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Public Acceptance of Nuclear Power Plants in Hosting Communities: A Multilevel System Analysis

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Abbreviations

ASEAN	Association of Southeast Asian Nations
CLI	Commission Local d'Information (Local Information Commission)
ERIA	Economic Research Institute for ASEAN and East Asia
ERIN	Energy Research Institute Network
MWe	megawatt electric
NPP	nuclear power plant
PAZ	Precautionary Action Zone
UK	United Kingdom
UPZ	Urgent Protective Action Planning Zone

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 Puspati 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.

Chapter 1
Public View of Nuclear Energy Today

Today it is getting harder to site or operate a nuclear facility without gaining public acceptance from stakeholders, including residents. There have been cases where construction plans were cancelled after a local referendum, such as the Maki and Ashihama nuclear power plants in Japan (Juraku, Ohkawa, and Suzuki, 2005). The underlying cause for opposition amongst the residents was a lack of information. There are also cases where a power station was ordered to stop operations, based on a judicial decision, even though it passed examination by a regulatory authority, like Takahama Units 3 and 4 and Ikata Unit 3.

Table 1.1. Current Status of Nuclear Power Plants in Japan

	Plant Name	Reactor Type	Output MWe	Commercial Operation	Age	Current Status	Review on Conformity to the New Regulatory Requirements		
							Application by operator	Official approval by NRA	Restart of commercial operation
JAPC	TOKAI-2	BWR	1100	1978	40	Outage (2011.03.11～)	2014.05.20	2018.09.26	
	TSURUGA-2	PWR	1160	1987	32	Outage (2011.05.07～)	2015.11.05		
Hokkaido EPC	TOMARI-1	PWR	579	1989	29	Outage (2011.04.22～)	2013.07.08		
	TOMARI-2	PWR	579	1991	28	Outage (2011.08.26～)	2013.07.08		
	TOMARI-3	PWR	912	2009	9	Outage (2012.05.05～)	2013.07.08		
Tohoku EPC	ONAGAWA-2	BWR	825	1995	23	Outage (2010.11.06～)	2013.12.27		
	ONAGAWA-3	BWR	825	2002	17	Outage (2011.03.11～)			
	HIGASHIDORI-1	BWR	1100	2005	13	Outage (2011.02.06～)	2014.06.10		
TEPCO	FUKUSHIMA Daini-1	BWR	1100	1982	37	Outage (2011.03.11～)			
	FUKUSHIMA Daini-2	BWR	1100	1984	35	Outage (2011.03.11～)			
	FUKUSHIMA Daini-3	BWR	1100	1985	33	Outage (2011.03.11～)			
	FUKUSHIMA Daini-4	BWR	1100	1987	31	Outage (2011.03.11～)			
	KASHIWAZAKI KARIWA-1	BWR	1100	1985	33	Outage (2011.08.06～)			
	KASHIWAZAKI KARIWA-2	BWR	1100	1990	28	Outage (2007.07.05～)			
	KASHIWAZAKI KARIWA-3	BWR	1100	1993	25	Outage (2007.07.16～)			
	KASHIWAZAKI KARIWA-4	BWR	1100	1994	24	Outage (2007.07.16～)			
	KASHIWAZAKI KARIWA-5	BWR	1100	1990	29	Outage (2012.01.25～)			
	KASHIWAZAKI KARIWA-6	ABWR	1356	1996	22	Outage (2012.03.26～)	2013.09.27	2017.12.27	
	KASHIWAZAKI KARIWA-7	ABWR	1356	1997	21	Outage (2011.08.23～)	2013.09.27	2017.12.27	
Chubu EPC	HAMAOKA-3	BWR	1100	1987	31	Outage (2010.11.29～)	2015.06.16		
	HAMAOKA-4	BWR	1137	1993	25	Outage (2011.05.13～)	2014.02.14		
	HAMAOKA-5	ABWR	1380	2005	14	Outage (2011.05.14～)			
Hokuriku EPC	SHIKA-1	BWR	540	1993	25	Outage (2011.03.01～)			
	SHIKA-2	ABWR	1358	2006	13	Outage (2011.03.11～)	2014.08.12		
Kansai EPC	MIHAMA-3	PWR	826	1976	42	Outage (2011.05.14～)	2015.03.17	2016.10.05	
	TAKAHAMA-1	PWR	826	1974	44	Outage (2011.01.10～)	2015.03.17	2016.04.20	
	TAKAHAMA-2	PWR	826	1975	43	Outage (2011.11.25～)	2015.03.17	2016.04.20	
	TAKAHAMA-3	PWR	870	1985	34	Operable	2013.07.08	2015.02.12	2016.02.26
	TAKAHAMA-4	PWR	870	1985	34	Operable	2013.07.08	2015.02.12	2017.06.16
	OHI-3	PWR	1180	1991	27	Operable	2013.07.08	2017.05.24	2018.04.10
	OHI-4	PWR	1180	1993	26	Outage (2013.09.15～)	2013.07.08	2017.05.24	2018.06.05
Chugoku EPC	SHIMANE-2	BWR	820	1989	30	Outage (2012.01.27～)	2013.12.25		
Shikoku EPC	IKATA-3	PWR	890	1994	24	Operable	2013.07.08	2015.07.15	2016.09.07
	GENKAI-3	PWR	1180	1994	25	Outage (2010.12.11～)	2013.07.12	2017.01.18	2018.05.16
	GENKAI-4	PWR	1180	1997	21	Outage (2011.12.25～)	2013.07.12	2017.01.18	2018.07.19
	SENDAI-1	PWR	890	1984	34	Operable	2013.07.08	2014.09.10	2015.09.10
	SENDAI-2	PWR	890	1985	33	Operable	2013.07.08	2014.09.10	2015.11.17
Total	37 units		37,483				25 units	15 units	9 units

Source: JAIF (2019), Current status of Nuclear Power Plant in Japan, https://www.jaif.or.jp/cms_admin/wpcontent/uploads/2019/06/jp-npps-operation190606_en.pdf (accessed 6 June 2019).

In this study, each country's awareness of nuclear power, and experiences and measures for building a consensus will be researched to contribute to the improvement of 'social acceptance of nuclear power', and how society should accept nuclear power, and to propose a policy.

1. Opinion Research in Japan

Before the nuclear accident at the Fukushima Daiichi nuclear power plant in 2011 (hereafter referred to as the 'Fukushima accident'), 54 nuclear power plants were in operation in Japan, accounting for about 30% of power generation, but these nuclear power plants were suspended one after another according to the intention of the chairman of the Nuclear Regulation Authority set up in the wake of the Fukushima accident. Although plants ascertained to be safe by regulatory criteria newly laid down have been restarted since 2015, 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. 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). Eight plants have not made clear their policies. Nuclear power plants generated 3% of power generated in 2017 but the Japanese government considers nuclear power as a base load power source and vows to raise this percentage to 20%–22% by fiscal 2030.

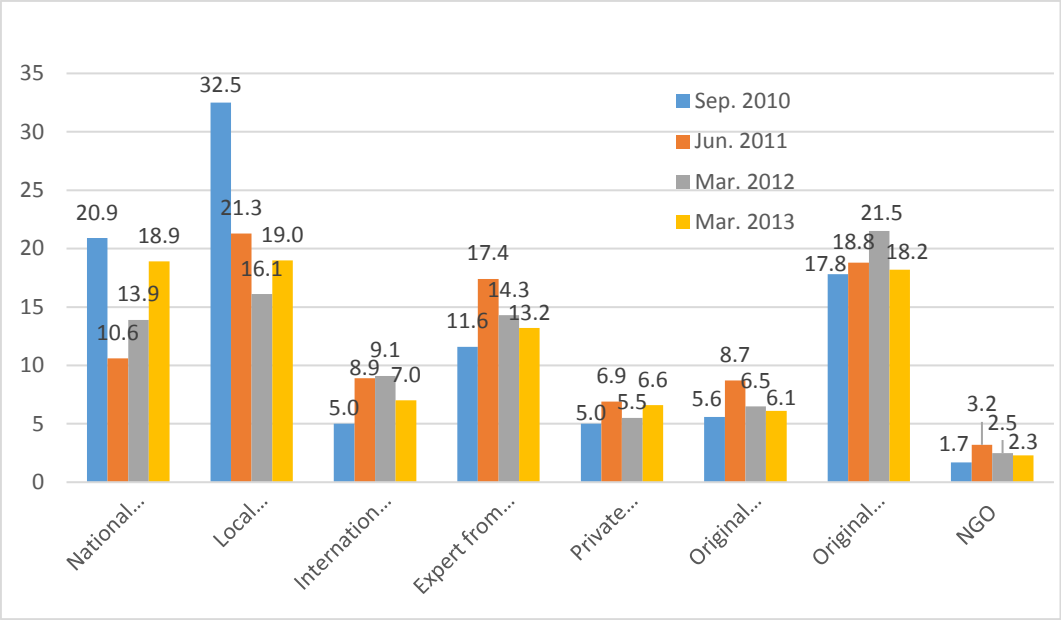
Purpose and method of the opinion research

This report considers the results of the public opinion poll introduced by the Japan Atomic Energy Commission. The poll was conducted at 200 points selected from all over Japan with six people chosen from each of the 200 points. Then, interviews and questionnaires were conducted with a total of 1,200 respondents.

This poll has been conducted four times, from 2010 (before the Great East Japan Earthquake and the Fukushima accident) to 2013, to examine people's trust or distrust in disaster information including on nuclear power. The respondents were asked to choose from several options only one source of information on disasters they can trust the most and it was found that very few people have trusted the government even from before the Fukushima accident (Figure 1.1). The percentage of people who trust local governments, that is, prefectural, city, town, and village governments, declined to 21.3% three months after the Fukushima accident from 32.5% before the accident. This share dropped further to 16.1% a year later. Many respondents replied in a survey into fields other than nuclear power that they trust international organisations, but only 10% or less said that they believe international organisations in a survey into nuclear power. One year after the Fukushima accident, the percentage of respondents who said they trust the original broadcast of TV stations was the highest at 21.5%.

Figure 1.1. Most Reliable Source about a Disaster

(%)



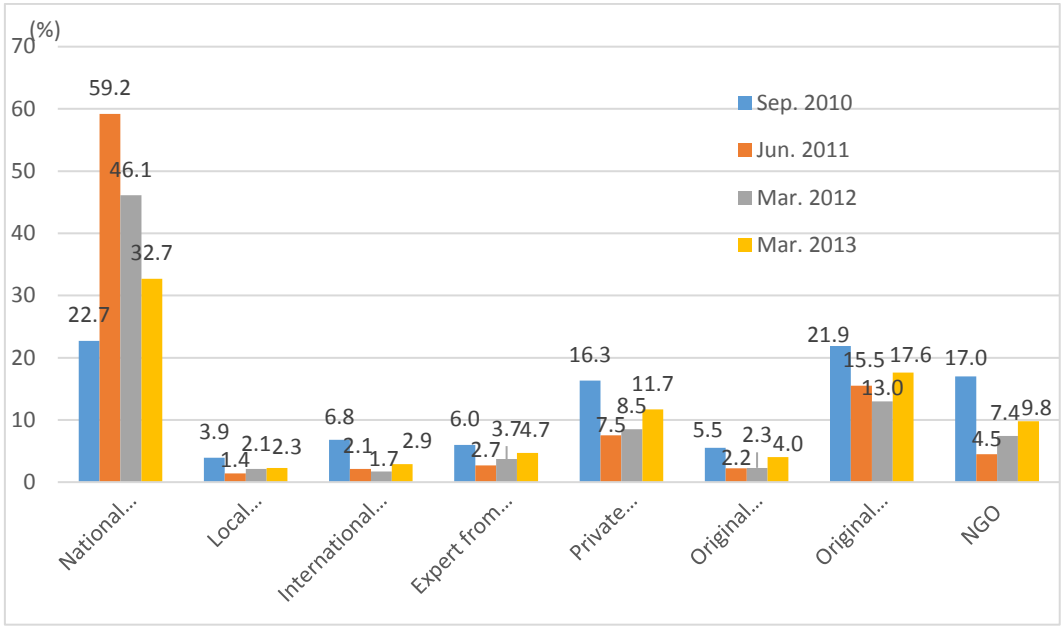
NGO = non-government organisation.

Source: Japan Atomic Energy Commission Conference, *Changes in Public Opinion Relating to Nuclear Power Generation, Hirotada Hirose* (17 July 2013), http://www.aec.go.jp/jicst/NC/iinkai/teirei/siryo2013/siryo27/siryo2.pdf (accessed 28 February 2019) (in Japanese).

In a survey where respondents were asked to choose only one source of information they can trust the least (Figure 1.2), the percentage of those who said that they trust information from the government the least jumped to 59.2% from 22.7% recorded before the Fukushima accident. Although this number is on the decline, the level of trust in the government before the accident has not yet been restored. In the meantime, the original broadcast of TV stations, which most people chose as the most trustful source of information, was selected by many people as the information that they can trust the least. The percentage of people who do not trust their prefecture, city, town, or village fell from 3.9% before the accident. It can therefore be said that distrust in municipalities is relatively low.

Figure 1.2. Least Reliable Source about a Disaster

(%)

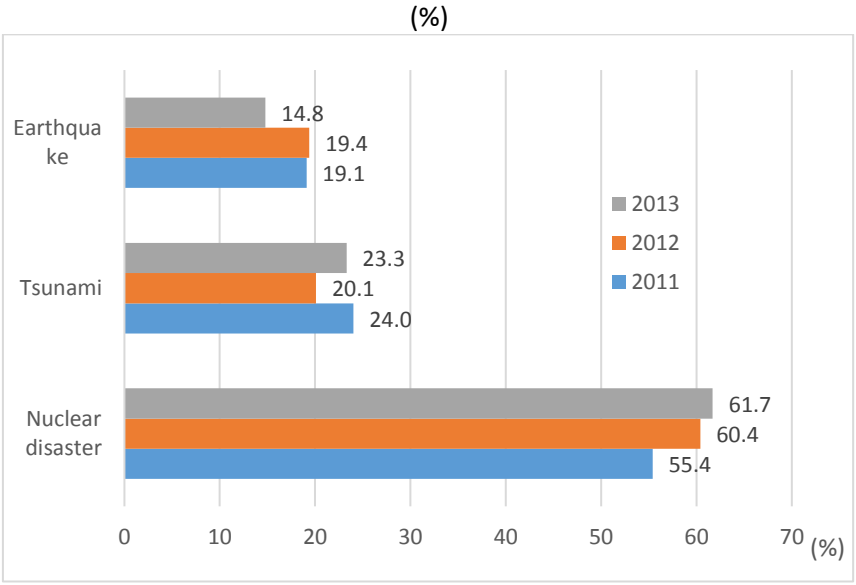


NGO = non-government organisation.

Source: Japan Atomic Energy Commission Conference, *Changes in Public Opinion Relating to Nuclear Power Generation, Hirotada Hirose* (17 July 2013), http://www.aec.go.jp/jicst/NC/iinkai/teirei/siryo2013/siryo27/siryo2.pdf (accessed 28 February 2019) (in Japanese).

Asked a question about the Great East Japan Earthquake, more than half the respondents said, 'the disaster that did the most serious damage was the nuclear power plants accident', despite the fact that most people were killed by the earthquake and tsunami (Figure 1.3). The number of these respondents is gradually rising every year because many people have died or taken their own lives after evacuation. This survey result indicates that many Japanese cite the Fukushima accident as an answer to a question about what caused the most damage in the Great East Japan Earthquake. Many surveys conducted after the Fukushima accident demonstrated that radiation did not have a serious impact on health. As time passes after the accident, however, it can be considered that evacuation and living in an unfamiliar environment have gradually affected the psychology of people.

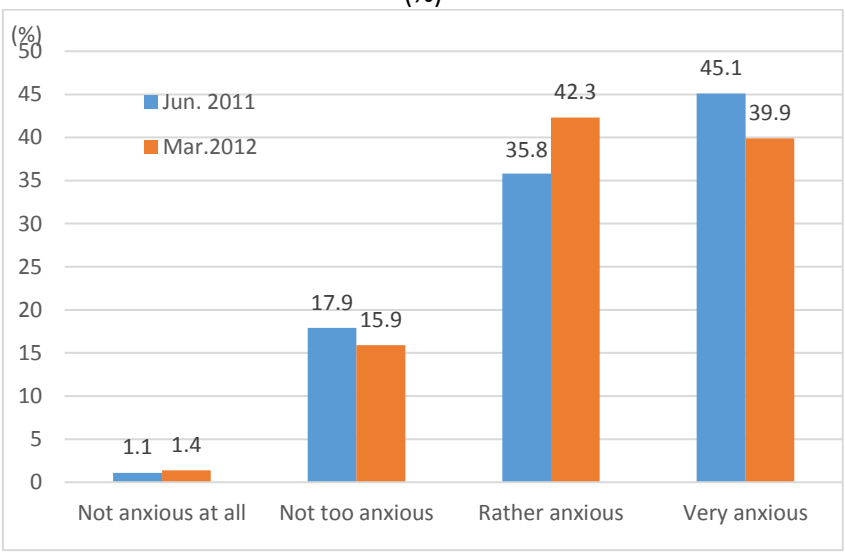
Figure 1.3. Which Disaster is Cited as Causing the Most Damage in the Great East Japan Earthquake?



Source: Japan Atomic Energy Commission Conference, *Changes in Public Opinion Relating to Nuclear Power Generation, Hirotada Hirose* (17 July 2013), http://www.aec.go.jp/jicst/NC/iinkai/teirei/siryo2013/siryo27/siryo2.pdf (accessed 28 February 2019) (in Japanese).

Surveys into people's anxiety about exposure to radiation in the wake of the Fukushima accident were conducted 3 months and 1 year after the accident (Figure 1.4). Those who said they were very anxious or they were rather anxious exceed 80% of the total, indicating that 80% of all Japanese, not only the residents in the neighbourhood of Fukushima, are concerned about exposure to radiation.

Figure 1.4. Anxiousness Regarding Radioactive Exposure due to Fukushima Disaster

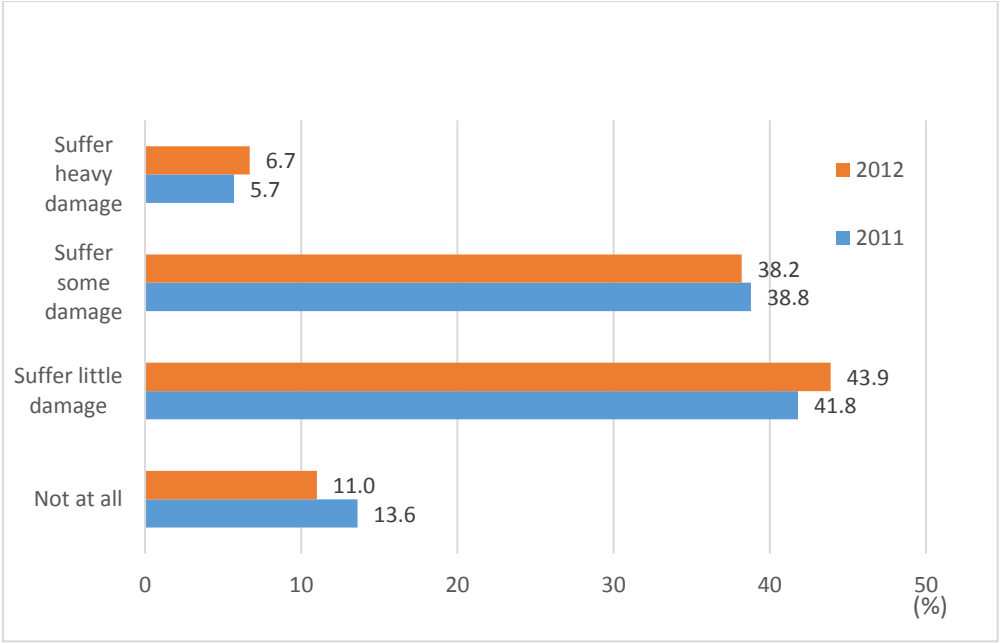


Source: Japan Atomic Energy Commission Conference, *Changes in Public Opinion Relating to Nuclear Power Generation, Hirotada Hirose* (17 July 2013), http://www.aec.go.jp/jicst/NC/iinkai/teirei/siryo2013/siryo27/siryo2.pdf (accessed 28 February 2019) (in Japanese).

In response to a question if the respondent's health has been affected as a result of the Fukushima accident, more than 40% replied they suffered little, but nearly 40% of the respondents thought they had suffered (Figure 1.5) as a result of the Fukushima accident.

Figure 1.5. Do You Think Your Health was Affected by the Fukushima Accident?

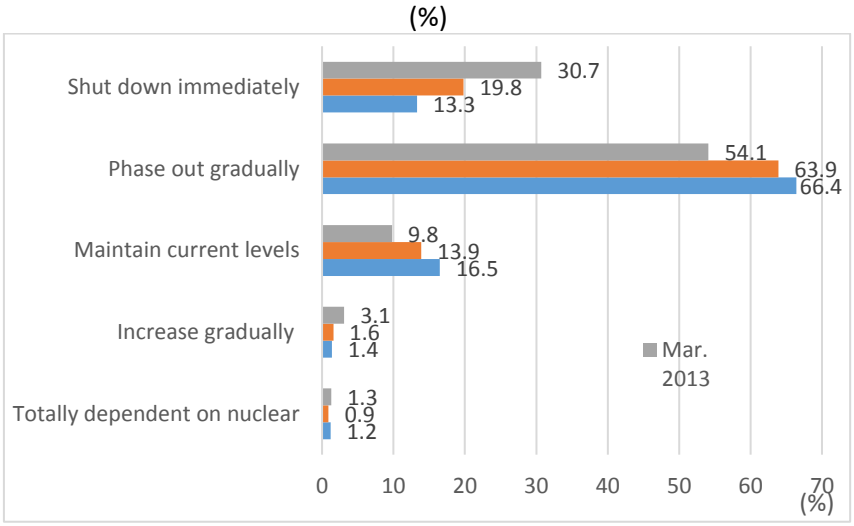
(%)



Source: Japan Atomic Energy Commission Conference, *Changes in Public Opinion Relating to Nuclear Power Generation, Hirotada Hirose* (17 July 2013), http://www.aec.go.jp/jicst/NC/iinkai/teirei/siryo2013/siryo27/siryo2.pdf (accessed 28 February 2019) (in Japanese).

The total of those who said that the nuclear power plants in Japan must be 'shut down immediately' or 'phased out gradually' in response to a question whether nuclear power generation should be discontinued or continued in Japan, the percentage of those who support decommissioning of nuclear power plants was 79.7% in a survey conducted immediately after the Fukushima accident in March 2011. This percentage increased to 84.8% two years later in March 2013 (Figure 1.6). Especially, those who replied that nuclear power plants should be immediately shut down more than doubled to 30.7% from 13.3%. This is probably because recognition has spread that electricity can be supplied even without nuclear power generation because electricity has been supplied without power outages after all the nuclear power plants were stopped in May 2012, even though there was at first a concern immediately after the Fukushima accident, that electricity could not be supplied if all nuclear power plants were shut down.

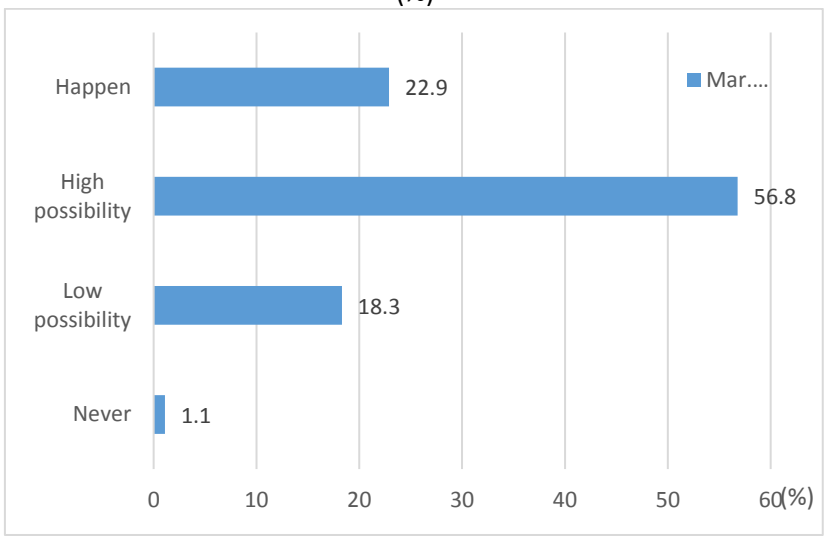
Figure 1.6. Should Nuclear Power Plants be Shut Down in Japan?



Source: Japan Atomic Energy Commission Conference, *Changes in Public Opinion Relating to Nuclear Power Generation, Hirotada Hirose* (17 July 2013), http://www.aec.go.jp/jicst/NC/iinkai/teirei/siryo2013/siryo27/siryo2.pdf (accessed 28 February 2019) (in Japanese).

In response to a March 2013 question 'Do you think it is possible that an accident similar in scale to the Fukushima accident could occur if nuclear power plants in respective regions are restarted?', nearly 80% replied they thought such an accident could 'happen' or such a 'possibility is high' (Figure 1.7). This is probably one of the causes that led to the answer that nuclear power plants should be 'shut down immediately' or 'phased out gradually' in response to the question in Figure 1.6.

Figure 1.7. Possibility of an Accident Similar to Fukushima if Nuclear Power Plants Restarted



Source: Japan Atomic Energy Commission Conference, *Changes in Public Opinion Relating to Nuclear Power Generation, Hirotada Hirose* (17 July 2013), http://www.aec.go.jp/jicst/NC/iinkai/teirei/siryo2013/siryo27/siryo2.pdf (accessed 28 February 2019) (in Japanese).

2. Status in Finland

In Finland, the Loviisa nuclear power plant began operations in 1977. Four power plants are operating and Olkiluoto Unit 3 was under construction as of the end of 2018. Nuclear power generation accounted for about 30% of total power generation in 2017.

The number of people who opposed the commercial use of nuclear power increased following the accident at Chernobyl Unit 4 in the Soviet Union in 1986, but the percentage of nuclear power generation supporters exceeded that of opponents in the second half of the 1990s and, as of 2016, most people support nuclear power generation. The energy resources of Finland include hydroelectric power, peat, and wood biomass but the country is not as rich in hydroelectric power as other Nordic countries and its fossil fuel resources are also scarce. In addition, per capita energy consumption in Finland is high, partly because industries consuming a lot of energy such as paper and iron and steel are flourishing and partly because its cold climate is pushing up demand for energy for heating. However, the self-sufficiency ratio in the primary energy supply in Finland is relatively low at 50% and the country relies on Russia for most of its electricity and fossil fuel. Elimination of the excessive reliance on Russia is considered a challenge. The Finnish government, therefore, is focusing on the promotion of nuclear energy, as well as enhancing efficiency in the use of energy and the expansion of renewable energy sources to address climate change impacts by 2020 as advocated by the European Commission. One of the reasons that the Finnish people support nuclear power generation is probably because the government and parties concerned have positively disclosed the above information on the energy situation.

Finland is the only country in the world where a final disposal facility of high-level radioactive waste is under construction. Since the total amendment of Finland's atomic energy act in 1987, its people, the municipality hosting the radioactive waste facility, neighbouring municipalities, and regulatory organisations expressed their opinions on the project for introducing nuclear power facilities, including the final disposal facility, even before the application for permission for construction was filed. For this reason, the planned construction site of the high-level radioactive waste final disposal facility was decided much earlier than the application for construction permission.

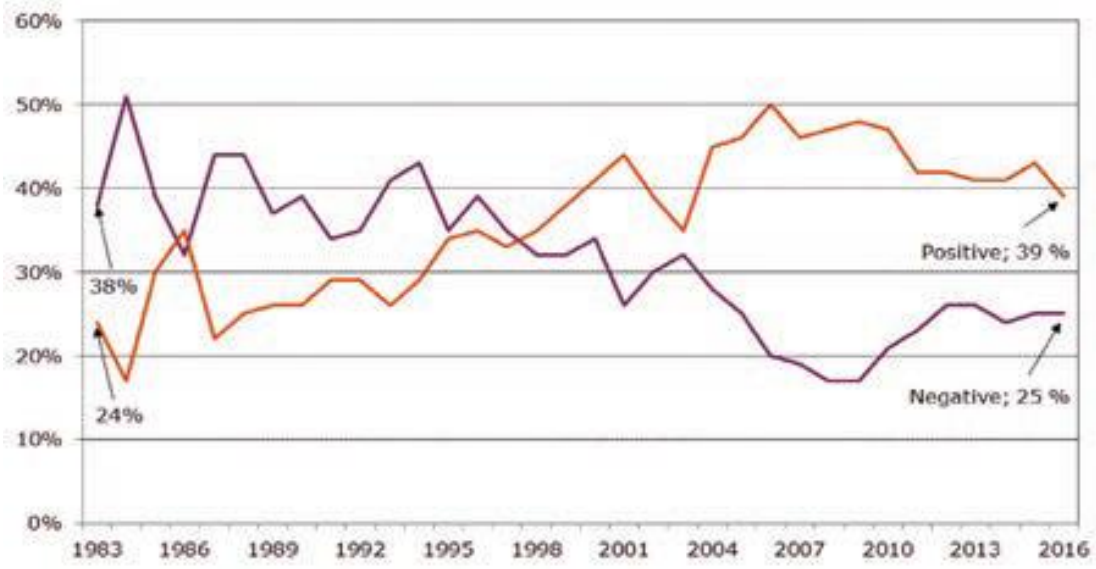
Under the atomic energy act, the Finnish government introduced a step for the government to decide whether a project for introducing nuclear facilities is appropriate or not, and made a decision in principle (DIP), a policy decision means peculiar to Finland. This step is known as the 'DIP procedure'. The atomic energy act clearly states what the government should decide on this DIP procedure and prescribes a procedure format. In this procedure, a nuclear power operator requests the government to make a decision on whether a business plan presented by the operator will be beneficial to the whole of Finnish society. Before making the decision, the government must confirm that the municipality of the planned construction site of the nuclear facility is willing to accept the facility. It is also necessary to confirm that the Radiation and Nuclear Safety Authority of Finland (STUK), a regulatory body, has the opinion that the plan would have no problem in terms of safety. In selecting energy, the

Finnish government concluded that nuclear power is the best option to cope with climate change, ensure energy safety, and reduce reliance on Russia, and has not changed this conclusion to this day.

Figure 1.8 is a revised version of a public opinion poll in Finland that the fiscal year 2017 version of this research quoted. Results of another poll shown in Figure 1.9 also indicate that the majority of the Finnish support nuclear power generation.

Figure 1.8. Evolution of Public Acceptance of Nuclear Power in Finland

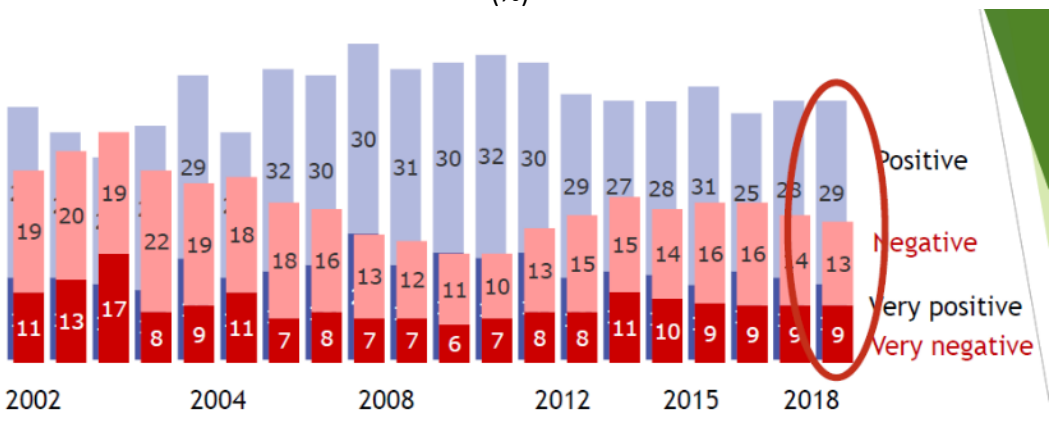
(%)



Source*: ATW–International Journal for Nuclear Power*, (2017), 'What People Really Think About Nuclear Energy*',* 62(3), pp.157–63. https://www.kernenergie.de/kernenergie-wAssets/docs/fachzeitschrift-atw/2017/atw2017_03_157_What_People_Really_Think.pdf (accessed 21 Feb 2019).

Figure 1.9. Nuclear Public Acceptance in Finland

(%)



Source: Partanen, R (2018), Public Acceptance in Finland, July 2018, http://nuclearsafety.gc.ca/eng/pdfs/third-party/Rauli-Partanen-Presentation-Public-Acceptance-Finland-eng.pdf (accessed 6 March 2019).

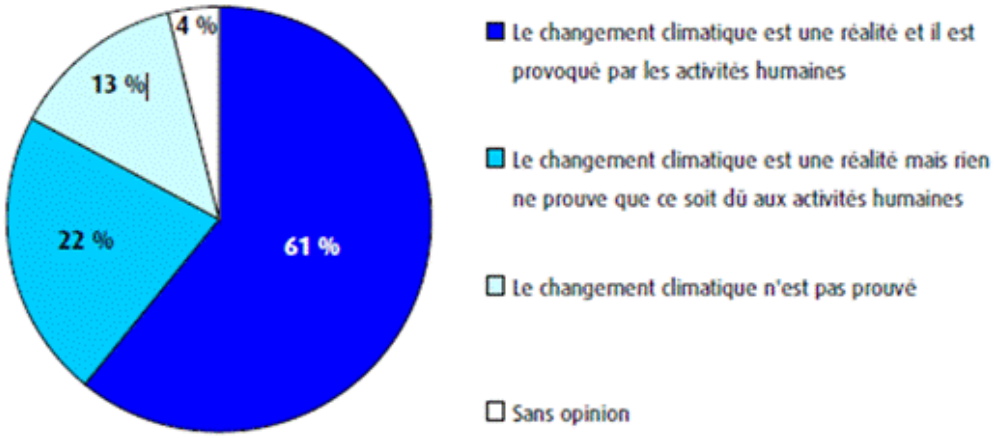
3. Status in France

France, which is not rich in energy resources, has pushed forwards with nuclear energy development to reduce its dependence on energy of other nations since the first oil crisis in 1973. As of the end of 2018, 58 nuclear power plants were operating in the country, producing about 75% of the electric power generated. In 2015, France enacted an energy conversion act that brings the percentage of nuclear power generation down from 75% to 50% by 2025. Later, however, it was found that achieving this goal by 2025 was practically impossible and the government announced in 2018 it would delay achieving the goal until 2035 whilst maintaining the upper limit of 50%.

Figure 1.10 shows the results of a survey conducted by France's Service de l'Observation et des Statistiques (SOeS) (Observation and Statistics Service Committee) in 2013. The committee employed the quarter method so that a reduced drawing of the gender, age, and occupation of all of France would be created, and conducted a survey questioning 1,910 people 15 years or older.

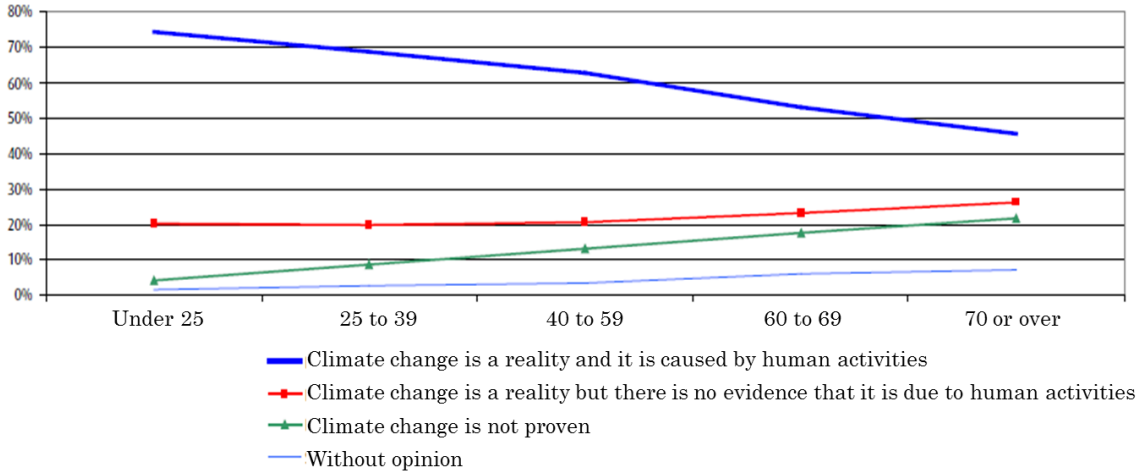
Eighty-three percent of French people regard climate change as a reality and 61% believe that this change is due to human activities (Figure 1.10). Figure 1.11 shows a decrease in this percentage as the age of the respondents increase. More than 70% of respondents less than 25 years old think that human activities have caused climate change while less than 50% of those who are 70 years or older think so.

Figure 1.10. Opinion on Climate Change in France



Source: Service de l'Observation et des Statistiques (2013), *Baromètre d'Opinion sur l'Énergie et le Climat en 2013*, https://www.connaissancedesenergies.org/sites/default/files/pdf-pt-vue/barometre_dopinion_energie_et_climat.pdf (accessed 6 March 2019) (in French).

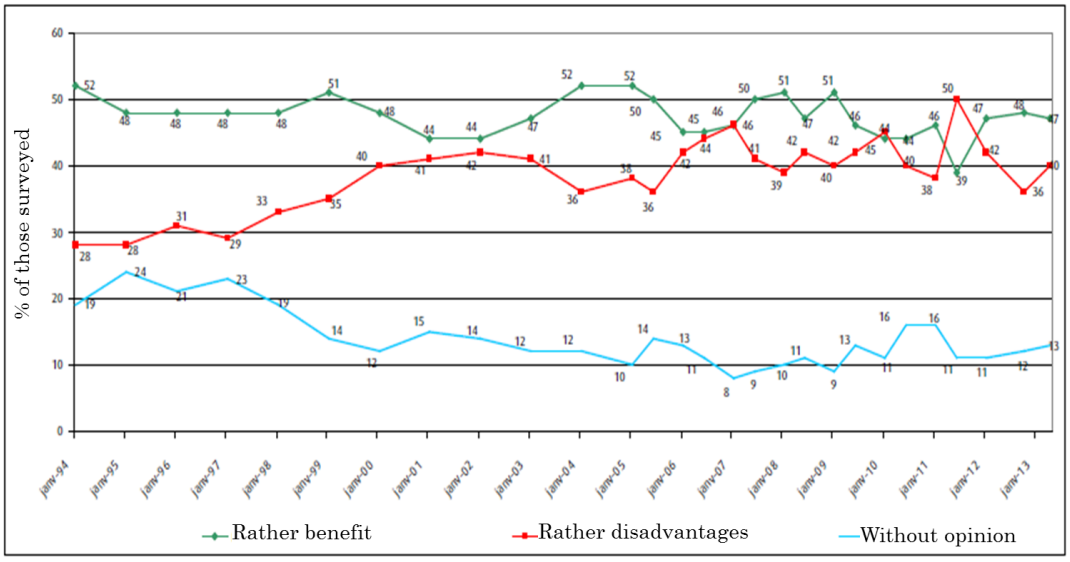
Figure 1.11. Opinion on Climate Change by Age in France



Source: Service de l'Observation et des Statistiques, *Baromètre d'Opinion sur l'Énergie et le Climat en 2013*, https://www.connaissancedesenergies.org/sites/default/files/pdf-pt-vue/barometre_dopinion_energie_et_climat.pdf (accessed 6 March 2019) (in French).

The percentage of those who think nuclear power is advantageous is 47%, surpassing 40% of the people who think it is disadvantageous. Those who thought it was disadvantageous rose to 50% three months after the Fukushima accident, exceeding by as much as 11% the 39% of those who thought nuclear power to be advantageous. Subsequent surveys show those who think nuclear power is advantageous exceeds the number of people who think it is disadvantageous (Figure 1.12).

Figure 1.12. Evolution of French Opinion on Nuclear Energy

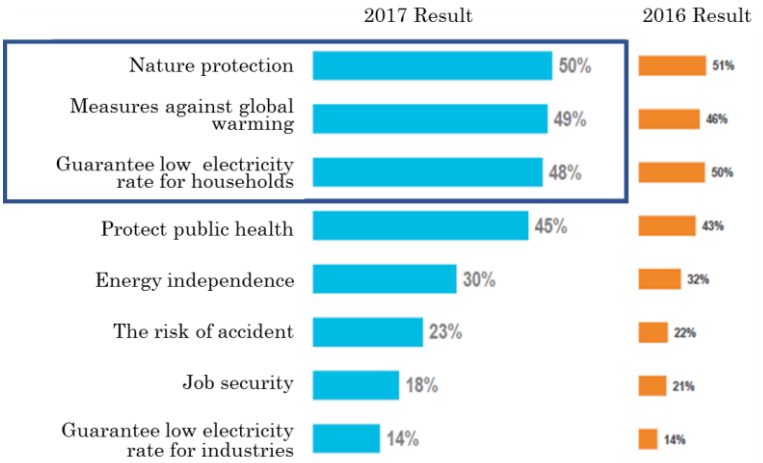


Source: Service de l'Observation et des Statistiques, *Baromètre d'Opinion sur l'Énergie et le Climat en 2013*, https://www.connaissancedesenergies.org/sites/default/files/pdf-pt-vue/barometre_dopinion_energie_et_climat.pdf (accessed 6 March 2019) (in French).

The results of a survey conducted by research company Consumer Science and Analytics (CSA), which was presented in January 2018 at a public debate over the energy programme of the Commission Nationale du Débat Public (CNDP) (National Commission of Public Debate), is outlined in Figure 1-13. This survey was conducted by CSA in December 2017 by interviewing 2,020 people 18 years or older.

As a basis to choose energy, about half of the respondents cited environmental protection, global warming prevention measures, and low electricity rate for households (Figure 1.13).

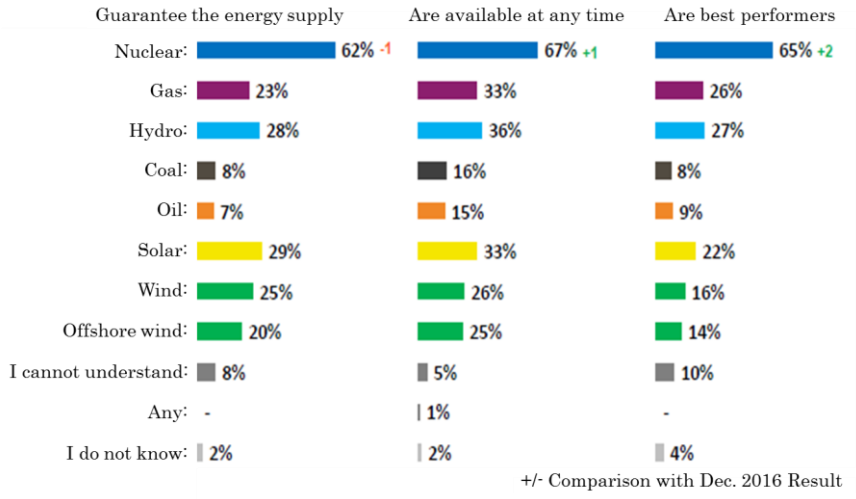
Figure 1.13. What are the Criteria to Choose Energies to Use



Source: Baromètre des Énergies (2018), – *vague 6, Etude de l'Institut CSA pour EDF,* Jan 2018, https://ppe.debatpublic.fr/sites/debat.ppe/files/barometre_des_energies_-_janvier_2018_-_ppe.pdf (accessed 6 March 2019) (in French).

In a survey into the image of each power source, more than 60% of the respondents chose nuclear power because it can be trusted, it contributes to stable supply, and has a high operating rate (Figure 1.14).

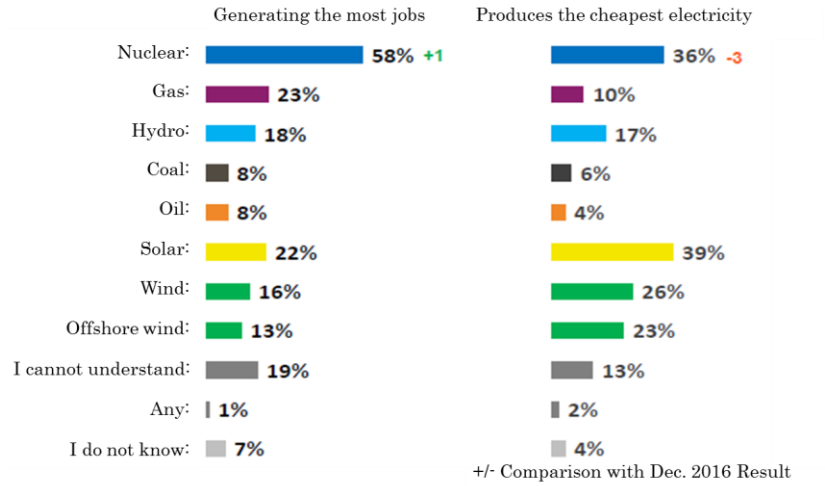
Figure 1.14. Your Image of the Following Power Generation Sources (1/4)



Source: Baromètre des Énergies – *vague 6, Etude de l'Institut CSA pour EDF,* Jan 2018, https://ppe.debatpublic.fr/sites/debat.ppe/files/barometre_des_energies_-_janvier_2018_-_ppe.pdf (accessed 6 March 2019) (in French).

The percentage of people who chose nuclear power as a means for securing employment was the highest, and nuclear power came second, following solar power generation, as a low-priced power source. This is the result of how people view each power source, and is different from the actual electricity price (Figure 1.15). OECD's Nuclear Energy Agency shows the actual electricity price in 'The full costs of electricity provision', in which it shows that nuclear power is the cheapest in France.

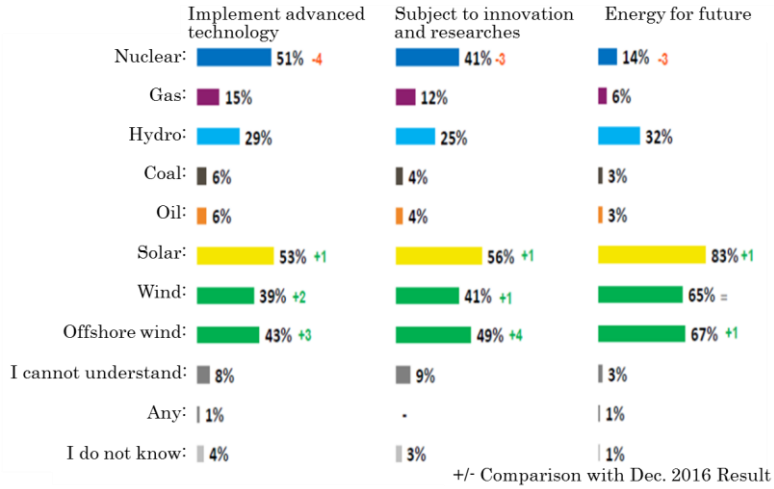
Figure 1.15. Your Image of the Following Power Generation Sources (2/4)



Source: Baromètre des Énergies – *vague 6, Etude de l'Institut CSA pour EDF,* Jan 2018, https://ppe.debatpublic.fr/sites/debat.ppe/files/barometre_des_energies_–_janvier_2018_–_ppe.pdf (accessed 6 March 2019) (in French).

More than half the respondents chose nuclear power as a power source of advanced technology, but a great number of people also chose solar power, wind power, or offshore wind power. As a future energy, more respondents chose nuclear power than those who chose fossil fuel, while the majority of the respondents chose renewable energy (Figure 1.16) as desirable future energy sources.

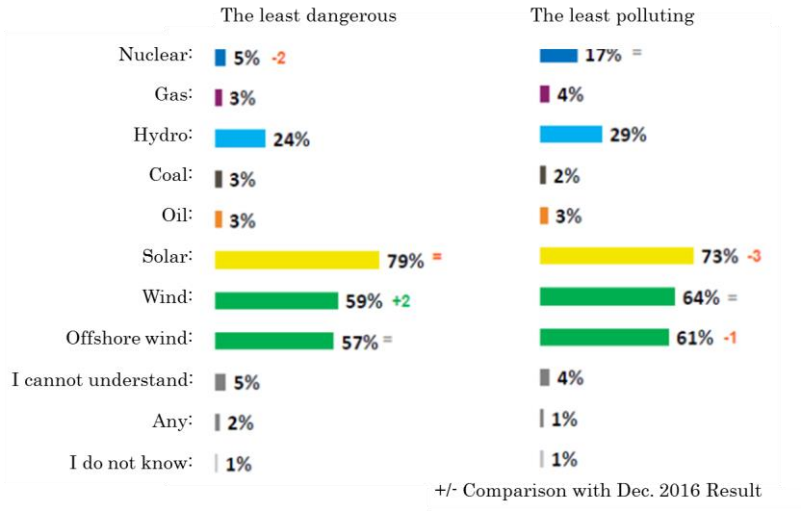
Figure 1.16. Your Image of the Following Power Generation Sources (3/4)



Source: Baromètre des Énergies – *vague 6, Etude de l'Institut CSA pour EDF,* Jan 2018, https://ppe.debatpublic.fr/sites/debat.ppe/files/barometre_des_energies_–_janvier_2018_–_ppe.pdf (accessed 6 March 2019) (in French).

When it comes to a safe and least polluting energy, a great number of respondents chose renewable energy, but more people chose nuclear power than those who chose fossil fuel (Figure 1.17).

Figure 1.17. Your Image of the Following Power Generation Sources (4/4)

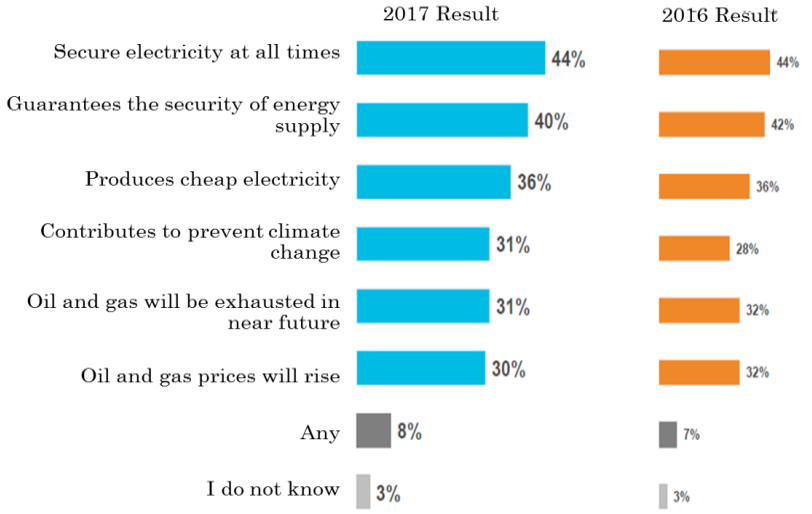


Source: Baromètre des Énergies – *vague 6, Etude de l'Institut CSA pour EDF,* Jan 2018, https://ppe.debatpublic.fr/sites/debat.ppe/files/barometre_des_energies_–_janvier_2018_–_ppe.pdf (accessed 6 March 2019) (in French).

It can be said from the above that nuclear power is positively accepted in France as compared with other power sources.

Moreover, as shown in Figure 1.18, it is understood as a benefit, that nuclear power contributes to the stable supply of electricity and ensures energy security. It is also understood that nuclear power generation supplies energy at low cost.

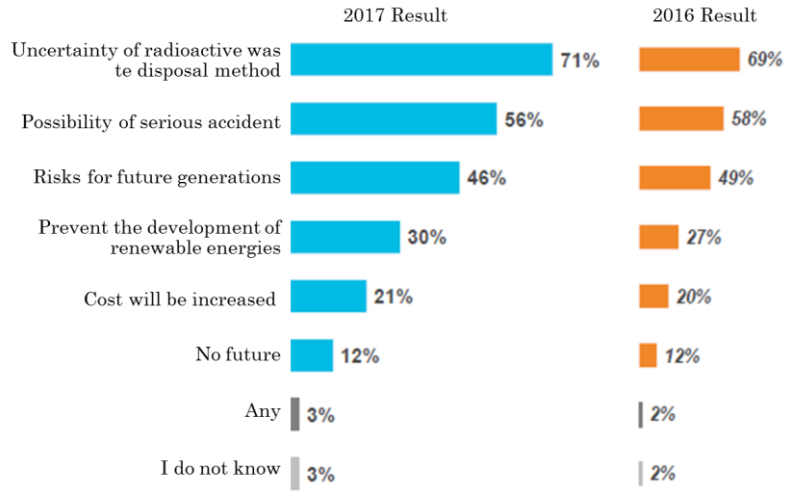
Figure 1.18. Which is the Most Convincing in Favour of Nuclear Energy?



Source: Baromètre des Énergies – *vague 6, Etude de l'Institut CSA pour EDF,* Jan 2018, https://ppe.debatpublic.fr/sites/debat.ppe/files/barometre_des_energies_-_janvier_2018_-_ppe.pdf (accessed 6 March 2019) (in French).

The main reasons for opposing nuclear power are that a method of disposing of radioactive waste has not been established, that an accident can happen, and that risks for the next generation are too large (Figure 1.19).

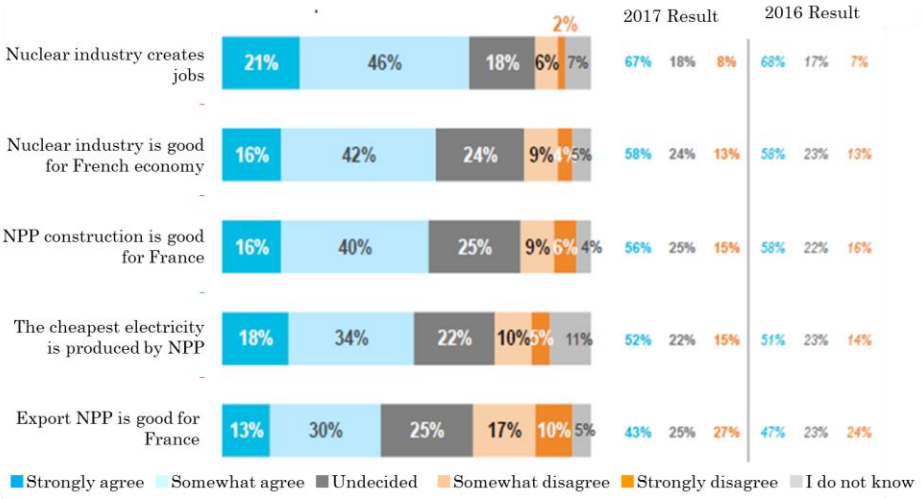
Figure 1.19. Which is the Most Convincing Reason Against Nuclear Energy?



Source: Baromètre des Énergies – *vague 6, Etude de l'Institut CSA pour EDF,* Jan 2018, https://ppe.debatpublic.fr/sites/debat.ppe/files/barometre_des_energies_–_janvier_2018_–_ppe.pdf (accessed 6 March 2019) (in French).

CSA also gathered opinions on the contribution of nuclear power to the French economy. In Figure 1.20, the blue (strongly agree) and light blue (somewhat agree) portions represent responses that nuclear energy contributes to the French economy. More than 50% of the respondents thought that nuclear power contributes to the expansion of employment, has an economic effect both during and after construction of a plant, and contributes to the supply of low-price electricity, positively responding to four of five questions. This indicates that the French understand well the contribution of nuclear power to the economy.

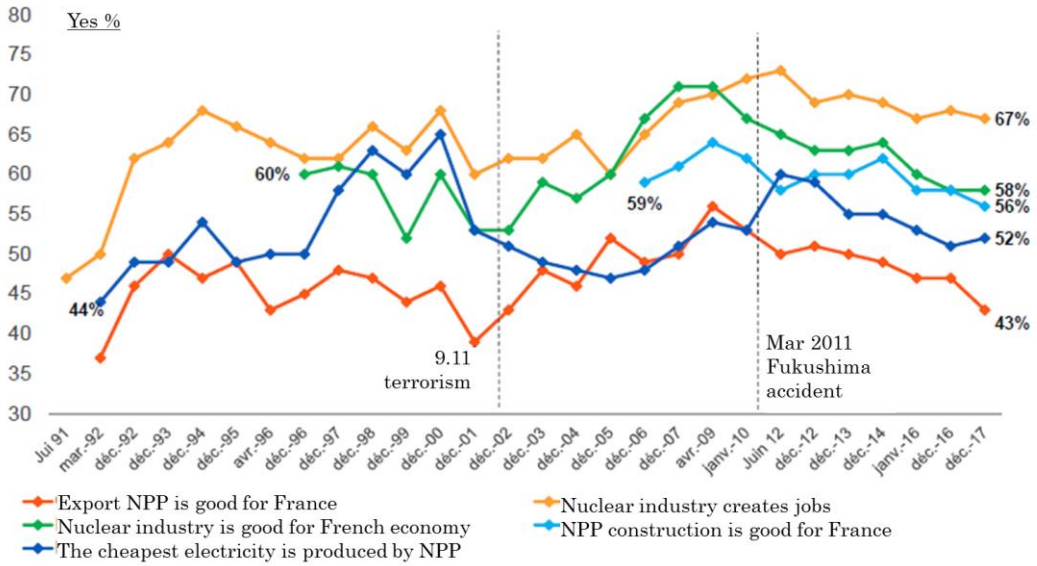
Figure 1.20. Economic Contribution of Nuclear Energy



NPP = nuclear power plant.
Source: Baromètre des Énergies – *vague 6, Etude de l'Institut CSA pour EDF,* Jan 2018, https://ppe.debatpublic.fr/sites/debat.ppe/files/barometre_des_energies_–_janvier_2018_–_ppe.pdf (accessed 6 March 2019) (in French).

Figure 1.21 shows changes with time in the survey results. Since 2011, the number of people that believe nuclear power is contributing to the French economy and constructing a nuclear power plant improves the economy has decreased, but, as compared with the 1990s, those who think that nuclear power generation has a favourable effect on the French economy is on the rise.

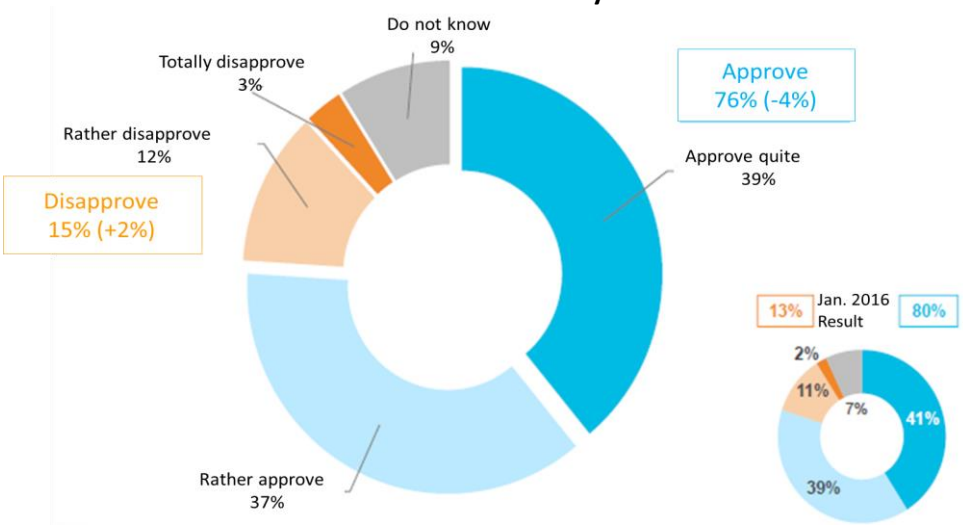
Figure 1.21. Evolution of Public Opinion regarding Economic Contribution of Nuclear Energy



NPP = nuclear power plant.
Source: Baromètre des Énergies – *vague 6, Etude de l'Institut CSA pour EDF,* Jan 2018, https://ppe.debatpublic.fr/sites/debat.ppe/files/barometre_des_energies_–_janvier_2018_–_ppe.pdf (accessed 6 March 2019) (in French).

To the question 'What do you think of the government decision in 2015 to lower the power generation ratio of nuclear power from 75% to 50% by 2025?', 76% of the respondents replied they would 'approve' or 'approve somewhat' the decision (Figure 1.22).

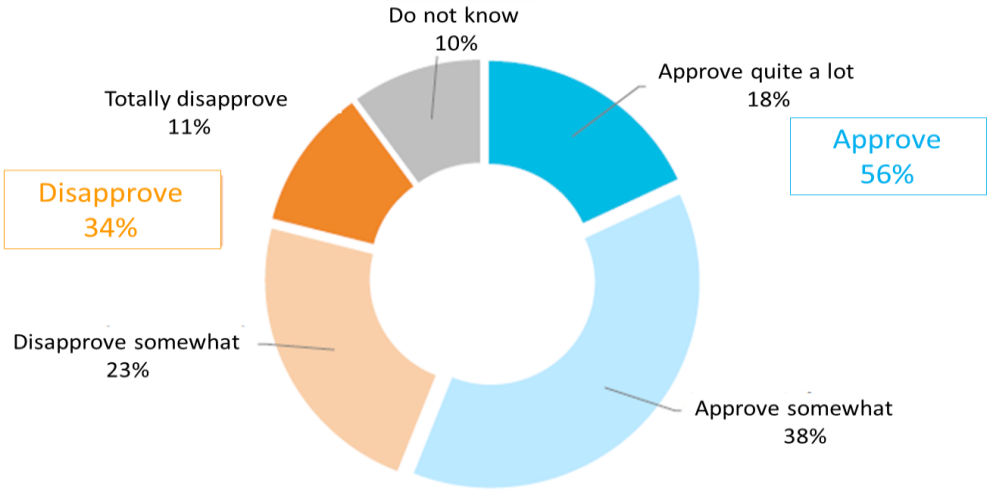
Figure 1.22. Do You Agree with Government Policy to Reduce Nuclear Power Generation Ratio from 75% to 50% by 2025?



Source: Baromètre des Énergies – *vague 6, Etude de l'Institut CSA pour EDF,* Jan 2018, https://ppe.debatpublic.fr/sites/debat.ppe/files/barometre_des_energies_–_janvier_2018_–_ppe.pdf (accessed 6 March 2019) (in French).

In 2018, the energy minister thought it impossible to push down the ratio of nuclear power generation to 50% by 2025 and decided to put it off to 2035. While 56% of people approved the decision, 34% opposed the postponement (Figure 1.23).

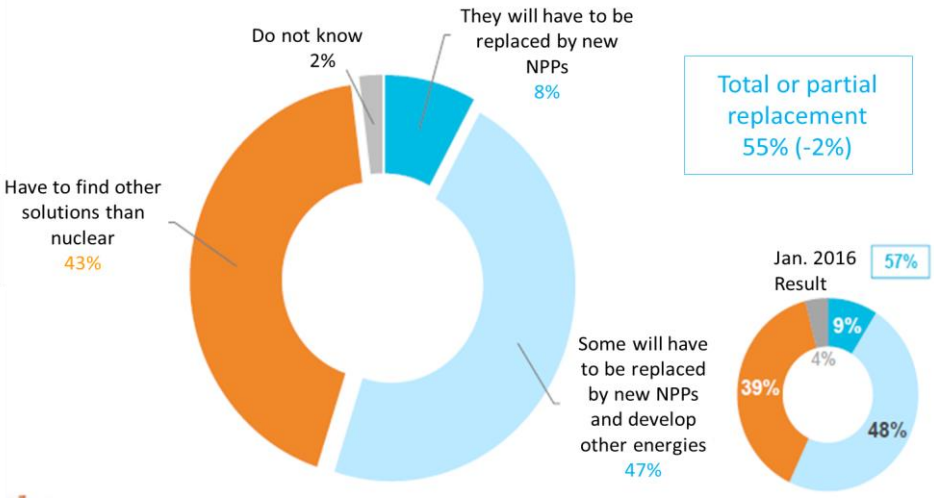
Figure 1.23. Do You Agree with the Government to Postpone the Target to Reduce Nuclear Power?



Source: Baromètre des Énergies – *vague 6, Etude de l'Institut CSA pour EDF,* Jan 2018, https://ppe.debatpublic.fr/sites/debat.ppe/files/barometre_des_energies_–_janvier_2018_–_ppe.pdf (accessed 6 March 2019) (in French).

To the question about what measures should be taken when a nuclear power plant has ended its service life, 55% of the people said, 'the plant should be replaced in part or entirety' while 43% replied that solutions other than nuclear power should be found (Figure 1.24).

Figure 1.24. Which is Your Preference Future, After the End of the NPP Life?



NPP = nuclear power plant.
Source: Baromètre des Énergies – *vague 6, Etude de l'Institut CSA pour EDF,* Jan 2018, https://ppe.debatpublic.fr/sites/debat.ppe/files/barometre_des_energies_–_janvier_2018_–_ppe.pdf (accessed 6 March 2019) (in French).

The survey results generally can be said to reflect French people's deep understanding of nuclear power.

4. Status in Sweden

Sweden's first nuclear power plant was AGESTA, an experimental reactor, that started operations in 1964. In Sweden, which does not have any energy resources other than hydroelectric power, hydroelectric power and nuclear power are important base load power sources and nuclear power accounts for about 40% of electric power generated.

On the back of the nuclear accident that took place at Three Mile Island Unit 2 in the United States in 1979, a national referendum was held in Sweden in 1980 and the Swedish congress decided to prohibit construction of new nuclear power plants and conditionally decommission 12 nuclear power plants by 2010. The accident that occurred at Chernobyl Unit 4 in the Soviet Union in 1986 mounted pressure on the Swedish government to give up nuclear power generation and, as a result, the government decided in 1988 to phase out nuclear power generation from 1995. In 1999, Barsebäck Unit 1 was shut down, followed by Unit 2 in 2005. However, development of alternative power sources did not progress, energy security was unstable because demand was satisfied by electric power imported through international cooperation amongst four Nordic nations, and the policy of abandoning nuclear power generation affected the Swedish economy and employment. For these reasons, the nuclear phase-out policy has practically stalled. In 2006, the Social Democratic Labour Party, which was advocating the nuclear phase-out policy, gave way to a coalition government. The

new government agreed to scrap the nuclear phase-out policy and announced in 2009 a new energy policy based on countermeasures against global warming and the energy policy of the European Union. The government set forth environmental sustainability, reinforcement of competition in domestic industries, and energy security as three pillars, permitting replacement of aged nuclear power plants with new ones. It acknowledged the importance of nuclear power generation to cope with global warming 'for the time being' and vowed to take the following four measures:

(1) Properly handle future applications for enhancing output
(2) Approve replacement in one site as long as the number of units at a nuclear power plant is kept to within the present 10
(3) Abandon 'nuclear phase-out act' and prepare a new legal system aimed at construction of new nuclear reactors
(4) Provide no financial assistance to construct new nuclear power plants

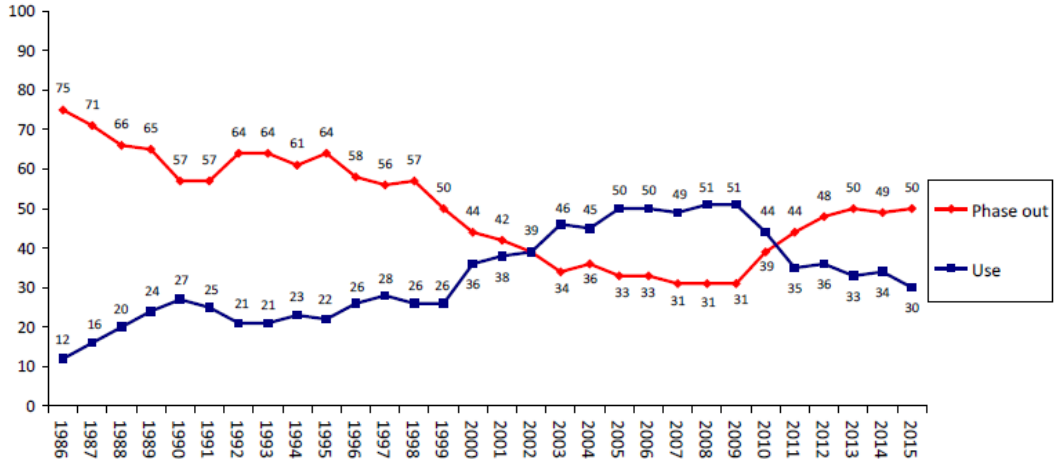
Oskarshamn Units 1 and 2 were closed in 2016 and 2017, respectively, but the reasons for the closure were not the nuclear phase-out policy, but economic factors such as the small output of these units, stagnant price of electricity, and a hike in nuclear power generation tax.

The results of a public opinion survey in Sweden are shown in Figure 1.25. The annual surveys are conducted by the SOM Institute with an investment from the Swedish energy agency. Questionnaires are sent by mail to 3,000 randomly selected people 16 to 85 years old. The response ratio is about 60% every year.

When the survey was started in 1986, 75% of the respondents were in favour of a phase out of nuclear power generation while 12% supported continued use. This ratio was reversed in 2003 and more people endorsed nuclear power generation than those who favoured the phase out. Since the Fukushima accident, however, the percentage of people choosing the phase out has been increasing (Figure 1.25).

Figure 1.25. Sweden on the Use of Nuclear Power as an Energy Source

(%)

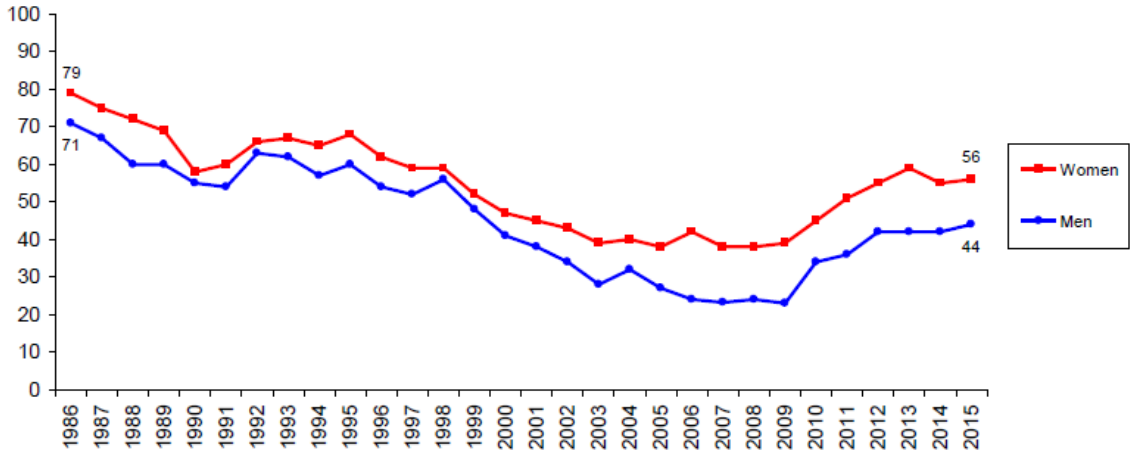


Source: Holmberg, S (2016), *Swedish Opinion on Nuclear Power 1986–2015,* June 2016, https://som.gu.se/digitalAssets/1579/1579277_swedish-opinion-on-nuclear-power-1986-2015.pdf (accessed 11 March 2019).

The ratio of men to women in favour of the phase out is shown in Figure 1.26. More female respondents are in favour of the phase out than male respondents every year.

Figure 1.26. Percent in Favour of Phasing Out Nuclear Power amongst Swedish Women and Men

(%)

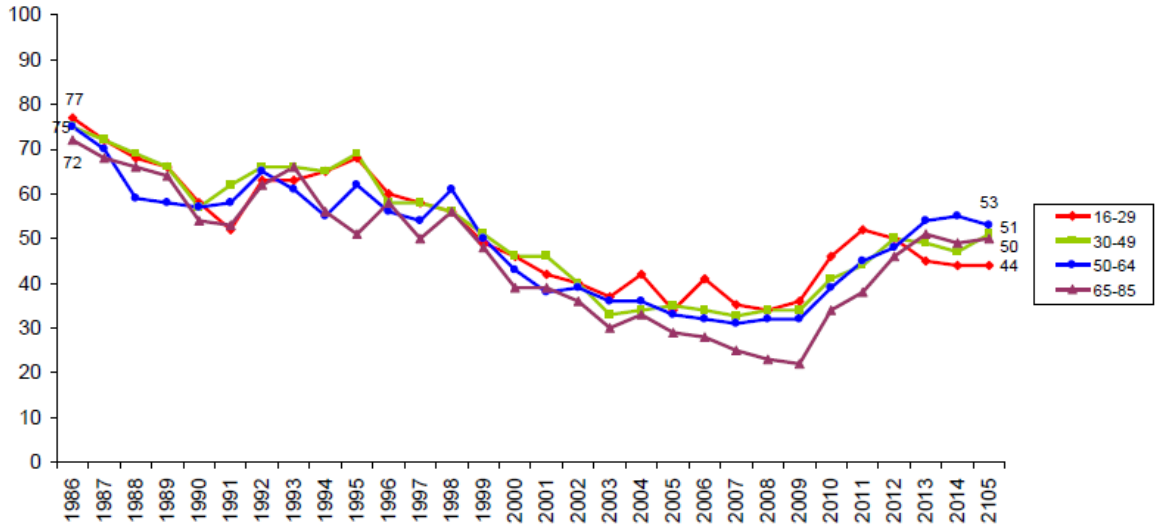


Source: Holmberg, S (2016), *Swedish Opinion on Nuclear Power 1986–2015,* June 2016, https://som.gu.se/digitalAssets/1579/1579277_swedish-opinion-on-nuclear-power-1986-2015.pdf (accessed 11 March 2019).

The age groups of those who favour the phaseout are shown in Figure 1.27. Before the Fukushima accident, younger people tended to support the phase out. After the Fukushima accident, older people favour the phase out whilst fewer young people choose the phase out. No statistically significant difference is observed anyway.

Figure 1.27. Percent in Favour of Phasing Out Nuclear Power in Different Age Groups

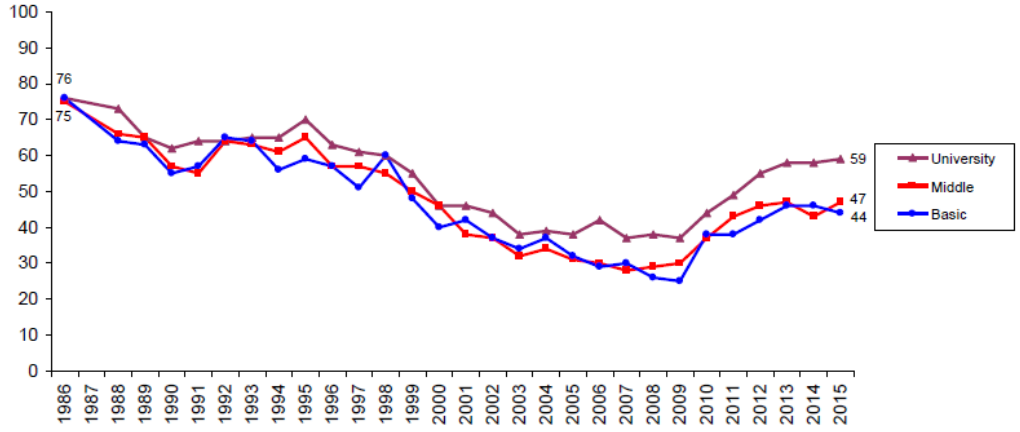
(%)



Source: Holmberg, S (2016), *Swedish Opinion on Nuclear Power 1986–2015, June 2016,* https://som.gu.se/digitalAssets/1579/1579277_swedish-opinion-on-nuclear-power-1986-2015.pdf (accessed 11 March 2019).

The educational backgrounds of those who endorse the phase out are shown in Figure 1.28. Those with a higher education (university graduates) tend to choose the phase out slightly more than those with other academic backgrounds, however, there is no statistically significant difference, either.

Figure 1.28. Percent in Favour of Phasing Out Nuclear Power in Different Educational Groups (%)

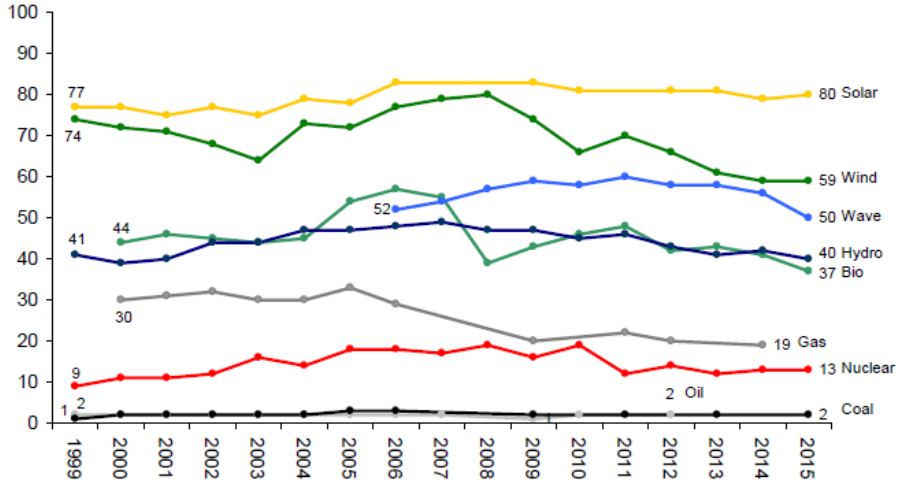


Source: Holmberg, S (2016), *Swedish Opinion on Nuclear Power 1986–2015,* June 2016, https://som.gu.se/digitalAssets/1579/1579277_swedish-opinion-on-nuclear-power-1986-2015.pdf (accessed 11 March 2019).

The percentage of people who favour renewable energy as an energy source that Sweden should use is high. In comparison with fossil fuel, those who choose gas are on the decline, but more people choose gas than nuclear power. The percentage of those who chose petroleum and coal remains unchanged from about 1.2% (Figure 1.29).

When it comes to renewable energy, it is interesting that more people favour solar power, which supplies less than 1% of electric power, than wind power, which supplies 11%.

Figure 1.29. Which Energy Sources do You Think Sweden Should Choose? (%)

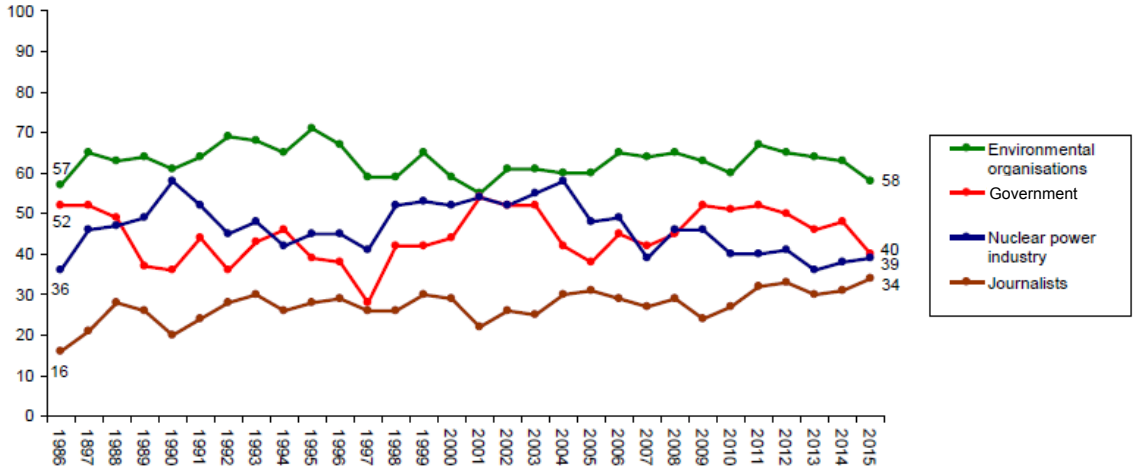


Source: Holmberg, S (2016), *Swedish Opinion on Nuclear Power 1986–2015,* June 2016, https://som.gu.se/digitalAssets/1579/1579277_swedish-opinion-on-nuclear-power-1986-2015.pdf (accessed 11 March 2019).

In this survey, a question 'What information source do you trust' was also asked and the results indicated that fewer people trusted the media and that more people trusted environmental organisations. The trust in nuclear power operators varies from year to year but has stood at about 40% in recent years, indicating no sign of an adverse influence from the Fukushima accident (Figure 1.30).

Figure 1.30. Do You Trust Information about Energy and Nuclear Power Provided by Different Groups?

(%)



Source: Holmberg, S (2016), *Swedish Opinion on Nuclear Power 1986–2015,* June 2016, https://som.gu.se/digitalAssets/1579/1579277_swedish-opinion-on-nuclear-power-1986-2015.pdf (accessed 11 March 2019).

It is difficult to generalise from the results of the above survey alone, but the results suggest that Swedish people do not think the use of nuclear power is favourable because a high percentage of people hope for the phase out of nuclear power generation, solar power comes first place as the desirable energy source, and trust in environmental organisations is consistently high. The gap from the reality that nuclear power generation supplies about 40% of electricity is interesting.

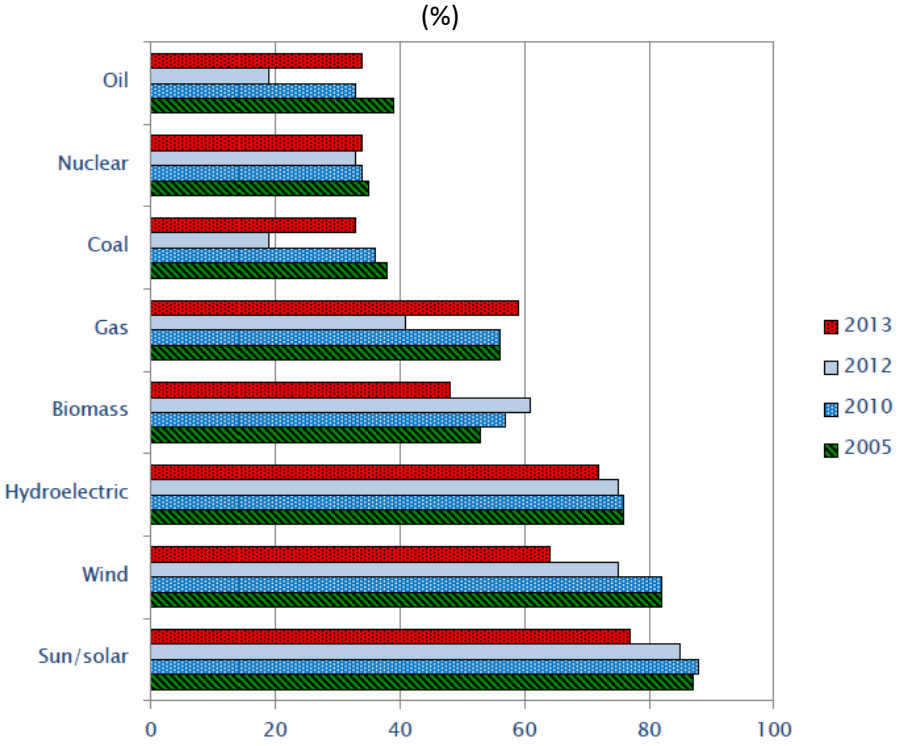
5. Status in the United Kingdom

In the UK, development of nuclear power has been promoted since 1956 when Calder Hall Unit 1 started operations, but no new power plants have been constructed since 1995, when Sizewell B opened, due to the liberalisation of electricity and fall in gas prices. After 2000, however, the advantages of nuclear power generation were recognised again as gas fields in the North Sea dried up and the need for a stable energy supply and reduction of greenhouse gas emissions were increasingly felt. In 2007, a policy for promoting the construction of new power plants was made clear in the nuclear white paper of that year. Nuclear power generation accounted for 21% of electric power generated in 2017 and, as of the end of February 2019, 15 nuclear power plants are in operation and a new station, Hinkley Point C, is under construction.

The results of surveys by the UK Energy Research Centre (UKERC) are shown in Figure 1-31. The surveys were conducted in 2005, 2010, 2011, and 2012. Until 2010, people 15 years or older were directly interviewed; however, online surveys have been conducted since 2011. In 2005, 1,491 people were directly interviewed and 1,822 in 2010. Online surveys were conducted with 2,050 respondents in 2011 and 2,441 in 2012.

Figure 1.31 shows that, while renewables remained the most favoured form of electricity production, support for them has dropped substantially over the years. Favourability ratings for wind power in particular have shown a sharp decline, from 82% in 2005 to 64% in 2013. Favourability ratings of solar power have dropped from 87% in 2005 to 77% in 2013. Favourability ratings of nuclear power are not high but do not show much difference before and after the Fukushima accident.

Figure 1.31. Percentage of Respondents having Mainly or Very Favourable Opinions or Impression of Different Energy Sources for Producing Electricity



Source: UKERC (2013) Public Attitudes to Nuclear Power and Climate Change in Britain Two Years after the Fukushima Accident, 19 Sep, http://www.ukerc.ac.uk/publications/public-attitudes-to-nuclear-power-and-climate-change-in-britain-two-years-after-the-fukushima-accident-summary-findings-of-a-survey-conducted-in-march-2013-working-paper.html (accessed 12 March 2019).

The purpose of the surveys is to assess what the general public thinks about nuclear power. Overall support for nuclear power has increased by about six percentage points since 2005, while opposition has decreased by about eight percentage points since 2005 (Table 1.2). A similar number of people generally supported (32%) or opposed (29%) nuclear power in 2013. The number of people ambivalent about nuclear power (that is, being unsure whether to express support or opposition) dropped from 32% in 2005 to 27% in 2013.

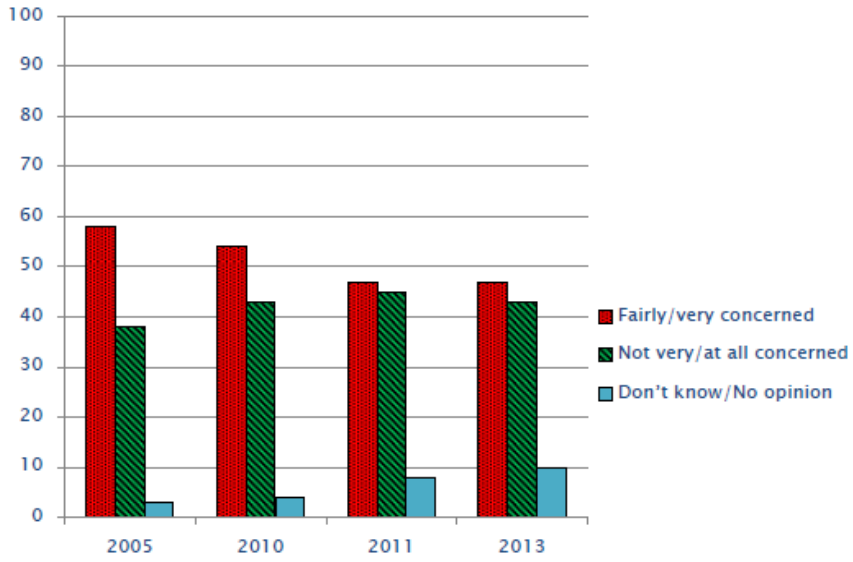
Table 1.2. Overall Support For and Opposition To Nuclear Power (%)

	2005	2013
Overall, I support nuclear power	26	32
Overall, I oppose nuclear power	37	29
I am not sure whether I support or oppose nuclear power	32	27
I don't care what happens with nuclear power	3	3
Other/None of these/ Don't know	1	9

Source: UKERC (2013), Public Attitudes to Nuclear Power and Climate Change in Britain Two Years after the Fukushima Accident, 19 Sep, http://www.ukerc.ac.uk/publications/public-attitudes-to-nuclear-power-and-climate-change-in-britain-two-years-after-the-fukushima-accident-summary-findings-of-a-survey-conducted-in-march-2013-working-paper.html (accessed 12 March 2019).

Figure 1.32 shows the proportion of people reporting being fairly or very concerned about nuclear power dropped from 2005 to 2013. The proportion of respondents being 'not very' or 'not at all' concerned about nuclear power remained stable over the same time period. The data shows the increased acceptability of nuclear power over the 2005–2013 period.

Figure 1.32. Concern about Nuclear Power
(%)

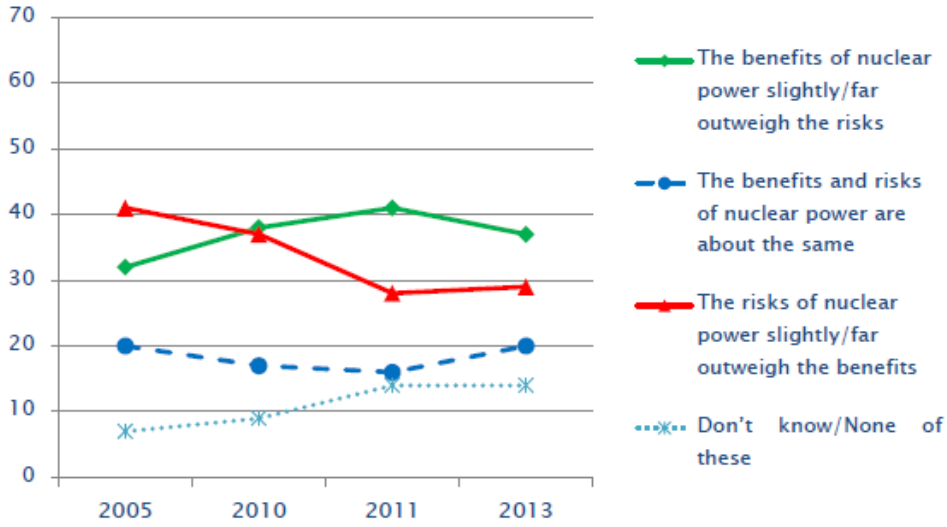


Source: UKERC (2013), Public Attitudes to Nuclear Power and Climate Change in Britain Two Years after the Fukushima Accident, 19 Sep, http://www.ukerc.ac.uk/publications/public-attitudes-to-nuclear-power-and-climate-change-in-britain-two-years-after-the-fukushima-accident-summary-findings-of-a-survey-conducted-in-march-2013-working-paper.html (accessed 12 March 2019).

Figure 1.33 shows the proportion of respondents who believe that the risks of nuclear power either lightly or far outweigh the benefits has likewise fallen. The proportion of people who believe that the benefits of nuclear power slightly or far outweigh the risk of nuclear power increased slightly, whilst the proportion being of the opinion that the risks and benefits of nuclear power are about the same remained stable.

Figure 1.33. Perceived Risks and Benefits of Nuclear Power

(%)



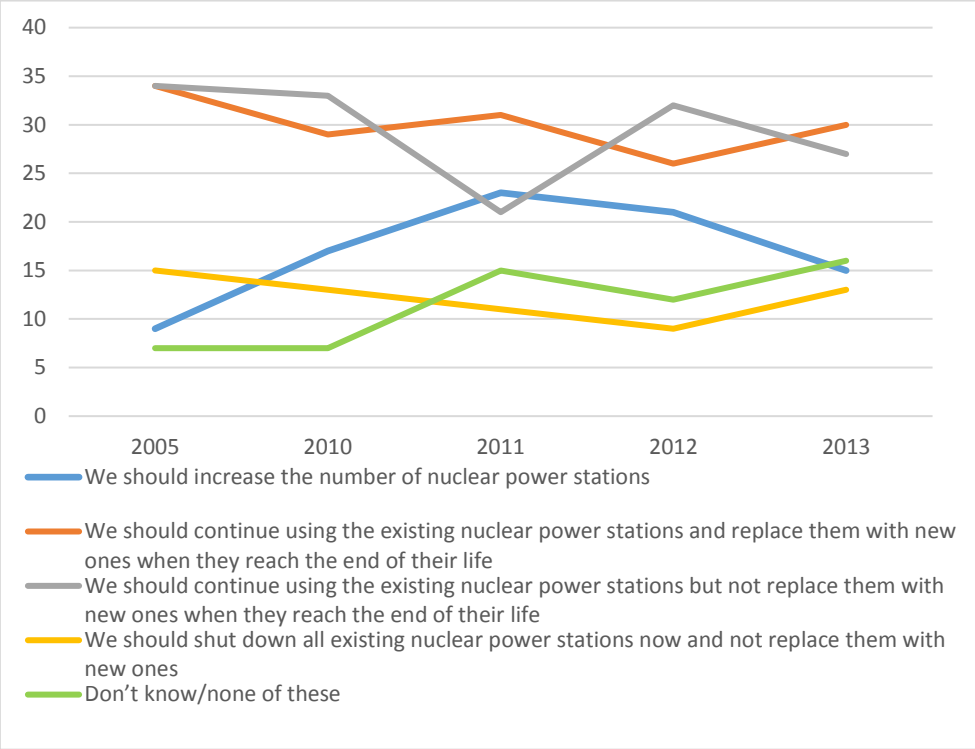
Source: UKERC (2013), Public Attitudes to Nuclear Power and Climate Change in Britain Two Years after the Fukushima Accident, 19 Sep, http://www.ukerc.ac.uk/publications/public-attitudes-to-nuclear-power-and-climate-change-in-britain-two-years-after-the-fukushima-accident-summary-findings-of-a-survey-conducted-in-march-2013-working-paper.html (accessed 12 March 2019).

Figure 1.34 regarding the future of nuclear power in the UK shows that public views were evenly balanced. While 15% maintained that the number of nuclear power stations should be increased, 13% were of the opinion that all existing nuclear power stations should be shut down immediately. A total of 30% of the sample were of the opinion that 'We should continue using the existing nuclear power stations and replace them with new ones when they reach the end of their life'; whereas 27% agreed that 'We should continue using the existing nuclear power stations but not replace them with new ones when they reach the end of their life'.

People who choose 'We should continue using the existing nuclear power stations but not replace them with new ones when they reach the end of their life' or 'We should shut down all existing nuclear power stations now and not replace them with new ones', want to phase out nuclear power immediately or gradually, has decreased from 50% in 2005 to 40% in 2013. People who choose 'We should increase the number of nuclear power stations' or 'We should continue using the existing nuclear power stations and replace them with new ones when they reach the end of their life', want to replace nuclear power plant has changed little from 43% in 2005 to 44% in 2013.

Figure 1.34. Views on the Future of Nuclear Power in the United Kingdom

(%)



Source: UKERC (2013), Made by IEEJ based on Public Attitudes to Nuclear Power and Climate Change in Britain Two Years after the Fukushima Accident, 19 Sep, http://www.ukerc.ac.uk/publications/public-attitudes-to-nuclear-power-and-climate-change-in-britain-two-years-after-the-fukushima-accident-summary-findings-of-a-survey-conducted-in-march-2013-working-paper.html (accessed 12 March 2019).

6. Summary of the public images on nuclear power

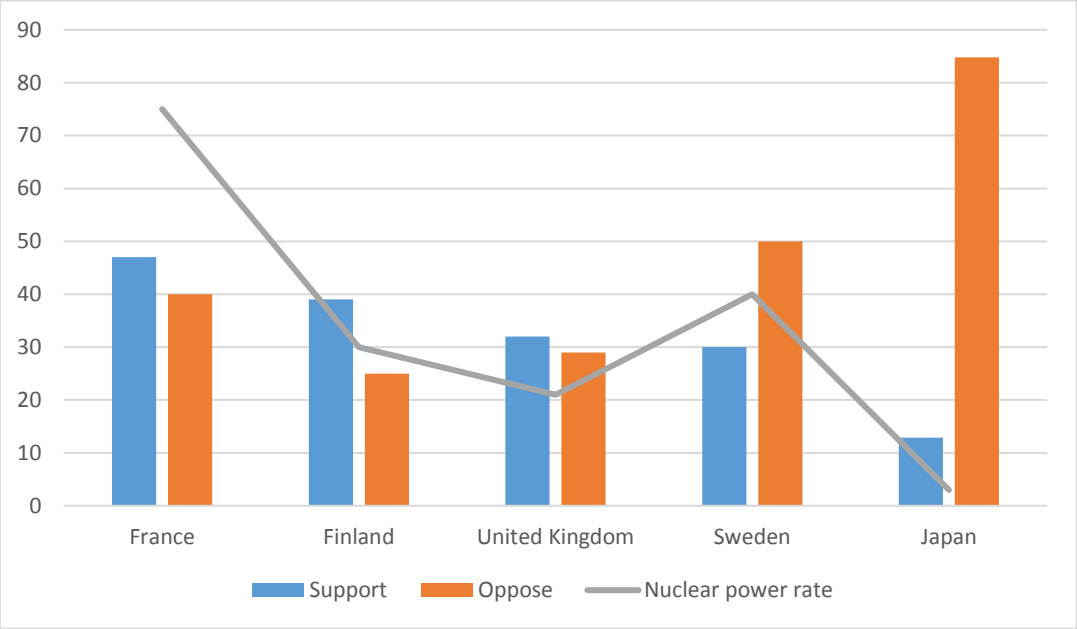
In general, nuclear power has been accepted in France, Finland and the UK, although its level differs from country to country depending on domestic affairs and how and by whom surveys are conducted.

Figure 1.35 shows the proportion between those who support nuclear power and those who do not, along with the share of nuclear power in each nation's electricity supply. These comparisons are not necessarily correct as they were made in different years, with questionnaires being inconsistent amongst the survey bodies. However, they indicate a rough correlation between the public acceptance of nuclear power and its share in the nation's electricity supply.

As mentioned in sub-chapter 4, nuclear power accounts for about 40% of Sweden's electricity supply, though the public in general does not support this power source. The greater the acceptance of nuclear power, however, the higher its share in the nation's electricity supply, which applies to France, Finland, the UK, and Japan.

The survey techniques and questionnaires, meanwhile, should be standardised to see if these trends apply to the 31 countries generating nuclear power. In particular, there are variations in energy policies, decision-making mechanisms and electrical institutions in Asia, which consists of countries with different cultures and histories. Thus, the results of surveys to be conducted in the Republic of Korea, China, India, Taiwan, and Pakistan based on standardised targets, techniques, and questionnaires remain to be seen, given that Japan's policymaking mechanisms are different from theirs.

Figure 1.35. Is there Correlation between Public Opinion and Nuclear Use? (%)



Source: Prepared by IEEJ based on the results of surveys shown in Chapter 1.

Chapter 2
Gaining Acceptance of Nuclear Facilities

In January 2019, the Institute of Energy Economics, Japan (IEEJ) organised workshops for gaining a better acceptance of nuclear power in Japan with the participation of opinion leaders from the municipalities that have hosted nuclear facilities in Europe for a long time. The workshops in Japan took place in three locations: Maizuru City in Kyoto, a prefecture that does not have a nuclear facility but is a neighbouring municipality of a nuclear facility; Omaezaki City in Shizuoka Prefecture which hosts nuclear facilities; and Tokyo to compile the opinions presented at the two workshops.

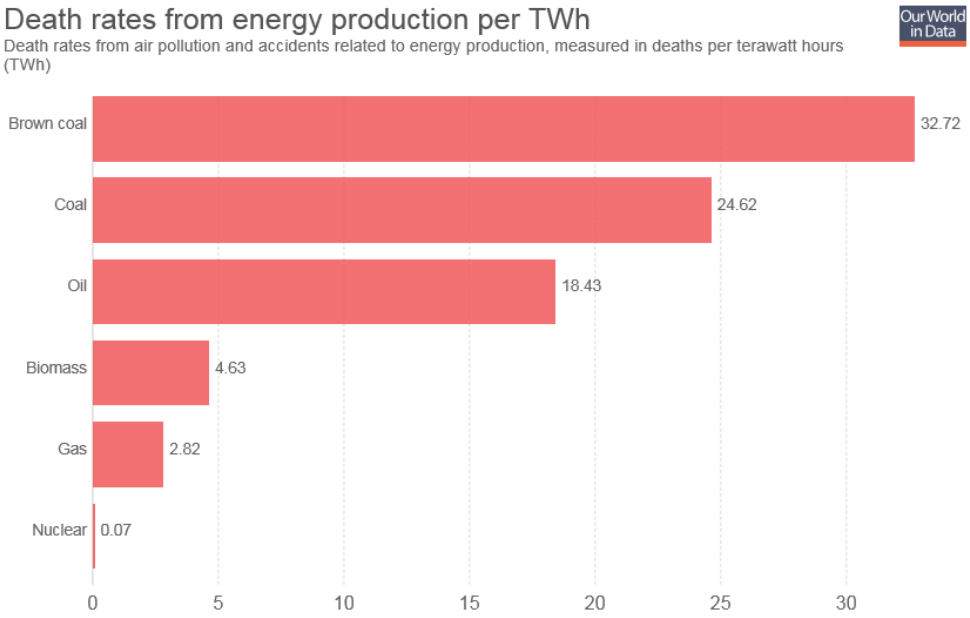
Chapter 2 discussions based on the presentations by the opinion leaders at the workshops, first describes the background to the acceptance of nuclear power in the three European countries of Finland, France, and Sweden on a scope that is broader than in Japan. This is followed by discussions on how municipalities that host nuclear facilities and their neighbours deal with nuclear power in Thailand and Japan, which are members of ERIA.

1. Experiences and cases in Finland

As noted in the results of an opinion survey in Chapter 1, the acceptance level of nuclear power is relatively high in Finland. The opinion leader from Finland explained the background to the country's acceptance of nuclear power as follows: 'For more than half a century, Finnish people have accepted nuclear power based on the awareness of the risks involved in nuclear power because they felt it had its advantages. Those who are against nuclear power only question the issues of waste and dangers and say we should ban nuclear power and develop renewable energy. However, I believe nuclear power is the safest and most efficient energy amongst all energy technologies that involve risks.'

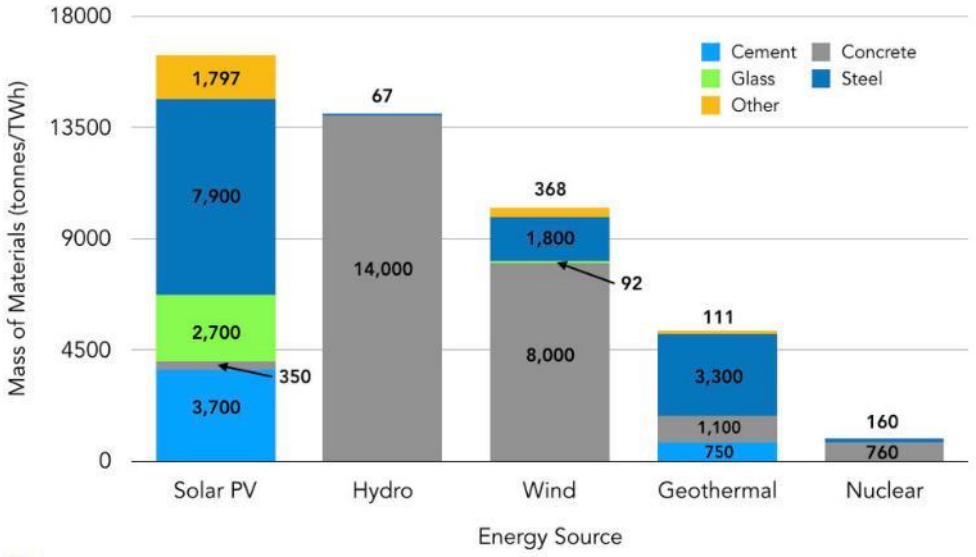
Certainly, the safety of nuclear power is frequently questioned, but it is also important to change viewpoints. Even if we take the impact of the Chernobyl accident into consideration, which is said to be the worst nuclear accident in history, the number of fatalities per generated electricity from nuclear accidents is far smaller than other energy production, as shown in Figure 2.1. Also, regarding waste, coal and other fossil fuels pose different problems by discharging pollutants and greenhouse gases into the atmosphere. There are also reports that toxic chemicals are released during the manufacture of solar panels. As shown in Figure 2.2, the amount of waste generated per terawatt hour of power generation is smaller for nuclear power than for coal, biomass, or other energy production. The Finnish government has explained these facts along with the data to its citizens over and over again. This would be one of the reasons of the wide acceptance of nuclear power amongst the public.

Figure 2.1. Fatalities in Energy Production



Source: Markandya, A. and P. Wilkinson (2007), *Our World in Data*, https://ourworldindata.org/grapher/death-rates-from-energy-production-per-twh (accessed 13 March 2019).

Figure 2.2. Materials Throughput by Type of Energy Source



Source: Desai, J. and M. Nelson, Are we Headed for a Solar Waste Crisis?, Environmental Progress, http://environmentalprogress.org/big-news/2017/6/21/are-we-headed-for-a-solar-waste-crisis (accessed 12 March 2019).

Finland is the first country in the world that granted permission to build a final repository for radioactive waste, which is currently under construction. The opinion leader from Finland gave the reasons why a nuclear facility, that is a final radioactive waste repository, was accepted by the public, as outlined below:

- Clear responsibilities
  i) Each producer of nuclear power-generated electricity is responsible for its own nuclear waste management.
  ii) The Ministry of Employment and the Economy holds the highest power of control and supervision over nuclear waste management in Finland.
  iii) The Radiation and Nuclear Safety Authority (STUK) supervises the safety of nuclear power generation.
- Long-term and stable policy on nuclear waste management
- Strict safety requirements, credibility, and independence of the safety authority (STUK)
- Strong expertise on nuclear sector – also in the future

Meanwhile, Finland's approach to nuclear and radiation emergency reflects well the social acceptance of nuclear power in this country.

Based on the understanding that the ultimate responsibility to secure the safety of a nuclear facility rests with the business operator, evacuation drills are held frequently with the participation of local residents. The regulatory authority is involved in the training of nuclear power plant staff, and a large-scale evacuation drill is held once every 3 years with the involvement of hundreds of institutions. Belarus and other neighbouring countries are engaged in the evacuation plan because information sharing and collaboration across the border is essential in the case of a major accident that would require evacuations. As mentioned later, there are cases in Japan where multiple municipalities are engaged in wide-area collaboration in emergency evacuation planning. Finnish cases of multinational and wide-area collaboration should provide a helpful perspective for Asian countries.

2. Experiences and cases in France

As noted in the results of an opinion survey in Chapter 1, the acceptance level of nuclear power is very high in France. The opinion leaders from France cited major reasons of the background to the country's acceptance of nuclear power: 'Information disclosure and dialogue implemented by Commission Locale d'Information (CLI) for more than 30 years; the significant authority of the central government in contrast to the relatively small authority of local municipalities; low electricity prices; and understanding of the French people, especially those living in areas close to a nuclear facility, that the nuclear power is a major industry and that nuclear power plants in France are operating safely.' And they cited the reasons for opposition are: 'promotion of clean energy, panic after Fukushima, political disputes that have no relationship with economic affairs, and misunderstanding that nuclear power is at the opposite end of renewable energy and that nuclear power is not clean energy.' In a multiracial nation where individuals hold different and divergent views, meetings are not

perceived as a device designed to forge a consensus in French. People express their views at briefings for local residents and public meetings but will relegate the final decision making to the decision-making authority, which may be a characteristic of French people.

In France, many of the opponents of nuclear power are not calling for the immediate shutdown of nuclear facilities. In areas without a nuclear facility, many want such facilities phased out by 2025, whilst the majority opinion in municipalities with nuclear facilities is to stop nuclear power plants after 2035.

The French opinion leader told the workshop participants, 'The policy to cut the ratio of nuclear power from 75% to 50% is a political judgement that lacks any concrete strategy. This is not a safety issue; some nuclear power plants had to be shut down due to the decision of the central government and operators and local residents do not support this decision.' The opinion leader described the French governance system and factors that played an important role in the process of the country's acceptance of nuclear facilities and on residents' concerns regarding 'whether we are sufficiently prepared for an accident,' as shown in 1) – 3) below:

1) How did the French governance system enable to introduce a nuclear facility and to dialogue with public?

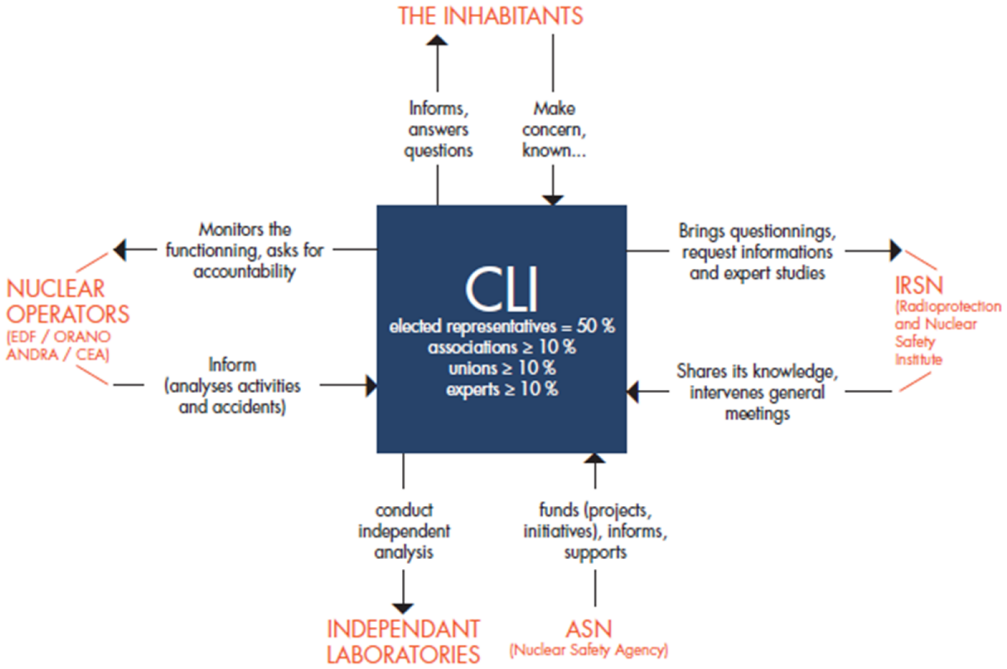
- *The 'Commission Local d'Information' (CLI) / Local Information Committees*

  CLIs are consultation and information organisations in charge of basic nuclear facilities (Figure 2.3). Their mission is to monitor and concentrate efforts in the field of nuclear safety, radiation protection, and the impact of nuclear activities on people and the environment, and to promote public information on safety.

  There are today 35 CLIs in France. They can order expertise, including epidemiological studies, and carry out any measurement or analysis in the environment relating to emissions or releases from a site's facilities. The operator shall inform the commission of any incident or accident mentioned in article 54 of this law as soon as possible. The CLI is chaired by the president of the conseiller général (head of the French Département) or by an elected member of the CLI, whom he designates for this purpose. Each CLI is composed of four colleges of local resident-elected, representatives of environmental protection associations, representatives of nuclear workers' unions, and experts such as scientists, doctors, business leaders, and academics. The French government believes in the importance of promoting discussions on the local acceptance of nuclear facilities by engaging both proponents and opponents. This is the reason why nuclear opponents including Greenpeace take part in CLI, an independent organisation that has no affiliation with the nuclear plant operator.

  The operator must disclose all information on accidents and other events to CLI. CLI has worked to enhance information transparency: all CLI members have equal access to information; results of CLI meetings are promptly delivered in news releases; all topics, which can be registered by anyone in advance, are taken up for discussion; and CLI information is made public via the web.

Figure 2.3. CLI and its Interlocutors



Source: Druez, Y. (2019), Presentation at the open workshop on 'Nuclear Public Acceptance' held in Omaezaki City, Japan on 24 January.

- *Commission Nationale du Débat Public (CNDP) / French National Public Debate Commission*

  The CNDP's mission is to inform citizens and make their opinion represented in the public debate. More specifically, the CNDP gives citizens a voice to development projects or equipment of national interest that have significant impacts on the environment and whose socio-economic issues are important. This process is made either in the context of a public debate organised by the commission and for which it appoints a particular internal commission, or in the context of a consultation for which it appoints a guarantor.

  The CNDP is composed of 25 members from different backgrounds: parliamentarians, local elected representatives, members of the Council of State, the Court of Cassation, the Court of Auditors, associations, employers, and unions. These members are the first guarantors of its neutrality and are not intended to pronounce on the merits of the projects. They are the ones who, collectively, make the decisions after reviewing the files.

  For example, in the nuclear field, the CNDP has conducted since November 2018 a public debate on nuclear waste and is working to report the risks of inconsistency in the 2019–2021 schedule for nuclear waste in the government's plan.

- *Autorité de Sûreté Nucléaire (ASN) / French Nuclear Safety Authority*

  The independent administrative authority set up by law 2006-686 of 13 June 2006 concerning nuclear transparency and safety (known as the 'TSN law') is tasked, on behalf of the State, with regulating nuclear safety and radiation protection in order

to protect workers, patients, the public, and the environment from the risks involved in nuclear activities. This reliable authority also contributes to informing the citizens.

The key figures of ASN are:

- More than 508 staff, with close to half of them in the 11 regional divisions.
- 311 inspectors distributed amongst the regional divisions and the departments
- A total budget of €84.4 million, and €84.3 million budget devoted to L'Institut de Radioprotection et de Sûreté Nucléaire (IRSN) analysis and assessment work
- More than 1,751 inspections of nuclear installations, radioactive material transport and in the medical, industrial and research sectors
- 19,894 inspection follow-up letters published on the website

2) *Why is nuclear power important for the country and communities?*

The development of a large nuclear-powered fleet has enabled France to reduce its imports of fossil energy to produce electricity. Thus, the electricity production from nuclear sources contributes, in its own way, to the purchasing power of consumers. Thanks to nuclear power, French industries benefit from one of the lowest electricity prices in Europe (25% cheaper on average). This asset mitigates the risks of relocation and lack of competitiveness of small and medium-sized enterprises that could cause more expensive energy.

Comparison with the German energy system that phased out its nuclear power plants and has now had to build, since 2007, 26 new coal-fired plants that increase CO_2 emissions. Even the European Union has admitted a 'mistake in state aid decision for German coal plants.'

3) *Can we prepare for accidents safely enough?*

- Yes, we can, by preventing upstream from all serious risks. One of them is the intrusion inside the nuclear installations by protesters or with, for example, a terrorist attack by airplanes. These risks can be easily solved politically and militarily. In France, the senior military officers have been reassuring when auditioned by the French Parliamentary Commission of Nuclear Safety and Security in July 2018. They answered that they had no serious data or information showing that terrorists target the French nuclear installations.
- Keeping the plants safe is also possible by not taking the intrinsic dangers of the nuclear industry as risks. For example, environmental associations often warn of the supposedly dangers of the spent fuel pool's security. One of their arguments is that the walls would not be thick enough, if a plane crashed or a rocket targeted the spent fuel pool. Although specialists interviewed in France, especially from the military field, say that there is no realistic risk on this issue.
- Keeping the plants safe is also to be done by focusing on the risks at the shutdown and dismantling phases, as well as at the transport of radioactive materials. Some

people argue that safety can be enhanced by shutting down nuclear power plants entirely. This may be true if we only consider the possibilities of an accident occurring on the scale of Fukushima, however, simply stopping nuclear power plants would not necessarily ensure safety.

- During a visit to Fukushima, I (the opinion leader from France) learned that some residents decided to remain in Fukushima based on their own judgement, and that their radioactive doses are not so high. We also need to consider the necessity and method of evacuating senior residents.

Based on the factors outlined above, the French opinion leaders propose the following requirements for the public acceptance of nuclear power:

- The conditions for the acceptance of a nuclear facility include safety first, information disclosure, and the ability to participate in all decision-making processes.
- Focus on safety and security. Risks and dangers should be considered separately. It is possible to reduce risks by perceiving and taking measures against dangers.
- Discussions should not be a confrontation between pro- and anti-nuclear ideas but should encompass future impacts from a multilateral perspective including the impact on employment, economic development, energy security, safety assurance, and other areas.
- Data for discussions should be prepared to ensure transparency and confidence, devoid of information asymmetry.
- The establishment of a dialogue scheme like CLI is effective. Even when opinions are in disagreement, it is important to respect and trust – and not fight against – each other.
- We all know that it is difficult for people to accept ideas when they get emotional. It is easy to raise objections.

3. Experiences and cases in Sweden

As noted in the results of an opinion survey in Chapter 1, Swedish citizens on the whole do not regard nuclear power utilisation as favourable, although the nation procures about 40% of its electricity from nuclear power. However, the acceptance level of nuclear power is high in municipalities where nuclear facilities are located, such as Östhammar and Oskarshamn. The opinion leader from Sweden stated the following concerning the reasons for the high acceptance in such municipalities: ‘The small population and a high level of autonomy that enable municipalities to negotiate directly with the government by bypassing the counties, the circumstances that make Sweden special, their competence to directly negotiate with the government on decision-making particularly on matters regarding nuclear power and hence the high level of administrative transparency, the right of discretion on their decision-making processes, good relationships developed with citizens based on their high confidence in operators, and citizens’ participation that helps reflect their opinions.’ This section reviews the background to the relationship between residents and stakeholders concerning nuclear

facilities in Sweden based on the views of opinion leaders in Östhammar, which became the second city in the world to accept a high-level radioactive waste (HLW) repository after Finland and Oskarshamn, where a nuclear power plant is located.

1) Experiences and cases in Östhammar municipality

With a population of some 21,400, Östhammar is a relatively large municipality in Sweden. Over many years, the operator has held a series of dialogue discussions with residents in the area. At present, the construction permit for an HLW repository is under review. Also, expansion works to the disposal facilities for intermediate-level waste (ILW), which is lower in radiation level than HLW, and for low-level waste (LLW), are underway.

Östhammar City changed its municipal organisation in the 1990s to encourage discussions on the introduction of a nuclear facility. After the city agreed to accept the facility in 2001, SKB, the operator for the final radioactive waste repository, selected Forsmark in Östhammar as the construction site in 2009. In 2009, the municipality took steps by establishing a new organisation for review.

Although municipalities have the right of veto on the establishment of a nuclear facility, they have actively taken part in discussions requesting complete transparency regarding the judgment of the central government. When the explanations and actions of the industry or the government lack transparency, it may exercise its right of veto.

The opinion leader in Östhammar stated how the municipality has actively participated in the discussion with the nuclear industries and the central government. He said that the residents in Östhammar have wanted to participate and be an active part in the whole process of decision making, from start to a final decision. He stressed that the conditions for the acceptance are, first of all, a clear statement from the government before decision making, openness and transparency in the authorities' decision making, and to understand what assessments the authorities do when making decisions and writing statements to the government.

The opinion leader pointed out some lessons learned from the discussions:

- Persistence is required since the process takes long time.
- Financing is necessary, both for the waste management and for participations from various kinds of organisations.
- Participation from NGOs is desirable.
- Clarifying roles of each participants is necessary.
- Voluntarism is crucial to keep sustainable discussions for a long time.
- Openness and transparency are important, and the cooperation between the municipalities as well.

2) Experiences and cases in Oskarshamn municipality

In the early 1980s, the Swedish government decided to store all spent fuels in the country in Oskarshamn, one of the regions hosting nuclear power plants. At present,

the spent fuel elements are stored at an intermediate storage facility called the 'Clab.' The storage at the Clab is provisional and not permanent. Some residents voiced concerns about the Clab becoming a permanent facility. Eventually, however, it was decided that the spent fuel elements would be disposed of at the final repository in Forsmark.

Undeveloped land and farming villages spread across Oskarshamn, a city with the population of 27,000. Thanks to the numerous good-standing companies located in the city, Oskarshamn is much wealthier and has a higher level of education than other municipalities. These businesses contribute to the economic development of the surrounding communities.

Because of their extensive experience co-existing with nuclear power, residents willingly take part in discussions on nuclear facilities, which help support the mechanism of residents' opinions being reflected in the process. When a nuclear operator proposed Oskarshamn City in an encapsulation plant project for radioactive waste disposal, the city consented to its construction. Moreover, the discussions were attended by assembly members from both the ruling and opposition parties for Oskarshamn City Council's Local Competence Oskarshamn, a committee for enlightenment. A task group was set up for safety and security, local development in the field of nuclear facilities, municipal development, auditing the application, and other topics. The group is engaged in multi-layered examination and consultation as it continues to examine ways to have a positive impact on economic development.

The opinion leader from Oskarshamn pointed out some municipal standpoints in search of a solution for the waste problem as follows:

- Oskarshamn is a municipality with extensive experience of the nuclear industry.
- Oskarshamn does not accept that the temporary solution for waste storage Clab becomes permanent or semi-permanent solution, since it has had strong support from the inhabitants to participate in the discussion.
- With their strong position Oskarshamn will safeguard the local perspective in the decision-making process.

The active and sustainable form of the stakeholder involvement in Oskarshamn Municipality is called 'The Oskarshamn Model'. The model has well informed citizens and politicians under such concepts as:

- Full openness, participation and influence are the key issues.
- The Municipal Council is the local client.
- The citizens and the environmental groups are resources.
- The authorities are the experts.

The opinion leader talked about the success factor behind and lessons learned from The Oskarshamn Model, 'It takes many years to form a consensus on the acceptance of a nuclear facility. Dialogue is important, as is the transmission of information. Stakeholders will need to conduct dialogue on a continual basis. All processes must be

transparent and predictable. Confidence and transparency are important; as experts, operators, government and regulatory organisations have the responsibility to give a clear answer to any questions that may be posed by residents.'

4. Experiences and cases in Thailand

One of the issues confronting Thailand is the pressing need to develop new power sources to meet the rapid expansion in electricity demand that accompanies economic development. At the same time, there is a growing trend in the nation to review its energy policies, given the aggravation of air pollution and depletion of natural gas resources at home.

The power development plan approved by the government in 2007 (PDP2007) included a project to introduce four nuclear reactors totalling 4,000MW as a power source development option. Preparations got underway to start the commercial operation of two units in 2020 and 2021, respectively. The PDP2010 disclosed in 2010 positioned nuclear power as an important source of alternative energy in consideration of steps to deal with the growing electricity demand, improvement of energy security, and the necessity of clean energy, amongst other things. All combined, plans were mapped out to sequentially start the operation of five 1,000MW reactors at nuclear power plants between 2020 and 2028. Thereafter, following the accident in Fukushima, the government decided to postpone the introduction of nuclear power generation. The ratio of nuclear power given in the latest version (2018-37) of the 'Power Development Plan (PDP2018),' released in January 2019, is 0%.

While PDP2018 does not include a plan to introduce nuclear power, the activities outlined below are underway in Thailand:

- *Public Understanding on Base Load Power Plants*
  Education and information for the local community and for each household
- *E-KNOW Energy the ICONIC Contest*
  Essay and VDO Contest on Base Load Power Plants as tools to assist public understanding of nuclear power as base load power
- *MoEn–JICC Seminar on Public Understanding of Nuclear Power Plants in Thailand*

The opinion leader from Thailand said that a broad range of people including experts and ordinary citizens took part in facility visits, essay contests, seminars, and other events, which helped to improve the public understanding of nuclear power. Participation of the people in these events often prompted them to change their views about nuclear power.

5. Experiences and cases in Japan

Many regions in Japan have nuclear facilities. The International Atomic Energy Agency (IAEA) international standards stipulate the establishment of zones in case of an accident at a nuclear power plant: Precautionary Action Zones (PAZ) and Urgent Protective Action Planning Zones (UPZ). The PAZ is an area within which preparations should be made to implement

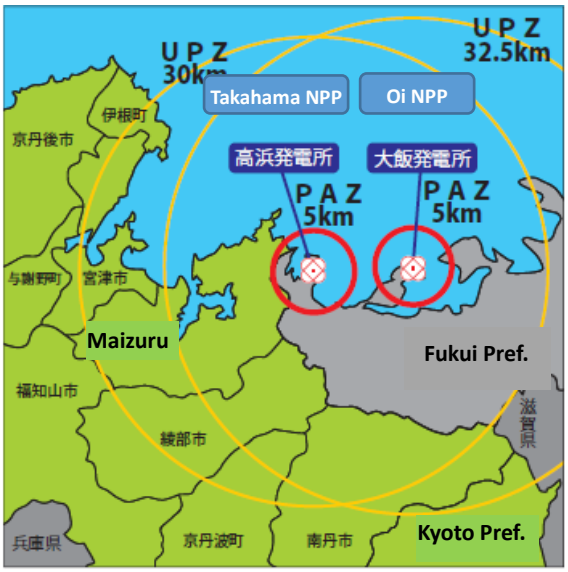
precautionary protection including evacuations before the release of radioactive substances, and the UPZ is an area where preparations should be made to implement urgent protective measures including indoor evacuation. Based on the IAEA international standards, the Nuclear Emergency Response Guideline in Japan defines the PAZ and UPZ as areas within approximately 5 kilometres (km) and within approx. 5–30km from a nuclear plant, respectively. The guideline mandates municipalities inside the UPZ to formulate evacuation plans.

This section discusses the evacuation measures adopted by Kyoto Prefecture and Maizuru City, municipalities that do not have a nuclear facility but neighbour a municipality that has such facilities, and measures of Omaezaki City, which is deeply involved in nuclear power as a municipality with a nuclear facility.

1) Experiences and cases in Kyoto

Kyoto Prefecture is the sole neighbouring municipality in Japan that has a PAZ. Its population inside the UPZ exceeds that in the prefecture that has the nuclear facility (Figure 2.4).

Figure 2.4. PAZ/UPZ of Takahama and Oi Nuclear Power Plants



NPP = nuclear power plant, PAZ = Precautionary Action Zone, UPZ = Urgent Protective Action Planning Zone.
Source: Kyoto Prefecture, Brochure to Prevent Nuclear Disaster (11 April 2014), http://www.pref.kyoto.jp/kikikanri/documents/kyotofusiori01.pdf (accessed 15 March 2019) (in Japanese).

Following the formulation of the Nuclear Emergency Response Guideline by the government, the Kyoto government revised its regional disaster prevention plan in 2013. Consequently, each local municipality within the UPZ in Kyoto formulated or revised their regional disaster prevention plans. The Kyoto government has published a brochure titled 'Brochure on Nuclear Disaster Prevention' (Figure 2.5), which contains basic knowledge on nuclear disaster prevention and the content of the revision of the prefecture's regional disaster prevention

plan. At the same time, local municipalities in the UPZ have prepared and released a similar brochure in the same format. In 2015, the Kyoto government prepared 'Instructions on wide-area evacuation associated with nuclear emergency' and signed a safety agreement with the nuclear plant operator establishing regional councils.

Figure 2.5. Brochure on Nuclear Disaster Prevention in Kyoto Prefecture

Source: Kyoto Prefecture website, http://www.pref.kyoto.jp/kikikanri/documents/kyotofusiori01.pdf (accessed 14 March 2019) (in Japanese).

Whilst the reviews of safety measures at nuclear power plants are implemented by the Nuclear Regulation Authority, each municipality is responsible for evacuation planning in the event of an emergency. As part of the steps to enhance the effectiveness of evacuations, municipalities with a nuclear facility and those in the UPZ conduct comprehensive nuclear emergency drills. Although the Kyoto government has signed a safety agreement with plant operators, Kyoto and other nearby municipalities do not have the right to consent or refuse to a nuclear restart (prior consultations on the restart of the operation of a facility that has been stopped due to request for safety measures, etc.), unlike Fukui Prefecture where the nuclear facility is located. This is an example of the differences in the content of an agreement signed between a nuclear power plant and a municipality where a nuclear facility is located and that concluded between the plant and a nearby municipality. And so, the Kyoto government established a regional council to fill the information gap by getting briefed on safety measures implemented at the nuclear power plant and communicating their request to the plant, etc. Kyoto is the only municipality that carries out such measures amongst all such peripheral municipalities in Japan.

The measures on evacuation plans currently adopted by the Kyoto government are as shown below. As many issues including the communication system, securing of personnel during evacuation, and the identification of their roles remain unresolved, the Kyoto government

says it will work to formulate better evacuation plans in consideration of anxieties felt by residents.

- Emergency drills and plan formulation
- Development of evacuation routes (ongoing)
- Preparation and distribution of evacuation guidebooks

The section below shows the questions raised by residents during a public meeting held by the Kyoto government for safety measures associated with nuclear power generation and evacuation plans. The questions indicate that people living in nearby municipalities have concerns similar to residents in municipalities with a nuclear facility.

- Various safety measures are in place, but how can you say that an accident like the one at Fukushima could never happen? (You cannot say that for sure, can you?)
- It is said that Japan has enough electricity. Why then do we need to operate a nuclear power plant? (We probably do not need one, right?)
- How will the conversion to renewable energy be promoted?
- Would the resident evacuation plan for a nuclear emergency ensure a safe evacuation?
- Evacuation plans should be formulated first before restarting a nuclear power plant.
- We were told that buses will be used for evacuation in principle. Can you secure enough buses for that purpose?
- Roads could collapse in the event of an earthquake. How are you going to secure the evacuation routes if that happens?
- What ideas do you have on measures to prevent traffic congestion associated with evacuation in the event of a nuclear emergency?
- Is nuclear power generation really cost competitive even when accident scenarios are taken into consideration?
- How long would it take for us to return home after we evacuate?
- Are sufficient countermeasures against terror attacks in place?

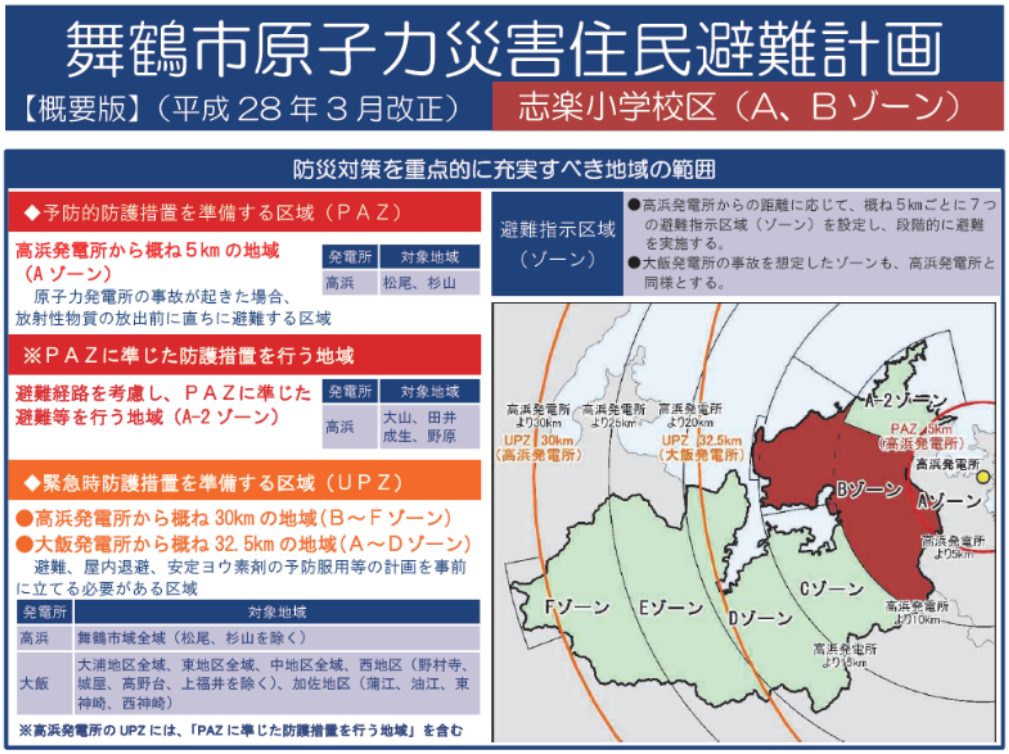
2) Experiences and cases in Maizuru and other UPZ cities

Maizuru City is the only municipality that has a PAZ in Kyoto Prefecture, and almost all areas of Maizuru City come under the UPZ of Takahama Power Station. The measures adopted by Maizuru City are as follows:

- The Maizuru government has decided evacuation order zones based on its own scenario. The evacuation order for each zone will be issued one-by-one.
- The city assumes on southwards and westwards evacuation destinations so that residents can be evacuated to different destinations depending on the spread of radioactive substances.
- In 2017, the city prepared the 'Residents' Evacuation Plans (Summary Version),' a brochure for residents that outlines the ideas behind and method of evacuation (Figure 2.6), which was distributed to all households in the city.
- The city is taking efforts to promote the public understanding of evacuation plans including an outreach lecture for town planning (briefing). Any other media channels will be employed to promote the understanding of residents on the topic.

- The city has developed facilities equipped with positive-pressure devices, air purifiers, and other necessary equipment at schools, civic halls, and other institutions for senior citizens, hospitals, and for other people who need special care. The development of more facilities is underway.
- Iodine pills are given out in the PAZ and equivalent zones so residents can take them as a precautionary measure. As for UPZ residents, the pills will be distributed during evacuation at the gathering places. The city plans to expand the areas subject to pill distribution. A sufficient number of pills are stockpiled, including those for temporary visitors.
- The city has conducted an emergency drill at least once every fiscal year after the accident in Fukushima. Various efforts are taken to facilitate the participation of more residents including shifting the zones targeted in each drill. During the drills, participants are engaged in a wide range of activities such as establishment and management of headquarters for disaster control, opening and management of temporary shelters, evacuation of those who need special care, screening, monitoring, preparation of meals and information sharing.
- The city will continue to review everything to create highly effective plans to protect its citizens.

Figure 2.6. Brochure of Residents' Evacuation Plans, Maizuru City



Source: Maizuru City website, https://www.city.maizuru.kyoto.jp/kurashi/cmsfiles/contents/0000002/2765/01siraku.pdf (accessed 15 March 2019) (in Japanese).

Problems that have arisen in evacuation planning and evacuation drills in Maizuru City include the shortage of materials and equipment and personnel to guide the evacuation. The municipality has devised ways to deal with the problems, for instance, by utilising existing resources (buses, buildings, and volunteers) that were assigned for use in the measures against natural disasters. Municipal workers take advice from experts on radiation and nuclear safety to equip themselves with sufficient knowledge on the importance of evacuation plans that would be required to brief residents on the matter.

Furthermore, the city also needs to foster cooperation with municipalities that have plans to accept evacuees, which can be located dozens of kilometres away. The municipality that will become the evacuation destination will not be known until an accident occurs. For this reason, Maizuru City and other municipalities in Kyoto Prefecture have been working continuously to share information with municipalities in Hyogo, Nara, Shiga, and other prefectures that are potential candidates for accepting evacuees.

For regions and countries that have no nuclear power plants but are next to a town (country) that has one, the example of Kyoto Prefecture and Maizuru City may provide insights in the field of evacuation planning and resident briefings.

3) Experiences and cases in Omaezaki

For almost half a century Omaezaki City in Shizuoka Prefecture has prospered in tandem with the Hamaoka nuclear power plant, which is located in the region.

The Hamaoka Unit 1 started operations in 1974 when Omaezaki City was still named Hamaoka town. When the accident in Fukushima occurred, Units 3 to 5 were in operation and a plan to construct Unit 6 was underway. About 2 months after the accident in Fukushima, the then Prime Minister Naoto Kan requested the suspension of all units at the Hamaoka nuclear Power plant, and that suspension is still in effect. Hamaoka is the sole power site that suspended its operations at the request of the government. Omaezaki City asked the government and regulatory authorities to conduct a rigorous and swift safety assessment and called for an explanation of the necessity of nuclear power plants. Figure 2.7 shows the document created by Omaezaki City at the time that illustrates the relationship between 'Nuclear Power and Our Lives.'

In Omaezaki City, the citizens, operator, and municipality have been working together to build a comprehensive, energy-oriented city. The municipal government has formulated the Omaezaki City Energy Vision as it aggressively promotes measures to revitalise the community. Also, the city hosts public meetings on nuclear power to address citizens' questions and concerns (Figure 2.7).

Figure 2.7. Snippet from Omaezaki City PR Magazine

Source: Omaezaki City website, https://www.city.omaezaki.shizuoka.jp/material/files/group/4/172.jpg (accessed 14 March 2019) (in Japanese).

Figure 2.8. Public Meeting in Omaezaki

Source: Omaezaki City website, https://www.city.omaezaki.shizuoka.jp/kurashi/kurashi_tetsuduki/energy/genshiryoku/ikenkoukan.htm(accessed 14 March 2019) (in Japanese).

The nuclear power plant in Omaezaki City was built after Chubu Electric Power Company made a proposal to and received a positive answer from the town. The plant was not constructed in response to local requests, which set the municipality apart from many others that have a nuclear facility in place. For Omaezaki City, the decision to accept a power plant proved to be a monumental undertaking with significant consequences. The city officials believed that the citizens' acceptance of the government's energy policies depended on whether they could identify with the social significance of a nuclear power plant and, needless to say, assurance of safety. For the municipality, the construction of the nuclear power plant had to be an opportunity that provided an impetus for industrial promotion, improvement of welfare for its citizens, revitalisation of the regional economy, training and employment of local human resources, advancement of education and culture, and the development of infrastructure in addition to the establishment of a stable foundation for long-term financing. Looking back on its history, Omaezaki City has held talks with

neighbouring municipalities, fisheries cooperative associations, and other stakeholders as the need arose and chose the path towards mutual prosperity whilst protecting the position of individual parties.

Omaezaki, an opinion leader, said that, after launching a wide range of measures in preparation for the construction, the municipality learned the lesson that 'for all matters, consensus-building depends on understanding and consent.'

Changes in the Japanese government's energy policies following the accident in Fukushima completely altered the way of life in the region that previously lived in harmony with the nuclear plant. Chubu Electric, which suspended the operations of the Hamaoka nuclear power plant at the request of the government, later launched large-scale safety enhancement works including the construction of a 22 metre-high tsunami protection wall. However, the suspension of operations was continued even after the safety enhancement works were completed. As Chubu Electric has not made any investment beyond such works, the number of people working at the plant has been on the decline. Tough conditions for the area continue with its impact being felt in industries that include accommodation facilities and restaurants in the siting area. The opinion leader in Omaezaki City says, 'Regardless of whether you're pro- or anti-nuclear in the discussions, the overriding desire amongst local citizens is to live in peace.'

Omaezaki City is one of the municipalities that was most directly affected by changes in the government's energy policies. 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.

Chapter 3
Considerations and Policy Proposals

How can we improve the stakeholder involvement on nuclear energy?

This chapter makes several recommendations and defines stakeholders and coexistence and co-development with surrounding communities.

1. Findings at the workshops

As the workshops were held 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 following is the summary of those findings, which were reviewed at a wrap-up meeting held in Tokyo for policy recommendations.

1) Responsibility of each 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 influence and direction for the local and prefecture activities.
- A stronger link between national government policies and implementation on the ground meaning outside host areas, as well as within, and with those managing and responsible for site operations would be a requisite.

2) Trust building

- Despite all the good work and the progress the workshop participants experienced, there is the 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.
- More public and wider understanding of 'why nuclear power is so important to that mix for public benefits and economic development, wealth, jobs, and health in future.'
- Authorities and/or experts should be well-equipped with expertise and should be trusted.

3) Providing information

- The media should have a more responsible role in strengthening that relationship with separate sessions with education and better understanding, and therefore more responsibility in being 'part' of the future solutions rather than creating fear and more problems.
- Incorrect information and images on prejudice destroy 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.
- Learning from other countries experiences is important but only if adapted to their own cultural, socio- economic, and political scenes. No single country has it 100% correct as each country and 'local' situation is very different.

4) 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 risks from radiation exposure are miniscule and that the risks are related more with earthquakes and tsunamis, not nuclear-centric in any sense.
- Reducing the gap between real understanding and perceptions is such an important task, and much more needs to be done.

As mentioned above, many findings were obtained through the project. In fact, an opinion leader from Europe found the project meaningful as he shared his experiences and learned new ideas (implications) for future studies by exchanging views with the workshop participants from around the world. Likewise, some participants from Asian countries found that building confidence between those who receive information and those who provide it is as important as providing technically accurate information and that capitalising on the media is key to sharing information amongst concerned parties.

2. Implications

- Understanding energy issues greatly depends on children's education in particular. Most of us take for granted that energy is readily available, but how much our life depends on it should be recognised. While situations differ from country to country, there is no denying that each government's energy policy is designed primarily to secure energy supply and conserve the environment. Each government's objective is clear and rational, with nuclear power playing a major role in the energy mix.
- It is more important to prove the safety of nuclear power (i.e. the risks involved can be avoided) than to deal with risks identified through technical analysis.
- While human resources in nuclear industries are generally well qualified, they should pay more attention to what interests the public. In addition to providing accurate answers, they should respond to the concerns of those who do not know much about nuclear power. Specifically, the public is interested in how energy is related to their everyday life, work, property, and health. Technical explanations are important, but there should be more discussions on how nuclear power contributes to the economy and job creation. France's CLI provides a good communication model that suggests the need for the involvement of local stakeholders and communities.

- The following are the top 10 energy-related factors in which the public is interested (not all of them can be applicable due to differences in culture and experiences): i) safety, ii) security aspects, iii) reliable power source – affordable, iv) importance for economic and social needs, v) employment benefits – direct and indirect, vi) importance for future economic development, vii) social fabric of local communities, viii) education and training issues, ix) environmental factors, and x) health factors.
- Sweden's decision-making structure, where the government communicates directly with local communities, serves as a good example as it facilitates discussions between the two parties.

Whilst Asian countries are still in their infancy when it comes to consensus building on nuclear power, the challenge is to secure public support in a country where life without nuclear power has never been experienced. Policies on energy, the economy, and nuclear power should thus be articulated properly.

Meanwhile, Japan is the only country that has experienced a Level 7 accident, the most significant level on the International Nuclear Event Scale, as defined by the International Atomic Energy Agency (IAEA). Because of its special circumstances, public acceptance of nuclear power in Japan may be different from that in other Asian countries such as China and India, where nuclear power is used. Thus, it is questionable whether they can learn lessons from the post-Fukushima accident public acceptance, which is mentioned below.

As is evident from the poll results shown in Chapter 1, most Japanese people doubt the safety of nuclear power, which is primarily based on a belief that a serious accident like the one in Fukushima results in irreparable damage. While some nuclear power experts asserted before the accident that multiple protections prevent serious accidents from happening, the concerned parties including the government, regulatory authorities, and power companies have been striving to improve safety and contingency plans since 2011, assuming that accidents cannot be prevented. Kyushu Electric Power Company, for example, released a pamphlet in March 2018 on the improved safety of the Genkai Unit 3 reactor, which is scheduled to restart following a successful safety assessment. An assertion to the effect that 'the containment vessels are damage-proof with upgraded protection facilities and systems in place,' however, was criticised by the hosting municipality and local communities who referred to it as a 'revival of the safety myth.'

The regulatory authorities are tasked with verifying the compliance of nuclear facilities with certain standards. It is true, however, that complying with such standards does not guarantee perfect safety. On the other hand, the public generally demands 'zero risk' for nuclear facilities – i.e. there should be no accidents at all. For example, some residents living near the Tokai Daini nuclear power plant said at a briefing session held by the Ibaraki government that they would not tolerate the restart of the plant unless 'accidents would never happen.'

Merely emphasising 'how much safety has improved' from the viewpoint of promoting nuclear power is not enough to obtain public consent. Their biggest concern is the possible impact of serious accidents on their lives, not the accidents themselves. Given that 'zero risk' is not possible, the government and power companies should explain their contingency plans in detail, assuming that accidents are unpreventable.

3. Policy proposals

Clearly more efforts are needed to improve further public involvement, understanding, and acceptance towards nuclear power for the future. In addition, more needs to be done especially in non-host adjacent areas and municipalities as well as to secure general public awareness and acceptance.

- The national government should be responsible for its role – defining the basic energy policy and comprehensive rules for safety regulation, emergency preparedness and response, and long-term radioactive waste management.
- Policymakers should be responsible for a predictable and transparent decision-making process and for steady progress of the operation, actively inviting stakeholders in the schemes – residents, the business sector, the public sector, and the media.
- Education on energy security and risks is crucial, however, and should be consistent with the basic objectives of policy development. This would benefit environmental protection, jobs, and the wealth of all people.
- CLI (Local Information Commission) or similar schemes in other countries could be the models for stakeholder involvement. How can it practically work? That is the issue to be developed further. Mutual respect is the basic principle as the starting line.
- No agreement can be made without public understanding and consent. The conditions for consent can be 1) consistency with one's own experience, 2) consistency with one's own instinct (feeling), 3) integrity and validity of the other side's logic, 4) credibility of information sources, and 5) trustworthiness of information communicators. These five conditions are prerequisites for obtaining public consent.
- The government, municipalities, and power companies should strive to build confidence of the public.

No single country has all the solutions but it is one of those special global sectors where we must collaborate because whilst accidents are rare, and nuclear risks most 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 positive and essential for the socio-economic needs of current and future generations; which must also be pursued to ensure those benefits are secured.

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Appendices

Appendix 1. Itinerary for the Public Acceptance Week for Nuclear Energy FY 2018

Workshop on 'Living just outside a hosting municipality of nuclear facilities – with opinion leaders from foreign countries'

Date and venue

Date: 22 January 2019

Venue: Maizuru Cultural Hall, Maizuru City, Kyoto Prefecture, Japan

Languages: Japanese/English/French (with simultaneous interpretation)

Timetable

12:00	Doors open and Registration
12:30–12:40	Opening Remarks: President and CEO, IEEJ
12:40–12:50	Opening Address: Executive Director, Disaster Prevention, Maizuru City
Session 1: Strategies and activities for nuclear disaster prevention at municipality just outside a nuclear hosting region (Moderator: Senior Economist, Manager, IEEJ)	
12:50–13:50	Provision at Kyoto pref.: Director, Nuclear Safety Division, Department of Citizen's Affaires, Kyoto Pref. Provision at Maizuru: Manager, Crisis Management and Disaster Prevention Division, Mayor Affairs Office, Maizuru City ・Disaster prevention activity, nuclear safety plan ・Municipal council ・Emergency exercise ・Briefing for residents Q&A
13:50–14:10	Coffee break
Session 2: Policy Proposals (Moderator: Senior Economist, Manager, IEEJ)	
14:10–15:10	Free discussion ・Representatives from cities and towns next to nuclear hosting region ・Opinion leaders from foreign countries ・Participants from ERIA
15:10–15:20	Wrap-up of proposals
15:20–15:30	Closing Address: Senior Energy Economist, Energy Unit, Research Department, ERIA

CEO = chief executive officer; ERIA = Economic Research Institute for ASEAN and East Asia; IEEJ = Institute of Energy Economics, Japan; Q&A = question and answer.

Workshop on 'Living in hosting municipality of nuclear faculties – public meeting with opinion leaders from three countries and Japan'

Date and venue

Date: 24 January 2019

Venue: Shizuoka Country Hamaoka Course and Hotel, Omaezaki City

Language: Japanese/English/French (with simultaneous interpretation)

Timetable

12:30	Doors open and Registration
13:00–13:10	Opening Remarks: Senior Energy Economist, Energy Unit, Research Department, ERIA
13:10–13:20	Opening Address: Director General, General Affairs Department, Omaezaki City
Session 1: Status of region hosting or introducing a nuclear facility and dialogue with stakeholder at each country; why nuclear power is important for the country and communities? Can we prepare for the accident safely enough? (Moderator: Senior Economist, Manager, IEEJ)	
13:20–14:00	Delegate, Consultative Commission on Industrial Change, European Economic and Social Committee (Finland)
	Member, French Parliament (France)
	Employment, International Specialist (the UK)
	Former Representative, Omaezaki City Audit Commissioner
Session 2: Reaching common understanding; significance of nuclear facilities in the local community, regulation schemes and risks (Moderator: Senior Economist, Manager, IEEJ)	
14:00–14:50	Mayor, Municipality of La Hague (France)
	Mayor, Municipality of Flamanville (France)
	Mayor, Municipality of Östhammar (Sweden)
	Strategic Management Director, Growth and Business department, Municipality of Oskarchamn (Sweden)
	Vice-Chairperson, Omaezaki City Tourism Association
Session 3: Policy Proposals (Moderator: Senior Economist, Manager, IEEJ)	
15:00–15:20	Q&A and Wrap-up of Proposals
15:20–15:30	Closing Address: Managing Director, Chief Economist, IEEJ

ERIA = Economic Research Institute for ASEAN and East Asia; IEEJ = Institute of Energy Economics, Japan; Q&A = question and answer.

Workshop and wrap-up meeting on 'How to improve PA for nuclear energy in referring to the experience in the respective countries'

Date and venue

Date: 25 January 2019

Venue: Keio Plaza Hotel, Tokyo

Language: English

Timetable

08:30	Doors open and Registration
09:00–09:10	Opening Address: President and CEO, IEEJ
09:10–09:20	Welcome Address: Director, Office for Regional Relations for Nuclear Facilities, Nuclear Energy Public Relations Office, (METI)
Session 1: Status of region hosting a nuclear facility or just outside a hosting municipality and Dialogue with stakeholder at each country; why nuclear power is important for the country and communities? Reaching common understanding (Moderator: Senior Economist, Manager, IEEJ)	
09:20–09:30	Introduction: Introduce speakers by moderator
09:30–10:00	Employment, International Specialist (the UK)
10:00–10:30	Delegate, Consultative Commission on Industrial Change, European Economic and Social Committee (Finland)
10:30–10:50	Coffee Break
Session 2: Reaching common understanding; significance of nuclear facilities in the local community, regulation schemes and risks (Moderator: Senior Economist, Manager, IEEJ)	
10:50–11:00	Introduction: Introduce speakers by moderator
11:00–11:30	Mayor, Municipality of La Hague (France)
11:30–12:00	Mayor, Municipality of Flamanville (France)
12:00–13:20	Lunch Break
13:20–13:30	Introduction: Introduce speakers by moderator
13:30–14:00	Strategic Management Director, Growth and Bossiness department, Municipality of Oskarchamn (Sweden)
14:00–14:30	Mayor, Municipality of Östhammar (Sweden)
14:30–15:00	Member, French Parliament (France)
15:00–15:20	Engineer, Senior Professional, Division of Nuclear Energy Study and Coordination, Office of the Permanent Secretary, Ministry of Energy (Thailand)
Session 3: Policy Proposals (Moderator: Senior Economist, Manager, IEEJ)	
15:20–15:30	Report Result of Workshops at Maizuru and Omaezaki
15:30–15:50	Free Discussion, Wrap-up of proposals
15:50–16:00	Closing Address: Senior Energy Economist, Energy Unit, Research Department, ERIA

CEO = chief executive officer; METI = Ministry of Economy, Trade and Industry in, ERIA = Economic Research Institute for ASEAN and East Asia; IEEJ = Institute of Energy Economics, Japan; Q&A = question and answer.

Appendix 2. Fiscal Year 2018

Public Acceptance Week Minutes

DATE	EVENTS	VENUE
21.JAN (MON)	Takahama NPP technical visit	Takahama NPP
22.JAN (TUE)	Workshop on 'Living just outside a hosting municipality of nuclear facilities – with opinion leaders from foreign countries'	Maizuru in Kyoto Pref.
	Press Conference	
24.JAN (THU)	Hamaoka NPP technical visit	Omaezaki in Shizuoka Pref.
	Workshop on 'Living in the hosting municipality of nuclear facilities – public meeting with opinion leaders from foreign countries and Japan'	
	Press Conference	
25.JAN (FRI)	Workshop and wrap-up meeting on 'How to improve PA for nuclear energy in referring to the experience in the respective countries'	Tokyo
	Press Conference	

NPP = nuclear power plant.

I. Workshop on 'Living just outside a hosting municipality of nuclear facilities with opinion leaders from foreign countries'

Date: 22 January 2019

Venue: Maizuru Cultural Hall, Maizuru City, Kyoto Prefecture

Session 1: Strategies and activities for nuclear disaster prevention at municipality just outside a nuclear hosting region

Presentations:

1. Countermeasures for nuclear disaster in Kyoto, Nuclear Safety Division, Department of Citizen's Affairs, Kyoto Prefecture
2. Nuclear disaster response by Maizuru City, Crisis Management and Disaster Prevention Division, Maizuru City

Session 2: Policy proposals

Free discussion amongst representatives from cities and towns next to nuclear hosting region, opinion leaders from European countries and participants from ERIA

II. Workshop on 'Living in the hosting municipality of nuclear facilities –with opinion leaders from foreign countries and Japan'

Date: 24 January 2019

Venue: Shizuoka Country Hamaoka Course and Hotel, Omaezaki City, Shizuoka Prefecture

Session 1: Status of region hosting or introducing a nuclear facility and dialogue with stakeholder at each country; why nuclear power is important for the country and communities? Can we prepare for the accident safely enough?

Presentations:

1. Why nuclear power is important for the country and communities
2. The different existing tools in the French system that 'introduce a nuclear facility and dialogue'
3. Nuclear and socio-economic development, international experience
4. Hamaoka NPP construction – from the viewpoint of local government

Session 2: Reaching common understanding; significance of nuclear facilities in the local community, regulation schemes and risks.

1. Intervention of LCI at La Hague
2. Flamanville, paradoxes and contradictions between local choice and national decisions.
3. Managing local dialogues and acceptance over long time frames
4. Gaining acceptance for nuclear waste management amongst local stakeholders
5. Experience of local residents of Hamaoka NPP

Session 3: Policy proposal

III. Workshop and wrap-up meeting on 'How to improve PA for nuclear energy in referring to the experience in the respective countries'

Date: 25 January 2019

Venue: Keio Plaza Hotel, Tokyo

Session 1: Status of region hosting a nuclear facility or just outside a hosting municipality and dialogue with stakeholder at each country; why nuclear power is important for the country and communities? Reaching common understanding.

Presentations:

1. Nuclear and socio-economic development
2. Nuclear energy, the pros and cons, and the public

Session 2: Reaching common understanding; significance of nuclear facilities in the local community, regulation schemes and risks.

1. LCI: Local Information Commission
2. Flamanville, paradoxes and contradictions between local choice and national decisions.
3. Managing local dialogues and acceptance over long time frames.
4. Gaining acceptance for nuclear waste management amongst local stakeholders
5. The different existing tools in the French system that 'introduce a nuclear facility and dialogue'
6. Policy and public understanding for nuclear power plant in Thailand

Session 3: Policy proposal

Findings:

- Workshop at Maizuru: A municipality which is in PAZ/UPZ of Takahama NPPs in Kyoto Prefecture

  - Emergency preparedness and response system introduced by Kyoto Prefecture, Maizuru City, and five other neighbouring municipalities
  - Some issues raised in the evacuation planning:
    - Limited infrastructure and human resources
    - Utilise everything existing: buses, buildings, voluntary staff from residents (Jichi-kai in Japanese), volunteers in fire departments, which work in cases of natural disasters
    - Support and advice from experts on radioactivity and nuclear safety
    - Sustainable cooperation between municipalities in wide regions

- Workshop at Omaezaki: A hosting municipality of Hamaoka NPPs within PAZ

  - A long history of Hamaoka (now Omaezaki) from the beginning stage of planning to today, and in the future was introduced. Most of the residents had not been informed of nuclear issues – there was not an active involvement at the beginning.
  - Fukushima Daiichi accident caused a HUGE disturbance amongst residents in hosting municipalities. They had to face big difficulties in daily activities.
  - 'We live within 5kms from Hamaoka NPPs. We want to continue living in the future as well.'

IV. Implications

- Authorities and/or experts – safety authorities, for example – should be well-equipped with expertise and trusted.
- Incorrect information and images on prejudice destroy 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 (as the successful cases in France and in Sweden).
- 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.
- Securing proper funding for emergency response and securing safety on radioactive waste management is also important for gaining trust.

V. Policy proposals

- National government should be responsible for its role – defining the basic energy policy and comprehensive rules for safety regulation, emergency preparedness and response, and long-term radioactive waste management.
- Policymakers should be responsible for predictable and transparent decision-making process and for steady progress of the operation, actively inviting stakeholders in the schemes – residents, business sector, public sector and media.
- Education on energy security and risks is crucial, however, and should be consistent with the basic objectives of policy development. This would make it widely known that nuclear energy is beneficial for environmental protection, jobs, and the wealth of all people.
- CLI (Local Information Commission) or similar schemes in other countries – e.g. the Oskarshamn model – could be the models for stakeholder involvement. How can it practically work? That is the issue to be developed further. Mutual respect is the basic principle as the starting line.

Appendix 3. Q&As at press conferences

I. Maizuru City

Q: *The prefectural and city governments have their own plans and information systems in place, and our lives depend entirely on those plans and systems. I would like to hear from the representatives of Europe – what do you think about this situation and how do you foresee the future of nuclear power in Asia?*

A: To be brief, the basic idea is the same in France. How to put it into practice is left to the discretion of each municipality.

Q: In Japan, municipalities are responsible for evacuating the public whilst the government takes the responsibility in France. What do European people think about this?

A: Risks do not exist in isolation. They are prevalent. So, I personally think the government should be responsible. While consistent risk-avoiding measures would reassure municipalities, they are considered 'straight-forward authoritative approaches' from the viewpoint of the participatory democracy, which leaves no room for public discretion. This could compromise the independence of each municipality. In fact, the heads of municipalities located more than 15km away from nuclear facilities tend to be indifferent. In France, meanwhile, most nuclear power plants are located in small cities.

A: Restarting nuclear power plants is not much of a problem in France, but there are plans to build and operate new reactors, which should be approved by the Nuclear Safety Authority (ASN). In addition, a local crisis management centre should be set up beforehand, whilst participation drills and public opinion collection are prerequisites for approval.

A: The government on behalf of municipalities authorises the restart of nuclear power plants in Sweden. Decisions on evacuation procedures, meanwhile, are made by municipalities in close liaison with the government.

A: In spite of the hosting municipalities' heightened interest, there are cases where neighbouring municipalities oppose the restart of nuclear power plants. For that matter, regional cooperation is needed to assure safety.

A: The Fukushima accident shed light on a serious problem, that is, the asymmetric nature of information. Specifically, power companies and the government were well-informed whilst the public and municipalities were not. Following the accident, however, information sharing has become compulsory. In fact, relevant information is collected and disseminated on a regular basis. This improvement can be attributed to the accident.

Q: *A system like CLI will probably be needed everywhere, but is it workable in the ERIA member countries?*

A: That is exactly the point. Whilst situations differ from country to country in Asia, newcomers can learn best practices from nuclear power countries including Japan. For example, we have received a lot of input from the Kyoto and Maizuru municipalities regarding various issues including responsibility sharing. As the power and size of the government are unique to each country, there may be no common approaches, but we still should share ideas.

A: The media also plays a major role in this respect. Although the public is increasingly divided, responsibilities should be shared amongst many people beyond their interests. In the UK, for example, the media takes part in community briefing sessions. They also participate in training programmes as independent members. Each one of us should be a responsible player.

II. Omaezaki City

Q: *Is this meeting intended to discuss how we should promote nuclear power worldwide?*

A: Strictly speaking, no. Some countries may or may not opt for nuclear power. The choice is theirs. We are not going to involve the latter in these discussions. It is a topic that should be discussed amongst them. What matters is not to persuade opponents but to understand how they feel. We need to build consensus, though the nuclear power option may eventually be scrapped. In any case, we should strive to improve communication.

Q: *Whilst two representatives from Omaezaki made presentations today, why didn't anyone from the opposition participate in the meeting today?*

A: Everyone was welcome to take part in this meeting. We never turn anyone down. We asked the municipality to recommend people that have long-established expertise in power generation, not necessarily supporters.

Q: *What recommendations will be made today?*

A: The key thus far is to provide all stakeholders with information in a timely manner, gather various opinions, create a fool-proof system to share information with those who have safety concerns, and continue communication efforts based on mutual trust. Europe's long-established experience in this particular field has been very informative.

Q: *What are the themes for Maizuru?*

A: Although we're not a hosting municipality, we are within the UPZ and PAZ. So, we have an evacuation plan in place. At the same time, we were briefed on issues such as how the neighbouring municipalities communicate information to the public, and evacuation and/or information sharing drills held in Kyoto and Maizuru, with nuclear emergency officials of the two municipalities taking part in them.

Q: *Are the policy recommendations intended for existing power plants or the ASEAN countries?*

A: They are intended for policymakers in the ASEAN countries. The findings gathered in Japan on building public consensus on nuclear power may be useful for the ASEAN countries.

Q: *Nuclear disasters can be prevented, according to one of the opinion leaders. As the Hamaoka nuclear power plant is said to be located right above a massive epicentre, a major earthquake could result in significant damage. Can they really be prevented?*

A: I think this question concerns hazards and risks. This issue was discussed by the French parliament. We should assess hazard and risk levels. For example, what if a plane crashed into a nuclear power plant, or what if two planes crashed into it, with an earthquake taking place at the same time? The worse the scenario, the greater the hazard. So, we should take measures against realistic hazards. We visited the Hamaoka nuclear power plant this morning, where there are many countermeasures in place. Whilst earthquakes can strike at any time, we do not necessarily live in an earthquake-free area. We just prepare for them. The same is true for nuclear power plants.

C: Presentations by the municipal representatives demonstrated what they are doing.

III. Tokyo

Q: *Are there plans to build nuclear power plants in Southeast Asia?*

A: Currently, there are none in Southeast Asia while there were some in Malaysia, Thailand, the Philippines and Viet Nam, but none have been carried out. Whilst two plants are under construction in Bangladesh, which is not a member of ERIA, there are none in other Asian countries.

A: Of the ASEAN+6 (China, Japan, India, New Zealand, Australia, and Republic of Korea), India, China, and Republic of Korea have already introduced nuclear power. Viet Nam, Thailand, and some other Asian countries have research reactors. We have plans to build some new plants, but concerns have been growing amongst the public since the Fukushima accident. Nuclear power is definitely one of the options as it is clean, cost-effective, and has economic advantages. However, we are in a dilemma brought about by the accident. That being said, we were able to share information on location planning and experience through the workshop, and the project has been meaningful in addressing public concern.

Q: *Did the Fukushima accident have an impact on the nuclear power plants in those four countries?*

A: Those plans were behind schedule even before the accident due to problems related to land acquisition, selection of technologies, costs, etc. So, it is not necessarily due to the Fukushima accident. In fact, it was not until 2016 that Viet Nam scrapped its plan. The major causes were the country's immature industries and infrastructure, a lack of public consent, economic circumstances, and overall ill-preparedness.

A: The Fukushima accident is certainly one of the causes, but the biggest cause is the demand from society. Local communities were not well informed, and no information was provided on safety issues.

A: Construction and replacement plans are not progressing as intended in some European countries. It is generally said to be due to the Fukushima accident, which, however, is not a direct cause. A drop from 75% to 50% in France took place well after the accident. Vattenfall applied for a licence to construct a new plant in Sweden in 2012. Finland is working on a new plan, following the Olkiluoto nuclear power plant. Attributing everything to the Fukushima accident is too short-sighted.

A: Ambitious nuclear power projects are underway in China and India, whose energy policies centre on renewable energy, improved energy efficiency, and nuclear power. The Fukushima accident has resulted in providing more information on safety issues and encouraging discussions amongst stakeholders.