nations (Finland, France, Sweden, and the United Kingdom [UK]), were invited to participate in a two-step workshop that aimed to compile a policy proposal draft. Two workshops were held at local municipalities as the first step to discuss with local opinion leaders who have experiences of coexisting with nuclear facilities. The second step was the wrap-up meeting in Tokyo to compile a policy proposal draft. The workshop participants included energy-related policymakers, local government officials, and researchers from Cambodia, Japan, Lao PDR, Mongolia, Myanmar, and Thailand. These countries are all members of ERIN, an organisation that includes the 10 ASEAN Member States plus Australia, China, India, Japan, Republic of Korea, Mongolia, New Zealand, and the United States – 18 countries in all – and is affiliated with the Economic Research Institute for ASEAN and East Asia (ERIA).

Before the invitation, the project leader visited Finland, France, Sweden, and the UK to discuss the major issues in the draft proposals with the invited opinion leaders, so that the workshop participants could focus on those essential issues to better promoting nuclear public acceptance.

The seven invited opinion leaders and five ERIN member participants visited Maizuru City in Kyoto Prefecture, which has a PAZ even though it is not hosting a nuclear facility, to hold a workshop with 18 local opinion leaders (Figure 1, Figure 2). The Maizuru workshop was designed so that officers responsible for disaster management and participants could discuss their approach and issues at the neighbouring municipality. It is hoped that this will lead to the design of a public acceptance scheme that would be desirable from the neighbouring municipality's viewpoint.

Figure 1. Maizuru Workshop (the neighbouring municipality)



Source: IEEJ.

Figure 2. Maizuru Workshop (representatives from local governments)



Source: IEEJ.

They visited Omaezaki City in Shizuoka Prefecture, which has been hosting nuclear power plants (NPPs) for half a century, to hold a workshop with five opinion leaders (Figure 3, Figure 4). They changed opinions based on the experience of opinion leaders from Omaezaki who have coexisted with NPPs.

Figure 3. Omaezaki Workshop (the NPPs hosting municipality)



NPP = nuclear power plant.
Source: IEEJ.

Figure 4. Omaezaki Workshop (opinion leaders from Omaezaki and ERIN member participants)



ERIN = Energy Research Institutes Network.
Source: IEEJ.

As workshops were held this year by the hosting municipality in Omaezaki City and the neighbouring municipality in Maizuru City, each with a different background, findings from different perspectives were obtained. The findings were summarised and led to the draft policy proposal at the final workshop in Tokyo (Figure 5).

Figure 5. Tokyo Workshop



Source: IEEJ.

Press conferences were held after each workshop (Figure 6). The press asked questions on the public stance on nuclear use in each country, strategies to improve public acceptance of nuclear power in each country, plans to introduce nuclear power in Asian countries, the purpose of this public acceptance improvement project, amongst others. NHK (Japan Broadcasting Corporation) broadcast the Maizuru workshop held in the neighbouring municipality in the Kyoto local news.

Figure 6. Press Conference after Maizuru Workshop



Source: IEEJ.

In addition to the programme, the participants toured the Takahama nuclear power plants owned by Kansai Electric Power Company and the Hamaoka nuclear power plants owned by Chubu Electric Power Company to give them a greater understanding of the situation in Japan. They were able to see for themselves how utilities are committed to promoting safety countermeasures.

Rather than using a lecture format, these workshops were structured so that people going through similar experiences or those who may require public acceptance in the future could jointly deliberate a policy proposal for nuclear public acceptance.

The seven invited opinion leaders were:

- a member of the steering committee of Innovation for Cool Earth Forum (an international organisation working to prevent global warming) who was formerly against nuclear energy but has recently been involved in its promotion;
- a member of the French Parliament, representing the area of Vaucluse next to the Tricastin NPP and the Orano facilities;
- a mayor of the municipality of Flamanville, France, who had contributed to public involvement as a former Commission Local d'Information (CLI) member;
- a mayor of the municipality of La Hague, France, who is also a La Manche Prefecture counsellor, president of the CLI for ANDRA waste final storage in La Manche Prefecture, and vice president of the agglomeration community Cherbourg-en-Cotentin;
- a mayor of the municipality of Östhammar, Sweden, which accepted a spent fuel final disposal facility (currently under review for construction permission);
- a strategic management director, growth and business department, municipality of Oskarchamn, Sweden, which accepted a spent fuel storage facility; and
- an advisor to governments, who has many years of experience working in the energy sector and strategic economic development issues across the world. He has been committed to the people and challenges of Cumbria in the UK.

Findings

The main findings obtained through the series of workshops are summarised as follows.

1) Organisation

- Recent government energy policy statements and objectives about the security and safety of future power sources and their significance for economic development, mean that the government must be involved with the direction of local and prefecture activities where the workshops were held.
- A stronger link between national government policies and implementation on the ground meaning outside of host areas, as well as within, and with those managing site operations would be a requisite.

2) Trust building

- Despite all the good work and the progress experienced, there is a need for a far stronger involvement of third party and independent sources of support to the nuclear option in the policy energy mix for the future.
- Greater public understanding of why nuclear power is so important to the mix for public benefits and economic development, wealth, jobs, and health in the future will need to be further explained.
- Authorities and/or experts should be well equipped with expertise and be trusted.

3) Providing Information

- The media should have a more responsible role in strengthening that relationship with separate sessions on education and better understanding, and therefore more responsibility in being 'part' of the future solutions rather than creating fear and more sensitivity problems.
- Reducing the gap between real understanding and perceptions is an important task, and much still needs to be done by all stakeholders such as utilities, government, media, and so on.
- Incorrect information and images on prejudice destroys the life and heart of local residents in hosting municipalities. They have 'accepted' and lived together with nuclear facilities for decades, actively participating in the decision-making process.
- Information disclosure and sharing by websites, smart phones etc. would be effective.
- Asymmetry of information and of recognition exist between hosting municipalities and areas remote from the facilities. Hosting municipalities have achieved economic development.

4) Distinguishing nuclear risks and non-nuclear risks

- Get across the safety aspects of nuclear risks in the event of natural disasters so that people understand that nuclear risks from radiation exposure are very small and that earthquakes and tsunamis cause greater risks.

No single country has it 100% correct as each country and 'local' situation is very different. Learning from other countries' experiences is important but only if adapted to a country's own cultural, socio-economic, and political scenes.

Policy proposals

Clearly more has to be done to improve further public involvement, understanding, and acceptance towards nuclear power for the future. More needs to be done, especially in non-host adjacent areas and municipalities to secure general public awareness and acceptance.

- National governments should be responsible for their own role – defining basic energy policies and comprehensive rules for safety regulation.
- Decisionmakers should be responsible for predictable and transparent decision-making processes and for steady progress of the operation, actively inviting stakeholders in the schemes.
- Education on energy security and risks is crucial, however, it should be consistent to the basic objectives of the policy development.
- Commission Local d'Information' (CLI) (Local Information Commission) or similar schemes in other countries could be the models for stakeholder involvement.
- No agreement can be made without public understanding and consent.
- Governments, municipalities, and power companies should strive to build confidence of the public.

No single country has a complete solution but it is one of those special global sectors where countries must collaborate because whilst accidents are rare, and nuclear risks unlikely in terms of radiation fall out, we have a duty to current and future generations to ensure that those unlikely risks never materialise. On the other hand, the economic and environmental benefits from nuclear power are also positive and essential for the socio-economic needs of current and future generations that we must also pursue to ensure those benefits are secured.