# **Introduction of the Public Opinion and Discussion How to Provide Information Concerning Nuclear Energy**

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On August 11, 2015, the Sendai Nuclear Power Station became the first nuclear power station in Japan to resume full-fledged operations since the 2011 Tohoku earthquake (also known as the Great East Japan earthquake) and tsunami. It is high time that we begin to reconsider how society should deal with nuclear energy. This commentary begins by providing some background to this issue with reference to the results of a public opinion survey conducted by the Japan Atomic Energy Relations Organization with respect to the use of nuclear power. The latter half of this commentary discusses how information on nuclear and other energy sources should be shared.

KEYWORDS: Nuclear energy, public opinion survey, provision of information

# I. Introduction

On August 11, 2015, the Sendai Nuclear Power Station became the first nuclear power station in Japan to resume full-fledged operations since the 2011 Tohoku earthquake and tsunami (hereinafter referred to as the "earthquake-induced disaster"). Nuclear energy has taken another step forward since its radical overhaul (i.e., fundamental reconsideration of its value, potential, risks, and necessity) was prompted by the earthquake-induced disaster.

The way society deals with nuclear energy had been discussed in relation to various aspects even before the disaster. However, the disaster almost completely discredited all that had been discussed and attempted earlier. Society has been compelled by the disaster to reconsider how we deal with nuclear energy. The resumed operation of this nuclear power plant should be considered a good opportunity for a radical overhaul.

This commentary begins by providing some background to this issue with reference to the results of a public opinion survey. The data was collected by the Japan Atomic Energy Relations Organization (JAERO) between October and November 2014 in their survey on the use of nuclear power. **Table 1** provides an outline of the survey.

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Target respondents:	Women and men aged between 15 and 79 who live in Japan
Method:	Omnibus questionnaires collected later from respondents assigned based on quota sampling
No. of responses: Period:	1,200 October 31 to November 12, 2014

Table 1 Outline of the public opinion survey on the use of nuclear power



Figure 1 Cognition on the use of nuclear power

"Question 6: What should Japan do about the use of nuclear power in the future?"

# II. Public Opinion on Nuclear Energy

This section briefly presents the results of the public opinion surveys with respect to the cognition on the use, the perceived benefits and perceived risks of nuclear power, respectively.

Due to space limitations, the role of trust as an important psychological factor in considering nuclear energy is not covered in this commentary. For details on this matter, please refer to the relevant discussions presented in a series of survey reports<sup>1)</sup> published by JAERO (particularly the FY2013 issue).

### 1. Cognition on the Use of Nuclear Power

**Figure 1** shows how people envision the future of nuclear power based on the results of the survey. Almost half of the respondents selected "Nuclear power should be continued for the moment but gradually phased out" as their response. In other words, although people would rather not rely on nuclear power in the future, they reluctantly accept the need to do so to meet today's needs. About 10% of the respondents selected "The output from nuclear power should be increased" or "The current status should be maintained by keeping nuclear power at the same level as it was before the earthquake-induced disaster." Slightly fewer than 20% selected "Nuclear power should be abandoned immediately," while another 20% had no opinion on the matter.

Earlier studies, such as the one quoted in *The Fukushima Nuclear Accident and Public Opinion*<sup>2)</sup>, often find that over half of the respondents want nuclear power to be abandoned. This is due to the binary options that they were given between the continued use of nuclear power or its abandonment. In this regard, the JAERO survey referred to in this commentary provides an interesting insight into the more nuanced opinions of people who are reluctant to make such binary choices.

## 2. Perceived Benefits of Nuclear Power

**Figure 2** presents the perceived benefits of nuclear power from three different perspectives: its contribution to the national economy, its contribution to household budgets, and its contribution to efforts to curb carbon emissions. According to the results of this survey, people generally believe that the national economy can develop further without relying on nuclear energy, although this would mean higher electricity bills. A slight majority believe that nuclear power plays a positive role in curbing carbon emissions. Most probably, however, the proportion of people who share this perception has dropped significantly in comparison to the findings of earlier studies conducted before the disaster<sup>3</sup>.

**Table 2** shows an interesting trend through the cross tabulation of the cognition on the use of nuclear power and its perceived benefits. In the row corresponding to calls for the immediate abandonment of nuclear power, two peaks (moderate responses and strongly negative responses) can be seen, particularly for responses related to household budgets and reductions in carbon emissions. Most probably, some respondents in favor of the immediate abandonment of nuclear power recognize its benefits while others do not recognize any such benefits at all. Further analysis based solely on this survey would be difficult. However, further detailed analysis and studies are necessary to consider the gaps in perceptions that still produce the same opinion in favor of the immediate abandonment of nuclear energy, as well as the processes that shape these perceptions.



#### Figure 2 Perceived benefits of nuclear power

"Question 7: Do you agree with the following statements?" (Only relevant questions were quoted.)

	The Jap further energy	No nuc higher	lear pov electrici	ver wou ty bills	ld mean		Nuclear power does not emit carbon dioxide so it helps curb global warming								
	Yes	←		$\rightarrow$	No	Yes	←		$\rightarrow$	No	Yes	←		$\rightarrow$	No
Total	116	261	576	151	71	229	387	416	59	86	106	280	621	80	99
N=1,200	(9.7)	(21.8)	(48.0)	(12.6)	(5.9)	(19.1)	(32.3)	(34.7)	( 4.9)	(7.2)	( 8.8)	(23.3)	(51.8)	( 6.7)	(8.3)
Increase output	0	3	4	4	5	4	<b>8</b> (50.0)	0	4	0	3	6	3	3	1
N=16	(0.0)	(18.8)	(25.0)	(25.0)	(31.3)	(25.0)		( 0.0)	(25.0)	( 0.0)	(18.8)	(37.5)	(18.8)	(18.8)	(6.3)
Maintain status before the accident N=105	0 ( 0.0)	9 ( 8.6)	44 (41.9)	38 (36.2)	13 (12.4)	31 (29.5)	37 (35.2)	31 (29.5)	4 (3.8)	1 (1.0)	19 (18.1)	33 (31.4)	47 (44.8)	6 ( 5.7)	0 ( 0.0)
Gradually phase out	59	143	276	68	18	123	215	175	28	23	54	152	287	39	35
N=573	(10.3)	(25.0)	(48.2)	(11.9)	(3.1)	(21.5)	(37.5)	(30.5)	( 4.9)	( 4.0)	(9.4)	(26.5)	(50.1)	( 6.8)	(6.1)
Abandon immediately	52	60	55	8	13	26	54	51	16	45	11	39	74	17	52
N=194	(26.8)	(30.9)	(28.4)	(4.1)	( 6.7)	(13.4)	(27.8)	(26.3)	( 8.2)	(23.2)	(5.7)	(20.1)	(38.1)	(8.8)	(26.8)
No opinion	2	35	169	23	15	31	62	133	5	10	10	35	180	14	5
N=247	( 0.8)	(14.2)	(68.4)	( 9.3)	(6.1)	(12.6)	(25.1)	(53.8)	( 2.0)	( 4.0)	( 4.0)	(14.2)	(72.9)	( 5.7)	(2.0)

Table 2 Cross tabulation of the perceived benefits and cognition on the use of nuclear power

The percentage indicated for each response within a given row appears in parentheses. The table does not include data for "Other" and "None of the above" in relation to "Cognition on the use of nuclear power" or data for "No response" in relation to "Perceived benefits of nuclear power." The "Increase output" category should be used for reference only given the small N value.

		0%	20%	40%	60%	80	%	100%
Nuclear safety can be	e ensured going forward	5. 7	13.8	44.	0	16.4	18.8	
Nuclear power plants pose haza	rds to earthquake-prone countries like Japan		34.3		31.1	27.	6	
The areas around nuclear power pl disaste	ants have an inadequate er management capacity		36.8		31.3	21	7.7	
The radioactive contamination wate	n of local soil, food, and er is a source of concern		26.9	32	2. 8	31. 2	5. (	3
No radiological impact or radiatio for our childrer	on should be left behind and future generations		47.5	-	29.	2	19.1	
			1	I	1			
Agree	Somewhat ag	ree		🗆 N	lo opinion			
Somewhat disagree	Disagree			$\square N$	lo response			

#### Figure 3 Perceived risks of nuclear power

"Question 7: Do you agree with the following statements?" (Only relevant questions were quoted.)

# 3. Perceived Risks of Nuclear Energy

**Figure 3** presents the perceived risks of nuclear energy from five different perspectives: nuclear safety, earthquake hazards, disaster management, the impact of radioactivity on the respondents themselves, and the impact of radioactivity on future generations. Broadly speaking, high levels of perceived risks can be noted in relation to every aspect of nuclear energy. The already high level of perceived risks associated with earthquakes before the disaster increased even further after the disaster<sup>3</sup>. Despite ongoing efforts to bolster the disaster management capacity, people still seem to think that is not enough.

Concerns over radioactive contamination and the impact of radiation remain. People tend to be more concerned about the impact on future generations than the impact on themselves. The disposal of high level radioactive waste is a major challenge associated with nuclear power. As pointed out in a study conducted by Tanaka (1998), the risks posed by high level radioactive waste are greater than those posed by the nuclear power plants themselves<sup>4</sup>. Given people's strong aversion to endangering future generations, the hurdle to be overcome with respect to the disposal of high level radioactive waste is growing ever higher.

# III. How Information Should be Shared

Moving on to another subject, this section discusses how information should be appropriately shared among people as the basic premise for nuclear power to be continued going forward.

The first point to be considered is how people obtain information on nuclear and other energy sources. Many studies have found that people obtain information most commonly from television programs, followed by newspapers and then the Internet. With reference to **Figure 4**, the JAERO survey also found that people mostly seek information from television programs (85.6%) and newspapers (56.4%). As the survey broke down the Internet into different categories, it turned out that the third most popular source of information is news websites (23.3%) and that people do not obtain much information from other sources available over the Internet. This finding suggests that people obtain a considerable amount of information on nuclear and other energy sources through the mass media in one form or another, be it from

C	) 20	40	60	80	(%) 100	Most socially minded N = 185	Moderately socially minded N = 482	Less socially minded N = 341	Least socially minded N = 192
Newspapers			56	. 4		150 (81.1)	315 (65.4)	153 (44.9)	59 (30.7)
Television programs					85.6	177 (95.7)	439 (91.1)	292 (85.6)	119 (62.0)
Radio programs	12	2.8	1	1		51 (27.6)	72 (14.9)	21 ( 6.2)	9 ( 4.7)
Magazines (weekly, monthly, etc.)	10	.4	1	1		46 (24.9)	55 (11.4)	19 ( 5.6)	5 ( 2.6)
Municipal newspapers	6.8	1	1	1		35 (18.9)	34 ( 7.1)	9 ( 2.6)	4 ( 2.1)
Books and brochures	3.8	1		1		23 (12.4)	19 ( 3.9)	4 ( 1.2)	0 ( 0.0)
Videos and DVDs	0.2	1	1	1		0 ( 0.0)	2 ( 0.4)	0 ( 0.0)	0 ( 0.0)
Lecture meetings, briefing sessions, seminars, and similar events	2.6	i.	i.	I.		14 ( 7.6)	14 ( 2.9)	1 ( 0.3)	2 ( 1.0)
School	2.3	1	1	1		4 ( 2.2)	10 ( 2.1)	9 ( 2.6)	4 ( 2.1)
Museums, exhibition centers, and public relations facilities	1.3	1	1	1		3 ( 1.6)	10 ( 2.1)	2 ( 0.6)	0 ( 0.0)
Conversations with family members, friends, and acquaintances	1	5.5	i.	1		59 (31.9)	80 (16.6)	39 (11.4)	8 ( 4.2)
Circulated notices	2.3		1	1		12 ( 6.5)	11 ( 2.3)	4 ( 1.2)	1 ( 0.5)
National and local government websites	3.7	1		1		18 ( 9.7)	19 ( 3.9)	6 ( 1.8)	1 ( 0.5)
Websites of nuclear power utilities, research institutes, etc.	2.6		1	1		12 ( 6.5)	14 ( 2.9)	5 ( 1.5)	0 ( 0.0)
News websites		23.3	1	1		46 (24.9)	139 (28.8)	71 (20.8)	23 (12.0)
Twitter	2.1	1		ernet		4 ( 2.2)	13 ( 2.7)	7 ( 2.1)	1 ( 0.5)
Facebook	1.7	1		1		5 ( 2.7)	7 ( 1.5)	7 ( 2.1)	1 ( 0.5)
E-newsletters and other emails	0.7	1		1		2 ( 1.1)	2 ( 0.4)	3 ( 0.9)	1 ( 0.5)
Other information from the Internet	1.5	i.		1		5 ( 2.7)	10 ( 2.1)	2 ( 0.6)	1 ( 0.5)
Other	0.3	1				0 ( 0.0)	2 ( 0.4)	1 ( 0.3)	0 ( 0.0)
Nothing in particular/Not sure	<b>8.</b> 8	5 I	1	1		0 ( 0.0)	13 ( 2.7)	28 ( 8.2)	62 (32.3)

Figure 4 Sources of information on nuclear and other energy sources

"Question 12: How do you usually obtain information on nuclear and other energy sources? (Please choose all applicable options.)"

Each option has been cross tabulated with the degrees of sociality indicated in the right-hand section. The percentage indicated for each response within a given column appears in parentheses. Refer to Table 3 for the classifications by degree of sociality.

television, newspapers, or the Internet.

So, what other sources do people get information from then? Conversations with family members, friends, and acquaintances ranked fourth (15.5%) as a source of information. Indeed, face-to-face conversations on nuclear and other energy sources play an important role that is second only to the mass media.

In the right-hand section of Figure 4, sources of information have been cross tabulated according to the degree of sociality of the respondents as classified according to the number of options selected from **Table 3**. In this context, "sociality" is used as an indicator of the weight of each respondent's commitment to society.

Regardless of their level of sociality, the respondents mostly rely on television programs and newspapers as their sources of information. Interestingly, a lower degree of sociality is accompanied by a sharp drop in the proportion of respondents who obtain information from newspapers. Over 30% of the least social group responded that they have no particular sources of information or that they were not sure how they obtained information. Next to television and newspapers, the most social group sought information from conversations with family members, friends, and acquaintances. It appears that people who value social commitment tend to place more weight on face-to-face conversations.

**Figure 5** shows the varying degrees of interest that the respondents had in terms of participating in events related to nuclear and other energy sources. It is important to note that more than 60% of the respondents indicated that they were not interested in any of the given

#### Table 3 Indicators of sociality

1.	The respondent is or has recently been involved in volunteer activities
2.	The respondent has never volunteered, but would like to do so at the next opportunity
3.	The respondent often participates in local events and festivals
4.	The respondent aims to vote in every election
5.	The respondent values close interactions with local community members
6.	The respondent is proactively involved in activities conducted by neighborhood associations, parent-teacher associations, and the like
7.	The respondent values efforts to keep the local area clean and beautiful
8.	The respondent believes that everyone should be hospitable and courteously attentive to visitors and tourists
9.	The respondent values local traditions and culture and is trying to pass them on to the next generation
10.	The respondent joins forces with neighbors in crime prevention and environmental initiatives
11.	The respondent is concerned about the declining sense of public morality among children and youngsters
12.	The respondent believes that citizens should take the initiative
	without leaving all problems and challenges to the local government
13.	The respondent pays attention to local affairs and tries to keep abreast of relevant information
14.	The respondent believes in the importance of mutual assistance
	during emergencies as well as adequate preparedness and drills for citizens to make this possible
15.	The respondent believes that local temples, shrines, and other cultural properties should be cherished as part of Japan's spiritual heritage
16.	None of the above

	0	20	40	60	80	(%) 100	Most socially minded N = 185	Moderately socially minded N = 482	Less socially minded N = 341	Least socially minded N = 192
Study tours of facilities		2	1.1	1	1		60 (32.4)	129 (26.8)	55 (16.1)	9 ( 4.7)
Study sessions		15	1	1	1		59 (31.9)	90 (18.7)	26 ( 7.6)	5 ( 2.6)
Craft classes	11.	4	1	1	1		4 ( 2.2)	8 ( 1.7)	5 ( 1.5)	0 ( 0.0)
Experiment classes		7	1	1	1		25 (13.5)	47 ( 9.8)	12 ( 3.5)	0 ( 0.0)
Hobby courses	1.	. 9		1	1		5 ( 2.7)	11 ( 2.3)	7 ( 2.1)	0 ( 0.0)
Small-scale and/or interactive lecture meetings		5 1	1	1	1		29 (15.7)	23 ( 4.8)	7 ( 2.1)	1 ( 0.5)
Large-scale lecture meetings and/or panel discussions		7.8	1	I.	I I		38 (20.5)	43 ( 8.9)	10 ( 2.9)	3 ( 1.6)
Contests	0.	3	1	1	1		1 ( 0.5)	1 ( 0.2)	1 ( 0.3)	0 ( 0.0)
Other	0.	5	i.	1	1		2 ( 1.1)	2 ( 0.4)	0 ( 0.0)	2 ( 0.1)
None of the above		1		6	61.8		65 (35.1)	254 (52.7)	247 (72.4)	176 (91.7)

Figure 5 Degree of interest in participating in events related to nuclear and other energy sources "Question 15: Which of the following events related to nuclear and other energy sources would

you like to participate in? (Please choose all applicable options.)" Each option has been cross tabulated with the degrees of sociality indicated in the right-hand sec-

tion. The percentage indicated for each response within a given column appears in parentheses. Refer to Table 3 for the classifications by degree of sociality.

options. Furthermore, over 90% of the least socially minded group responded in this way according to the cross tabulation with the degree of sociality shown in the right-hand section of Figure 5. On the contrary, this kind of response decreased with higher sociality. Moderate-ly socially minded respondents showed a greater interest in participating in study tours at facilities, study sessions, and similar events. In addition to these events, the most socially minded respondents tended to be more eager to participate in events involving face-to-face

exchanges, such as large-scale lecture meetings with panel discussions and small-scale interactive lecture meetings.

Each of the respondents was asked to choose all of the applicable options. Respondents who chose one or two options from Options 1 to 15 were classified as less socially minded, respondents who chose three to seven options were classified as moderately socially minded, respondents who chose eight to fifteen options were classified as the most socially minded, and respondents who chose Option 16 were classified as the least socially minded.

These findings indicate that only a certain group (i.e., the most socially minded people) would participate in any event that is organized to provide information. The question of what should be done with respect to uninterested people is often encountered in discussions of how information should be shared. According to the results of this survey, information can be delivered to less socially minded people almost exclusively through the mass media (mostly by television). (Although this commentary does not address this matter, the survey results also revealed that least socially minded people tend to have little interest in nuclear and other energy sources.)

The author believes that more serious thought must be given to how and what kind of information should be shared with the most socially minded people who value social commitment. These people obtain information from a diverse range of channels. Instead of depending solely on the mass media, they obtain a significant amount of information from conversations with family members, friends, and acquaintances. In addition, they eagerly participate in events that are intended to provide information on nuclear and other energy sources. Unfortunately, however, such information is not shared with these receptive people in a suitable manner. The first step that we need to take is to provide opportunities and hold events that allow receptive people to engage in face-to-face exchanges. Such occasions should be carefully upgraded to provide an environment that is more conducive to enabling the participants to think independently and shape their own opinions. We should not worry about what needs to be done after that until we move onto the next stage.

Recently, grassroots movements related to nuclear power and other energy sources have been gathering momentum. Nuclear experts, utility companies, and other stakeholders should perhaps start participating more proactively in these low-profile efforts. It could be an important first step in gaining a better understanding of how people view such matters and helping them to shape their own opinions.

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