

**Disagreeing with 'local agreement': A survey of public attitudes
towards restarting the Hamaoka nuclear power plant**

Takashi, NAKAZAWA* and Tomoyuki, TATSUMI

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* Corresponding author.

Disagreeing with ‘local agreement’: A survey of public attitudes towards restarting the Hamaoka nuclear power plant

NAKAZAWA, Takashi and TATSUMI, Tomoyuki

Abstract

The resumption of Japan’s NPPs has become a controversial issue since the Fukushima Daiichi nuclear disaster in 2011. Although local agreement is a significant process of the resumption, the attitude of the general public toward the local agreement process has received little attention. This study uses a postal questionnaire survey with stratified random sampling to investigate the case of the Hamaoka NPP. Results show that the conventional way of seeking local agreement is not generally supported by the public. This may be explained by apparent widespread support for the participation of broader geographical areas, including those affected by reputational damage and urban areas consuming electricity, and by a general distrust of local governments/assemblies and the ‘experts’. It was also found that respondent attitudes regarding local agreement differ depending on the respondent’s position on the restart as well as the area in which the respondent resides.

Keywords: LULUs; nuclear power plant; local agreement; questionnaire survey

1. Introduction

This study explores public attitudes towards the ‘local agreement’ process in Japan as it relates to the restart of the Hamaoka nuclear power plant (NPP). The resumption of NPPs has been a crucial — and highly controversial — issue in the environmental and energy politics of Japan since the Fukushima nuclear disaster in 2011. In Japan, there used to be 54 nuclear reactors in 17 places as of February 2011. On 11 March 2011, the Great East Japan Earthquake and resulting tsunami struck the Fukushima Daiichi Nuclear Power Plant, causing a massive nuclear disaster; all nuclear reactors in Japan ceased operation. However, some of the reactors have since passed examination under the New Regulatory

Requirements and have resumed operation; more are in the restart process. As of March 16, 2020, nine reactors have been restarted, seven facilities have been given permission to amend their reactor instalment license, eleven are still under examination, and 24 reactors are in the process of being decommissioned².

Local agreement, which concerns the process through which a political decision is made at sub-national level, is a critical part of the resumption process. In Japan, NPPs are owned and operated by private power companies, and the national government centrally regulates and supervises the country's nuclear power, while there is no legal authority for local governments as to the restart of NPPs. However, local politics have significantly influenced nuclear policy in Japan (Lesbirel 1998; Aldrich and Fraser 2017; Kikuchi 2020). In fact, even before the Fukushima nuclear accident, the agreement of local governments and organisations has taken a significant part of the construction process. The construction of a new reactor requires the consent of the prefectural governor. Although a host municipality does not have the legal authority, mayors have historically served as powerful veto players (Aldrich and Fraser 2017), generally based on the safety agreement concluded between the local governments and the power companies (Sugawara et al. 2010, 2009). In addition, the agreement of fishery cooperatives with fishing rights is necessary; fishermen have been the most powerful organized opposition to the constructions of NPPs in Japan (Lesbirel 1998; Aldrich 2008). The establishment of a local referendum ordinance also worked as powerful collective veto such in the case in Maki-town in Niigata prefecture in the 1990s (Juraku, Suzuki, and Sakura 2007). Thus, in addition to political and policy approval at the national level through the Power Development Coordinating Council³ and licensing by the regulatory agency, utilities must also obtain the agreement of local governments and right holders at the local level. The Japanese government, therefore, established various subsidies and grant programs through the Three Laws for Power Source Development (Kato

² Agency for Natural Resources and Energy "The status of nuclear power plants in Japan as of March 16, 2020"
URL: https://www.enecho.meti.go.jp/category/electricity_and_gas/nuclear/001/pdf/001_02_001.pdf
(accessed on March 18, 2020)

³ Now defunct.

et al. 2013), and the power companies tried to gain local approval by compensating fishermen and landowners, and providing voluntary donation to local governments and other local organisations (Lesbirel 1998).

While the pro-nuclear energy policy in Japan has not much changed even after the Fukushima nuclear disaster⁴ due to the continuing power of vested interests called the 'nuclear village' (Kingston 2012), the conventional framework of local agreement has been challenged as to the restart of NPPs (Vivoda and Graetz 2015; Aldrich and Fraser 2017; Kikuchi 2020). Conventionally, NPPs could have been restarted with the approval from the host municipality and the prefecture after passing the examination under the new regulatory standards. However, there has been growing criticism of the conventional local agreement process in which only the host municipality and prefectural governments are given a direct voice.

Firstly, neighbouring municipalities have insisted that NPPs should not be restarted without their agreement (Izumi 2020, 2019; Kikuchi 2020). The Fukushima nuclear disaster clearly showed that not just the municipality in which an NPP is located, but also the surrounding areas within a rather large radius, will be seriously affected in case of a severe accident. After the Fukushima disaster, the Japanese government set up Urgent Protective Action Planning Zones (UPZs) within approximately 30km of an NPP. Local municipalities included in a UPZ are legally required to formulate an effective regional evacuation plan. Understandably, municipalities inside these UPZs feel strongly that they should be included in the local agreement process.

Secondly, there have been a number of movements insisting that any restart should be judged via a prefectural referendum. A draft ordinance for a prefectural referendum on the restart was submitted prefectural assemblies of Niigata and Shizuoka in 2012, Miyagi in 2019, and Ibaraki in 2020. Although these drafts were rejected in the prefectural assemblies,

⁴ Aldrich and Fraser (2017) categorises factors which affect the restart in Japan into flawed energy diversification efforts, embedded interests in national politics, economic dependence of local governments, diversity within host communities, safety agreements, and judicial weaknesses.

they called into question the conventional local agreement in which ordinary citizens have not been directly involved.

Thus, conflicts have come over not only whether NPPs should be restarted, but also how and by whom the local agreement on the restart should be made. To resolve this dispute over local agreement, and to design a more socially agreeable local agreement process, it is necessary to understand public attitudes towards local agreement. For that purpose, this paper conducted a questionnaire survey, specifically as it relates to the restart of Japan's Hamaoka NPP in Shizuoka prefecture.

The next section briefly reviews the literature of local agreement in conflicts over locally unwanted facilities. The third section introduces a history of the Hamaoka NPP and disputes over local agreement regarding the restart, focusing on the safety agreement and prefectural referendum. The fourth section explains a methodology of the study, followed by the fifth section which shows results and discussions.

2. Local agreement and conflicts over locally unwanted facilities

Issues related to local agreement have been studied in research on conflicts over locally unwanted facilities such as nuclear power plants and renewable energy facilities, as well as waste disposal facilities and human service facilities (Aldrich 2008; O'Hare 1977; Rabe 1994; Takahashi 1999; Delicado, Figueiredo, and Silva 2016). For both scholars and practitioners, it is essential to understand why it is often difficult to obtain local agreement and to find a generally acceptable approach to securing such agreement. A variety of ways to achieve local agreement have been proposed, from compensation (O'Hare 1977), community benefit approaches (Kojo and Richardson 2014), risk mitigation (Portney 1991), to burden sharing (Valletta 1993).

Local agreement has become increasingly significant as a voluntary approach, as well as social license of operate, attracted substantial attention (Munton 1996; Rabe 1994). A voluntary approach emphasizes the importance of giving the local community veto power and allowing it to make its own decisions regarding the acceptance/rejection of a proposed

facility⁵. The concept of social license of operate, which means the approval from the public or an affected community granted to the operations of specific projects or land uses, has also been applied to various types of industrial activities such as mining and nuclear waste management (Prno and Slocombe 2012; Lehtonen et al. 2020).

Nevertheless, while local agreement is valued in these approaches, it remains a controversial and ambiguous concept. For example, a voluntary approach leaves open the question on how a community decides to volunteer (Nakazawa 2018). It is quite possible that a local government could volunteer to host a facility without soliciting broad public opinion. A voluntary approach, therefore, is often combined with citizen participation (Munton 1996; Rabe 1994). Holding a local referendum offers one way to introduce public opinion into the decision-making process, but there have been criticisms of this form of direct democracy as well (Juraku, Suzuki, and Sakura 2007; Topaloff 2017). Participatory and deliberative processes have been proposed in which citizens are informed and communicate with each other in order to reconcile different, conflicting views and values, and to decide on possible alternatives (Fischer 2000; McAvoy 1999; Renn, Webler, and Kastenholz 1996). However, it is contentious how much the decision-making process involving controversial technologies such as nuclear power should be open to ordinary citizens, and exactly what roles citizens, experts and stakeholders should play in the deliberations (Collins and Evans 2002).

Moreover, who should be included as 'local'? This question concerns the ways in which 'local' is defined. 'Local' implies communities potentially affected by a facility and 'local agreement' implicitly suggests that the affected communities should have the right to decide whether to accept a proposed facility as 'those affected theories' expect (Näsström 2011; Simcock 2014). How 'local' is interpreted is significant as it relates to who should be included or excluded in decision-making process (Hunold and Young 1998; Walker 2009).

⁵ A variety of voluntary approaches are possible, from an incentives-based approach to a partnership approach, and from trust-based voluntarism to competitive voluntarism, precarious voluntarism and passive voluntarism (Di Nucci 2019).

However, as the geographical scale affected by a facility can be difficult to determine, which areas should be considered 'local' is often open to debate (Simcock 2014). Therefore, political battles arise over how 'local' is defined and who should be included in, or excluded from, 'local' (Pesch 2019).

As noted, prior studies on facility siting have proposed a variety of ways to achieve local agreement. In addition, public acceptance of controversial facilities, including energy infrastructure, has been surveyed (Visschers and Siegrist 2013; Sjoberg 2004; Batel and Devine-Wright 2018; Kato et al. 2013). It has also been studied how local publics are different from wider general publics in their concerns and interests as well as their attitudes to legitimacy and justice of decision-making regarding controversial facilities in Japan (Nonami, Tsuchiya, and Sakurai 2014; Nonami et al. 2015). However, as noted, who is 'local' is difficult to tell a priori and therefore politically controversial, especially in the case of NPPs in Japan. This paper contributes to better understanding of conflicts over locally unwanted facilities through exploring public attitudes toward local agreement, such as who should be involved in 'local' and whose opinions should be respected, specifically as it relates to the restart of Japan's Hamaoka NPP.

3. Hamaoka NPP and local agreement

3.1. Hamaoka NPP

The Hamaoka NPP is located in Omaezaki city, Shizuoka prefecture (Figure 1). Chubu Electric Power (CEP) began construction of the first reactor in 1971. Today, Hamaoka has five reactors, the first two of which are currently in the decommissioning process. Following the Fukushima nuclear accident, Naoto Kan, Japanese Prime Minister at the time, requested CEP to halt operation of Hamaoka's fourth and fifth reactors and to not restart the third reactor, which was, at the time, undergoing regular inspection. CEP has since introduced a variety of safety measures to prevent tsunami damage and the occurrence of severe accidents. As of March 2020, the third and fourth reactors were being evaluated under the New Regulatory Requirements.

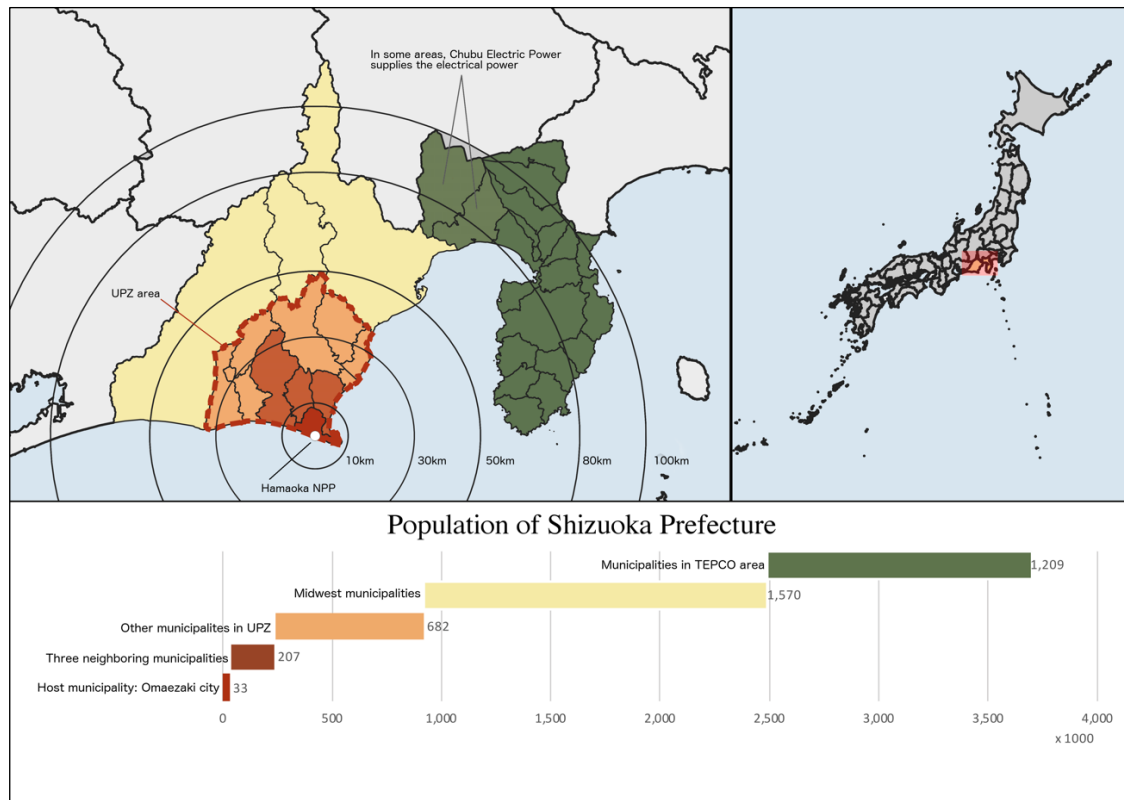


Figure 1. Map and population of Shizuoka prefecture.

Disputes have arisen not only with regard to whether the Hamaoka NPP should be restarted or decommissioned, but also on how the question should be decided. For the original construction of the new reactors and the introduction of plutonium-thermal power generation, local agreement had been reached through a series of confirming agreements (Sugawara et al. 2010). First, agreement was sought from the community of Sakura, the section of Omaezaki city where the reactors were located. After Sakura agreed, the host municipal government gave its consent based on the agreement of the municipal assembly. The neighbouring three municipalities then gave their approval, followed by the agreement of the prefectural government. However, especially after the Fukushima nuclear disaster, this conventional local agreement process has been called into question.

3.2. Safety agreement in Hamaoka

There has been considerable controversy over the safety agreement, especially after the Fukushima nuclear disaster⁶. As noted, local governments have served as veto players, generally based on the safety agreement with the power companies. However, a requirement for 'local agreement', which is normally written into safety agreements for cases involving significant changes in a nuclear facility, is not clearly stipulated in the formal safety agreement for the Hamaoka NPP. Instead, a supplementary document states that consultation with local governments is required in the case of significant changes in the facility.

Therefore, it has been claimed that local agreement should be clearly stipulated in the safety agreement to ensure that CEP could not restart the reactors without the consent of the affected municipalities. On the other hand, it has also been argued that local agreement need not be clearly stipulated since prior consultation with the local governments was required and the Hamaoka NPP would not be restarted without their agreement given mutual trust with CEP. Moreover, as nuclear power is regulated and supervised by the national government, some have insisted that it would be legally ineffective to have local agreement written into the safety agreement.

Another dispute concerned the geographic area that would be covered by the safety agreement. The safety agreement for the Hamaoka NPP includes not only Omaezaki city, where the NPP is located, but also three neighbouring cities—Kikugawa city, Kakegawa city, and Makinohara city⁷. However, following the Fukushima disaster, the seven municipalities in the surrounding UPZ argued that they should be included in any safety agreement with CEP. These municipalities began negotiations with CEP, raising, among various issues, the issue of whether the local agreement should be clarified in the safety agreement. If local agreement were to require the consent of all seven municipalities, it would be almost

⁶ The arguments were extracted from the records of local assemblies of Shizuoka prefecture, Kakegawa city, Kikugawa city, Makinohara city and Omaezaki city.

⁷ As for the history of the local agreement, see Shizuoka Shimbun-sha (2011, 2013).

impossible to restart the reactors. As part of the counterargument, it was pointed out that local agreement should not be written into the safety agreement since it was not stipulated even in the safety agreement approved by the host municipality and the three adjacent municipalities⁸. In 2016, the safety agreement with CEP was concluded without an explicit reference to local agreement.

3.3. Disputes over a prefectural referendum

Another conflict over local agreement arose over a prefectural referendum⁹. A citizen group requested the use of a prefectural referendum to determine the public attitude toward resumption. The group collected more than 165,000 signatures and submitted a draft of the referendum ordinance to the Shizuoka prefectural assembly in 2012. The prefectural government pointed out various technical flaws in the draft, and the group proposed a revised version.

One of the practical issues raised in the debate was the difficulty of conducting a referendum at the prefectural level¹⁰. It was argued that such a referendum would require the cooperation of the municipal governments in the region, who would be needed to compile the list of voters and count responses. If a municipal government were to refuse to cooperate, conducting a referendum would not be feasible. In addition, some questioned whether nuclear power, which had long been a significant part of Japan's national energy policy, should be judged in a local referendum. It was argued that since prefectural governments had no legal authority over nuclear power, the results of a local referendum based on a local ordinance would not be legally binding, rendering any referendum pointless. Some questioned the ability of ordinary citizens to make an informed judgement on a

⁸ The arguments were extracted from the records of local assemblies of the seven municipalities.

⁹ For the details, see Nuclear Safety Control Division, Shizuoka Prefecture, "The Process of the Citizen Initiative for Referendum on the Restart of the Hamaoka Nuclear Power Plants in Shizuoka Prefecture," (2012), [in Japanese], URL: http://www.pref.shizuoka.jp/kinkyu/documents/siryu_matome.pdf (cited 2018 Oct 10).

¹⁰ The arguments were extracted from the records of the prefectural assembly of Shizuoka.

complex topic that required proper expertise to understand, while others maintained that the choice between two alternatives in a referendum vote was too simplistic to reflect complicated views and attitudes towards NPPs. Others criticized the referendum movement for being led by various anti-nuclear groups and motivated by political ideology. A question was raised as to whether the prefectural level was the proper scale for decision-making.

Both the original and revised drafts were ultimately rejected by the assembly. However, the disputes over the prefectural referendum will surely be reignited as CEP's plan to resume the operation of the Hamaoka NPP proceeds.

4. Methodology

As reviewed above, the political battles have come over which areas should be included in, or excluded from, 'local agreement', and how and by whom agreement should be made, as the conventional local agreement has been challenged. A postal questionnaire survey using stratified random sampling was conducted to examine the attitudes of residents of Shizuoka prefecture towards the restart of the Hamaoka NPP and the issue of local decision-making. Five thousand residents, age 18 and above, were selected from the electoral rolls of all the municipalities in the prefecture. The survey was conducted from 8 March to 12 April 2019. In all, 2,052 people responded to the questionnaire (response rate: 40.7%)¹¹.

The questionnaire included 30 questions and one open-ended opinion section¹². In addition to providing demographic characteristics such as gender, age, family structure, employment, residence, and so forth, participants were asked whether they agreed with the restart of the Hamaoka NPP and with the idea of a prefectural referendum on the restart. Respondent attitudes towards nuclear energy and local agreement on the restart of the Hamaoka NPP were also solicited.

¹¹ There is no great difference between the population of Shizuoka prefecture and the respondents in social attributes. For more details, see Tatsumi and Nakazawa (2021).

¹² The questionnaire (in Japanese) is available at <https://lap.inf.shizuoka.ac.jp/document/publication/a6046c25-0fce-4071-917c-97ddbcde2e9e.pdf>.

This paper focuses on two items from the survey questionnaire: 'Agree or disagree with the idea of a prefectural referendum', and 'The range of municipalities from which agreement should be required before the restart'. To elucidate the reasons for their responses to these items, respondents were asked to indicate on a five-point scale ('1' indicating 'agree' and '5' signifying 'disagree') their level of agreement or disagreement with each of the following statements:

- S1. The restart of NPPs should be judged by the areas where direct damage such as pollution and evacuation is expected.
- S2. The judgement of the areas where not just direct damage but reputational damage is expected should be respected in the restart of NPPs.
- S3. The judgement of the areas where damage to industries and employment and a decrease of subsidies are expected if the Hamaoka NPP would not restart should be respected more.
- S4. The judgment of Omaezaki city, which has accepted the nuclear power plants, should be respected in the restart of the Hamaoka NPP.
- S5. Urban areas that consume electricity from NPPs have the right and responsibility to decide on the restart of the Hamaoka NPP as well.
- S6. Once the safety examination by Nuclear Regulation Authority is completed, power companies should be able to restart NPPs without agreement from local autonomies.
- S7. As the restart of NPPs is a national issue, the Japanese government should be responsible and make the judgement regarding the restart.
- S8. The local assemblies and governor/mayors who are elected should be responsible and make the judgement regarding the restart.
- S9. As the problems related to the restart of NPPs are too difficult for ordinary citizens to understand, the judgement should be left to experts.
- S10. The restart of NPPs should be judged by the will of ordinary citizens without leaving it to politicians and experts.
- S11. The governments, companies, and experts who are promoting the restart of NPPs provide accurate information to the people.

S1-5 pertained to which geographic areas should be heard and respected in local agreement process. The conventional local agreement typically consisted of relatively narrower range of areas such as ‘those directly damaged by pollution and evacuation’ (S1) and ‘those that would suffer economic and financial deterioration’ (S3) as well as ‘Omaezaki city as the host municipality’ (S4). On the other hand, ‘areas possibly affected by reputational damage’ (S2) and ‘areas of electricity consumption’ (S5) suggested relatively wider range of areas which have been excluded from the conventional local agreement.

S6-11 concerned which actors’ view should be heard and respected. The power companies (S6), the Japanese government (S7), and experts (S9) have been significant parts of the ‘nuclear village’: the vested interest structure which has promoted nuclear power in Japan (Kingston 2012; Vivoda and Graetz 2015). S11 also asked the degree of trust in those who have promoted the nuclear power. They were influential actors not only in the national energy politics, but also in the local agreement process. The local assemblies and governor/mayors (S8) have played significant roles in the conventional local agreement process; they were potential political vetoes players over the restart (Aldrich and Fraser 2017). On the other hand, the will of ordinary citizens (S10) has not been considered, at least not directly, in the conventional local agreement.

In addition to elucidating public attitudes in general, this study examined how attitudes towards the restart and residential areas of the respondents affected their attitudes towards local agreement. The influence of attitudes towards the restart was examined to know how the division of opinions on the restart affects their preference of local agreement procedures. As noted, in the discussion of prefectural referendum in Shizuoka prefectural assembly, the pro-referendum group was often regarded as the anti-restart group. Uezono, Eguchi, and Seki (2012) shows that those supporting the restart of the Shimane NPP were more likely to favour the conventional geographical range of local agreement, while those advocating the decommission tended to favour wider geographical areas. The difference in attitudes towards the restart could be expected to affect which form of local agreement an individual advocates since how the local agreement is designed is likely to determine the fate of the Hamaoka NPP.

Residential areas of the respondents were examined as well. It has been pointed out that the place of residence in relation to NPPs in Japan affects attitudes toward nuclear power (Kimura, Furuta, and Suzuki 2003) and the perception of the risk and benefits (Kataoka and Fukino 2015). As to the Hamaoka NPP, Yamamoto (2016) points out that people living in Omaezaki city tended to favour the restart more than those in the three adjacent cities. It has also been argued that there is difference in the perception of fairness and legitimacy regarding a controversial project between local concerned public and wider general public (Nonami, Tsuchiya, and Sakurai 2014; Nonami et al. 2015). It is reasonably expected that where respondents live significantly affect not only their opinions of the restart, but also their attitudes towards who should be included in local agreement.

The present study divided Shizuoka prefecture into five areas: the host municipality, the neighbouring municipalities, the UPZ area, the TEPCO area, and the Midwest area (). As noted, the host and the three neighbouring municipalities have been included in the conventional local agreement, while there might be significant difference between them in respondents' attitudes towards local agreement because the benefits of the NPP, such as taxes, subsidies, corporate donation and employment, have been disproportionately distributed to the host municipality. The UPZ area consisted of the seven municipalities including the UPZ which concluded a safety agreement after the Fukushima accident. The TEPCO area was comprised of municipalities in the eastern area which were not covered by CEP which owned and operated the Hamaoka NPP, but by Tokyo Electric Power Company (TEPCO). The other municipalities were categorised into the Midwest area including the two largest cities, Hamamatsu and Shizuoka.

Multiple regression analysis was conducted to examine the independent effects of attitudes towards the restart and the residential areas on each of the eleven statements¹³. Other factors (social attributes and attitudes) were used as control variables. The categorical variables used in the analysis were as listed below ('ref' indicates the reference group):

¹³ The statistic was calculated using R (version 4.0.1).

- attitudes towards the restart (agree, disagree [ref], and don't know),
- residential areas (host municipality, neighbouring municipalities, UPZ area, TEPCO area, and Midwest area [ref]),
- gender (male [ref], female),
- generation (10s/20s, 30s, 40s [ref], 50s, 60s, 70s, and 80s),
- education (ISCED3, ISCED4 [ref], ISCED5, and ISCED6-8),
- and employment status (full-time [ref], part-time, self-employed/manager, primary industry, student, and unemployed).

5. Results and discussions

5.1. Week support for the conventional local agreement

Based on survey responses, the conventional local agreement was not supported. More than 70% of the respondents agreed with the idea of a prefectural referendum, while less than 10% disagreed. Furthermore, for the question regarding the range of municipalities from which agreement should be required before a restart, approximately 50% supported 'all of the municipalities in Shizuoka prefecture', while approximately 37% chose the 'eleven municipalities' included in the UPZ (Table 1). Only 7% advocated 'only the host municipality' or/and the 'three neighbouring municipalities' as specified in the conventional local agreement.

Table 1. Attitudes toward Hamaoka NPP restart and geographical scale of local agreement.

		Geographical scale of local agreement							Attitudes toward Hamaoka NPP restart			
		n	Host	Host & Neighbouring	UPZ	Shizuoka prefecture	Need not local agreement	DKNA	n	Pro-restart	Anti-restart	DK
Total		2,052	1%	6%	37%	51%	2%	4%	2,024	22%	49%	29%
Residential Area	Host	18	11%	6%	56%	17%	0%	11%	*2 18	33%	44%	22%
	Neighboring	137	2%	13%	45%	35%	2%	3%	133	17%	55%	28%
	UPZ	361	0%	4%	53%	37%	1%	4%	358	21%	49%	30%
	Midwest	892	1%	5%	33%	55%	2%	4%	878	24%	48%	28%
	TEPCO	644	1%	5%	32%	56%	2%	4%	637	19%	50%	31%
Attitudes toward Hamaoka NPP restart	Pro-restart	439	3%	13%	48%	<u>28%</u>	5%	2%				
	Anti-restart	998	0%	2%	28%	65%	1%	3%				
	DK	587	1%	5%	44%	43%	1%	6%				

Note: Bold values are significantly larger in the residual analysis, and bold values with underline are significantly smaller ($p < 0.05$).

*1) Fisher's exact test $p < .001$ Cramer's $V = .12$. *2) $\chi^2(8, N = 2024) = 9.25$, $p = .32$, Cramer's $V = .05$. *3) $\chi^2(10, N = 2024) = 275.42$, $p < .001$, Cramer's $V = .26$.

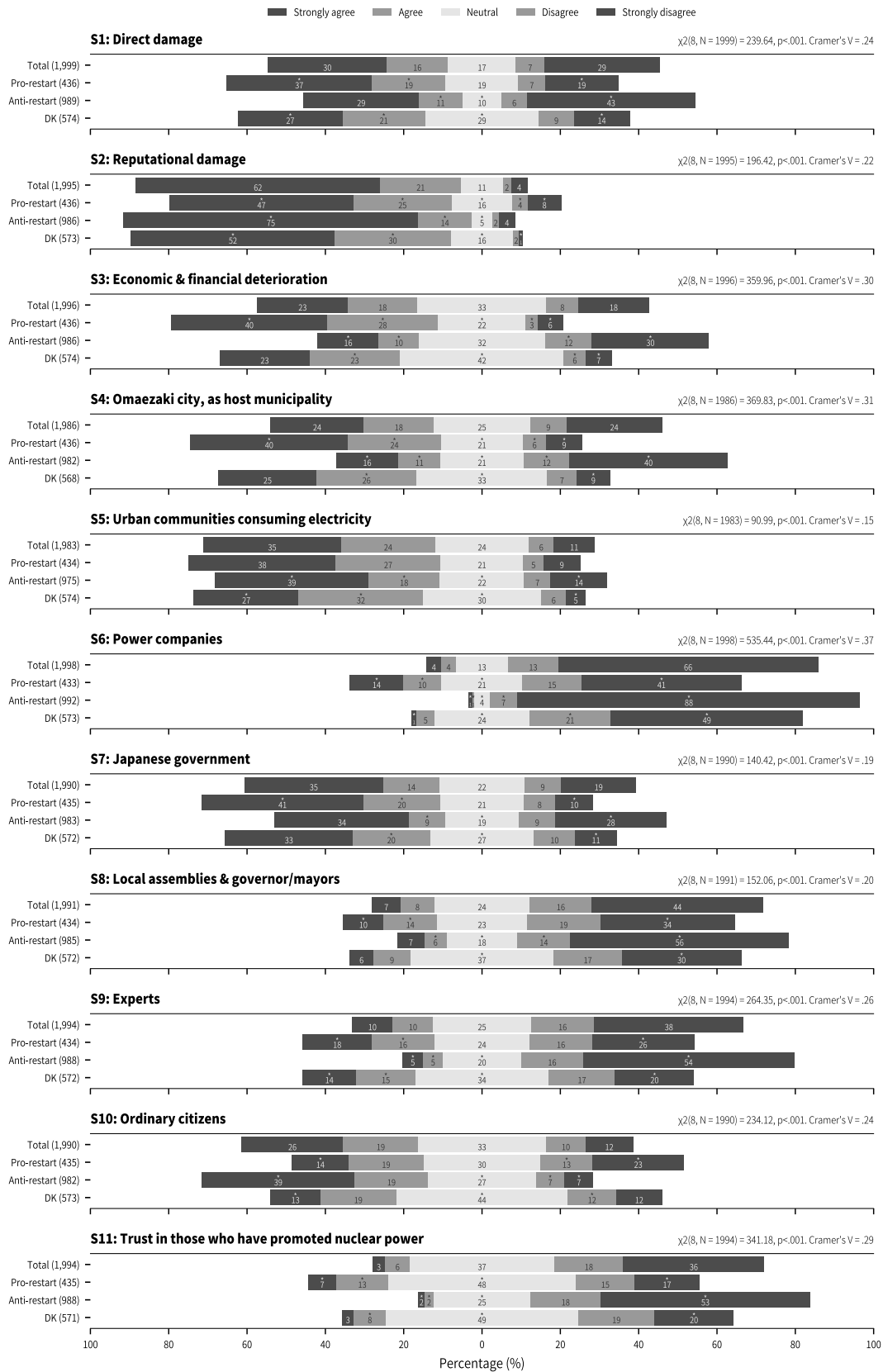


Figure 2. Attitudes toward local agreement.

Note: Values with are significantly different in the residual analysis ($p < .05$).

Why is the conventional local agreement losing support? Responses to the eleven statements provide some useful insights (Figure 2). Firstly, respondents indicated that broader areas beyond just those directly affected by the restart should be heard. The responses for S1, S3, and S4 indicated a divided view of 'areas directly damaged by pollution and evacuation' and 'those that would suffer economic and financial deterioration if the NPP would not restart', as well as 'Omaezaki city as the host municipality'. On the other hand, 'reputational damage' (S2) and 'areas of electricity consumption' (S5) had wide support. Although S2 and S5 did not necessarily mean that areas expected to be directly affected should not be heard, it is clear that the public is supportive of broader geographical area representation.

Secondly, some of the actors who have played central roles in the conventional local agreement were seen as not trustworthy by many of the respondents. Nearly 80% disagreed with S6, indicating that the consent of local autonomies, at least in some form, was considered necessary. At the same time, the decisions and judgements of local governments and assemblies (S8) as well as experts (S9) were not generally endorsed, while roughly half of the respondents supported S7, agreeing that the national government should make the restart judgement since the restart is a national issue. On the other hand, approximately 45% of the respondents supported the proposition that the judgement should be made according to the will of ordinary citizens rather than by politicians and experts (S10).

In summary, the respondents tended to be more inclusive with regard to involvement in the restart decision-making process. This inclusiveness is reflected in the widespread support for a broader geographical scale in the local agreement. Distrust of the judgement of local politicians as well as experts, combined with an endorsement of the will of ordinary citizens, likely explains the broad support for a prefectural referendum. It is likely that the trend toward greater inclusion has been influenced by the Fukushima disaster, which, it has been revealed, damaged a wider area than expected and increased the distrust of those who have promoted nuclear power (Suzuki 2019).

5.2. *Difference by attitudes towards the restart*

The remainder of this section examines how attitudes towards the restart and the residential area affected his/her attitudes towards local agreement. Results show that the pro-restart group was more supportive of the conventional local agreement than the anti-restart group. Overall, approximately 22% of all respondents agreed with the restart, while 49% disagreed (Table 1). Although the idea of a referendum was supported by more than 70% of the pro-restart group, support for a prefectural referendum was less strong in this group than in the anti-restart group. In addition, the pro-restart group favoured a narrower geographical scale for local agreement to a greater extent than did the anti-restart group (Table 1). It is noteworthy, however, that only 16% of the pro-restart group supported the four municipalities or the host municipality options; that is, the conventional geographical scale was not widely supported even by the pro-restart group.

For both groups, the 'agree' responses outnumbered the 'disagree' responses when considering the inclusion of 'areas possibly affected by reputational damage' (S2) and 'areas of electricity consumption' (S5) (Figure 2). Support was broader among the anti-restart group than the pro-restart group with respect to inclusion of the 'reputationally damaged' areas, while the reverse was true for the 'electricity consumption' areas. As to including in the local decision-making process areas that represented narrower geographical scales such as 'directly damaged' areas (S1), 'negatively affected by not restarting' areas (S3), and 'Omaezaki city as the host municipality' (S4), the anti-restart group was generally negative, whereas the pro-restart group was positive. These tendencies were statistically significant in results of the multiple regression analysis as well (Table 2).

Compared with the pro-restart group, the anti-restart group was more negative regarding judgements by experts (S9) and local politicians (S8) (Table 2). For the judgement by the national government (S7), there were more 'agree' responses than 'disagree' responses among the pro-restart group, while the responses were close to even among the anti-restart group. On the other hand, the judgement of ordinary citizens (S10) was supported by approximately 58% of the anti-restart group (with 14% disagreement), while in the pro-restart group the number of 'agree' responses was outnumbered by the 'disagree'

responses. Results of the multiple regression analysis also showed that these differences were statistically significant (Table 2).

Thus, the study revealed a clear difference between the anti-restart and pro-restart groups in their attitude towards local agreement. Compared with the pro-restart group, the anti-restart group did not favour the cases associated with a narrower geographical scale. Also, the pro-restart group tended to show relatively more trust in experts as well as in local governors/mayors and assemblies, who have played a significant role in the conventional local agreement process. Gross (2007) argues that those with overriding belief in the need of a project cares more about the outcome than the process. It seems reasonable that those who favour the restart are more supportive of the conventional agreement which will make the restart much easier, while those against the restart are more likely to oppose the conventional agreement. However, it needs careful investigation to tell whether it is the case that each of the two groups preferred a local agreement process that was more likely to bring about their favoured outcome. The idea of a prefectural referendum was supported by more than 70% of respondents, including the pro-restart group, despite the fact that only 12% of the pro-restart group believed that restart supporters would be in the majority if a prefectural referendum were conducted (43% believed that opponents would outnumber supporters; 46% did not know). It is also noteworthy, as mentioned above, that even among the pro-restart group, disagreement with the conventional local agreement was quite high. Even in the pro-restart group, there was distrust of local politicians as well as experts. These results indicate the possibility that their attitudes to local agreement were not just related with their outcome favourability (Gross 2007), but also with their recognition of the extent of the benefits and potential damage by NPPs as Uezono, Eguchi, and Seki (2012) argued in the case of the Shimane NPP.

It is interesting that the pro-restart group was more positive than the anti-restart group as to the 'electricity consumption' areas (S5) which supposedly is wider than the other areas and has not been included in the conventional local agreement process. Nakajima (2016) suggested a concept of 'shohi jimoto' (the electricity consumption area in Japanese) to seek

Table 2. Results of multiple regression analysis.

	S1. direct damage		S2. reputational damage		S3. economic and financial deterioration		S4. Omaezaki city, as host municipality		S5. urban communities consuming electricity	
	Estimate	Std. Error	Estimate	Std. Error	Estimate	Std. Error	Estimate	Std. Error	Estimate	Std. Error
Intercept	3.0	0.13	4.5	0.09	2.8	0.11	2.6	0.11	3.8	0.11
Attitude to Restart (ref. Anti-restart)										
DKNA	0.5	0.09	-0.3	0.06	0.7	0.07	0.9	0.07	0.1	0.07
Pro-restart	0.6	0.09	-0.6	0.06	1.2	0.08	1.2	0.08	0.2	0.08
Gender (ref. Male)										
Famale	0.1	0.08	0.1	0.05	0.1	0.06	0.2	0.07	0.1	0.07
Generation (ref. 40's)										
18, 19 and 20s	0.3	0.18	0.2	0.12	0.4	0.15	0.3	0.16	-0.2	0.15
30s	0.1	0.14	0.1	0.09	0.0	0.12	0.1	0.13	-0.1	0.12
50s	-0.1	0.13	0.0	0.08	-0.2	0.11	-0.2	0.11	-0.2	0.11
60s	-0.5	0.13	0.1	0.08	-0.2	0.11	-0.4	0.11	0.0	0.11
70s	-0.7	0.15	0.1	0.10	-0.3	0.12	-0.3	0.13	0.1	0.13
80 years and older	-0.1	0.17	0.1	0.11	0.0	0.14	0.1	0.15	0.1	0.14
Education (ref. ISCED4)										
ISCED3	0.2	0.13	0.0	0.08	0.3	0.10	0.3	0.11	0.1	0.11
ISCED5	0.1	0.10	0.0	0.07	-0.1	0.08	0.0	0.09	0.0	0.08
ISCED6-8	0.0	0.10	-0.1	0.06	-0.3	0.08	0.0	0.08	-0.1	0.08
Employment status (ref. full-time)										
part-time	-0.1	0.12	-0.1	0.08	0.1	0.10	0.1	0.10	-0.2	0.10
primary industry	-0.1	0.28	0.1	0.18	0.2	0.23	0.5	0.24	0.0	0.23
self-employed/manager	0.1	0.14	-0.1	0.09	0.0	0.12	-0.1	0.12	-0.3	0.12
student	-0.2	0.25	-0.1	0.16	-0.1	0.20	-0.4	0.22	-0.1	0.21
unemployed	-0.1	0.12	-0.1	0.08	-0.1	0.10	-0.1	0.10	-0.2	0.10
Residential area (ref. Midwest)										
Host municipality	0.6	0.39	0.0	0.26	0.3	0.32	0.5	0.34	-0.1	0.33
Neighbouring municipalities	0.5	0.15	0.0	0.10	0.0	0.12	-0.3	0.13	-0.4	0.12
UPZ	0.0	0.10	0.0	0.07	0.0	0.08	-0.2	0.09	-0.2	0.08
TEPCO area	0.0	0.08	0.0	0.05	0.1	0.07	0.0	0.07	0.0	0.07
Sample Size	1,919		1,915		1,915		1,904		1,904	
AIC	7154.3		5497.7		6320.6		6554.8		6410.0	
R2 Nagelkerke	0.23		0.09		0.33		0.37		0.04	

	S6. power companies		S7. Japanese government		S8. local assemblies and governor/mayors		S9. experts		S10. ordinary citizens		S11. Trust in those who have promoted nuclear power	
	Estimate	Std. Error	Estimate	Std. Error	Estimate	Std. Error	Estimate	Std. Error	Estimate	Std. Error	Estimate	Std. Error
Intercept	1.2	0.08	3.0	0.13	2.1	0.11	1.8	0.11	3.8	0.11	1.8	0.09
Attitude to Restart (ref. Anti-restart)												
DKNA	0.7	0.05	0.4	0.08	0.4	0.07	0.9	0.07	-0.6	0.07	0.7	0.06
Pro-restart	1.2	0.06	0.7	0.09	0.4	0.07	1.0	0.08	-0.9	0.08	1.0	0.06
Gender (ref. Male)												
Famale	0.0	0.05	0.1	0.07	0.0	0.06	0.1	0.06	0.0	0.06	0.1	0.05
Generation (ref. 40's)												
18, 19 and 20s	0.1	0.11	0.1	0.17	0.2	0.14	0.0	0.15	0.2	0.14	0.1	0.12
30s	-0.1	0.09	-0.2	0.14	0.0	0.12	0.0	0.12	0.0	0.12	0.0	0.09
50s	-0.1	0.08	0.0	0.12	-0.2	0.10	-0.1	0.10	-0.1	0.10	0.0	0.08
60s	0.0	0.08	0.1	0.12	-0.4	0.10	0.0	0.10	0.0	0.10	-0.2	0.08
70s	0.0	0.09	0.2	0.14	-0.4	0.12	0.3	0.12	0.1	0.12	-0.1	0.10
80 years and older	0.0	0.11	0.6	0.16	-0.2	0.14	0.4	0.14	0.1	0.14	0.0	0.11
Education (ref. ISCED4)												
ISCED3	0.1	0.08	0.4	0.12	0.2	0.10	0.1	0.10	0.1	0.10	0.0	0.08
ISCED5	0.0	0.06	0.0	0.09	0.1	0.08	0.0	0.08	-0.1	0.08	-0.1	0.06
ISCED6-8	-0.1	0.06	-0.1	0.09	0.2	0.08	-0.3	0.08	0.0	0.08	-0.1	0.06
Employment status (ref. full-time)												
part-time	0.0	0.07	-0.1	0.11	-0.1	0.09	0.1	0.09	-0.1	0.09	0.2	0.08
primary industry	-0.2	0.17	0.3	0.26	0.3	0.22	0.3	0.22	-0.2	0.22	0.3	0.18
self-employed/manager	0.1	0.09	-0.1	0.14	-0.1	0.11	0.0	0.11	-0.1	0.11	-0.2	0.09
student	-0.1	0.16	-0.2	0.24	0.0	0.20	0.0	0.20	0.0	0.20	0.3	0.16
unemployed	0.0	0.07	-0.1	0.11	0.0	0.09	0.0	0.09	-0.1	0.09	0.0	0.08
Residential area (ref. Midwest)												
Host municipality	0.3	0.25	-0.1	0.10	0.1	0.08	0.0	0.08	0.0	0.08	0.1	0.07
Neighbouring municipalities	-0.1	0.09	0.1	0.08	-0.1	0.07	0.2	0.07	0.0	0.07	0.0	0.05
UPZ	0.0	0.06	-0.2	0.37	0.1	0.32	-0.3	0.32	0.4	0.32	0.2	0.26
TEPCO area	0.0	0.05	0.1	0.14	0.0	0.12	0.1	0.12	0.1	0.12	0.0	0.10
Sample Size	1,918		1,910		1,911		1,914		1,911		1,913	
AIC	5329.5		6925.8		6264.3		6293.0		6275.4		5484.2	
R2 Nagelkerke	0.31		0.14		0.13		0.28		0.18		0.27	

responsibility of those consuming electricity in urban areas given the Fukushima nuclear disaster. However, the results of this study showed that the pro-restart group favoured the 'electricity consumption' areas more than the anti-restart group. This might be because including the 'electricity consumption' areas was associated with prioritising the benefit of nuclear power as a stable energy source.

5.3. Difference between residential areas

The area in which a respondent lives also affected his/her opinion regarding local agreement, although the effect is not as clear as the effect of membership in the pro-restart or anti-restart group. No statistically significant difference between areas was found in attitude towards the restart and the idea of a prefectural referendum: the pro-restart rate was only slightly higher in the Midwest area (Table 1), while a prefectural referendum was supported by approximately 70% of the respondents in every area¹⁴. As for the geographical scale of local agreement, respondents in the neighbouring municipalities and the UPZ area advocated UPZ inclusion to a greater extent than those in the other areas and favoured 'all municipalities in the prefecture' to a lesser extent.

The difference in the geographical scale of local agreement could be related with the negative influences of living in the neighbouring municipalities and the UPZ area on the support for 'electricity consumption' areas (S5). As to the eleven statements, the results of the multiple regression analysis showed some statistically significant influences on their attitudes towards local agreement by the areas (Table 2). Compared with the Midwest area, the neighbouring municipalities and the UPZ area had negative impact on the support of the inclusion of 'electricity consumption' areas (S5). This might be related with their relatively weaker support for 'all municipalities in the prefecture', suggesting that people in those areas do not like the two largest and most urbanized cities in the prefecture, Shizuoka city and Hamamatsu city, to be involved in local agreement process.

¹⁴ The sample size of respondents in Omaezaki city was too small to draw statistically significant results.

Furthermore, living in the neighbouring municipalities and the UPZ negatively affected the support for 'Omaezaki city as the host municipality' (S4). As to respondents in the UPZ area, it is understandable since the area is within approximately 31km of the Hamaoka NPP and is required to have an effective regional evacuation plan in case of a nuclear disaster, although it has not had a say in the conventional local agreement process. On the other hand, the neighbouring municipalities have been involved in the conventional local agreement process. Although Omaezaki and the three neighbouring municipalities are equal in status in the safety agreement, Omaezaki has played a leading role in local agreement process (Sugawara et al. 2010). The result might indicate that respondents in the neighbouring municipalities have stronger complaints to Omaezaki city regarding the local decision-making process as well as the distribution of benefits of the Hamaoka NPP which had been disproportionately concentrated on Omaezaki, despite their vicinity to the NPP¹⁵.

Thus, the neighbouring municipalities and the UPZ area tended to support the UPZ as the geographical scale of local agreement, negatively affecting the support for 'electricity consumption' areas (S5) and 'Omaezaki city as the host municipality' (S4). On the other hand, the TEPCO area positively affected the inclusion of areas that would experience 'economic and financial deterioration by not restarting' (S3) and the judgement of experts (S9), although it is difficult to find reasonable explanation for them. Other than that, as to the judgement actors, the multiple regression analysis found no statistically significant influence by the residential areas.

6. Conclusion

As noted in the introduction, in order to create a socially agreeable local agreement process, it is essential to understand how the public views local agreement in cases involving controversial energy infrastructure. The issue here is not only whether an NPP should recommence operations, but how the process for making that decision should be designed.

¹⁵ The neighbouring municipalities showed positive influence for the inclusion of 'directly damaged' areas (S1).

This study explored public attitudes towards local agreement in the case of the Hamaoka NPP in order to promote a better understanding of the politics of local agreement related to Japan's NPPs.

The results showed that the conventional local agreement process is not generally supported; a suitable alternative needs to be found — one that treats a broader geographical area as 'local' and one in which the voices of ordinary citizens are clearly heard and respected. A prefectural referendum could be a way given the wide support found in the survey, while it does not necessarily exclude other alternatives.

Study results also found that attitudes towards local agreement differed depending on the respondent's position on the restart: the pro-restart group tended to be less critical of the conventional local agreement than the anti-restart group. Nonetheless, neither group supported the conventional local agreement. It was also found that residential areas of respondents affected their attitudes towards which area should be included in local agreement, while the study found little difference in actors that should be heard and respected in the local decision-making process. To design a local agreement process that is more socially acceptable, it will be necessary to reconcile such differences. Although the current study does not offer specific ways to bridge the differences identified in the survey, it paves the way for creating a more socially agreeable local agreement by developing data and offering a better understanding of public attitudes towards local agreement.

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