

An Energy Justice Analysis of Korea's SMR Siting Framework: Gijang i-SMR Site Selection

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1. Introduction

The 11th Basic Plan for Electricity Supply and Demand includes the deployment of a 0.7 GW innovative small modular reactor (i-SMR) [1]. In June 2026, Gijang-gun, Busan, was selected as the candidate site for the i-SMR project [2]. This represents an important step towards the deployment of SMRs in South Korea.

SMRs differ from conventional large reactors in terms of plant scale, modular construction, safety characteristics, and siting flexibility. In particular, their smaller scale and flexible deployment have raised the possibility of locating SMRs closer to electricity demand centres. Previous research on nuclear power plant (NPP) siting in South Korea has highlighted the importance of public acceptance and proactive siting strategies for future SMR deployment [3]. The first i-SMR candidate-site selection largely followed the institutional approach used for conventional NPP siting, including voluntary applications by local governments and comparative site evaluation.

Nuclear siting is not solely a technical issue. It also concerns how the benefits and burdens of nuclear development are distributed, how local populations participate in decision making, and which populations are recognised as affected by a project. These issues correspond to the three dimensions of energy justice: distributive, procedural, and recognition justice [4,5].

This study examines the current SMR siting framework using the Gijang case. Rather than assessing whether the selection of Gijang itself was appropriate, the study focuses on three institutional questions: how candidate sites are formed, how public acceptance is measured and incorporated into site selection, and which populations are recognised as affected stakeholders. Based on this analysis, considerations for future SMR siting are proposed.

2. SMR Site Selection in Gijang

The current SMR siting process can be broadly understood as a sequence of national energy planning, voluntary applications by local governments, comparative site evaluation, candidate site selection, and subsequent project approval and nuclear safety

licensing. This sequence follows the institutional framework developed for conventional NPPs. Public participation is incorporated differently across these stages. At the initial site selection stage, local governments and local councils play a central role in expressing willingness to host the project, while resident opinion surveys are used as part of the site evaluation [2].

This study is based on publicly available information, including KHNP press releases, official materials from Gijang-gun, and publicly reported media sources. As detailed information on the composition of the site selection committee was not identified in the materials reviewed, the analysis focuses on the publicly documented site selection process and evaluation results.

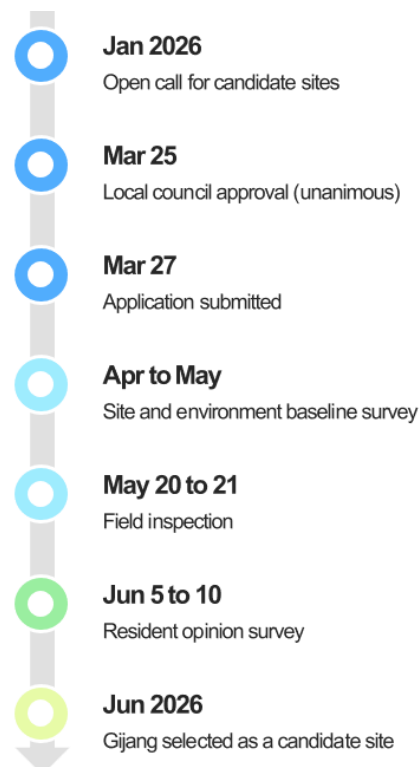


Fig 1. Timeline of the i-SMR candidate site selection [6,7]

Fig 1 shows the sequence of the first i-SMR candidate site selection in Gijang-gun. The local council approved the application in March 2026, and the

application was submitted two days later. The resident opinion survey used in the public acceptance evaluation was conducted in June 2026, approximately 72 days after the council approval. The willingness to host the project was therefore expressed through the local council before the resident opinion survey was carried out.

For the first i-SMR project, candidate sites were evaluated in four categories: site suitability, environmental conditions, construction suitability, and public acceptance. Each category was assigned 25 points, giving public acceptance the same nominal weight as each technical or environmental category [2]. Two local governments, Gijang-gun and Gyeongju-si, applied in response to the open call. Both are existing nuclear host regions, hosting the Kori and Wolsong NPPs, respectively. Gijang-gun received a total score of 87.11 points, compared with 84.56 points for Gyeongju-si, and was selected as the candidate site (Table I) [2].

Table I: Category scores in the first i-SMR site evaluation

Category	Maximum	Gijang-gun	Gyeongju-si
Site suitability	25	21.60	19.80
Environmental conditions	25	20.00	20.80
Construction suitability	25	23.60	23.93
Public acceptance	25	21.91	20.03
Total	100	87.11	84.56

The results show that social considerations are formally incorporated into the current site selection framework. At the same time, the Gijang case illustrates that the significance of public acceptance depends not only on its numerical weight but also on how candidate regions are formed, how acceptance is measured, and whose preferences are represented.

3. Energy Justice Considerations

3.1. Distributive Justice

Distributive justice concerns how the benefits and burdens of energy development are allocated across regions and populations [4,5].

Both regions that applied for the first i-SMR project were existing nuclear host regions. The Gijang site also has advantages associated with existing nuclear and electricity infrastructure. Such conditions may reduce uncertainties related to infrastructure development and project implementation. From an energy justice perspective, however, the important issue is not whether the use of existing nuclear sites is technically or economically appropriate. Rather, it is how the candidate pool is formed before formal site evaluation begins. Because the current process relies on voluntary applications from local governments, the geographical range of sites considered for deployment is substantially

determined at the application stage. The Gijang case therefore suggests a potential institutional path dependence in SMR siting. Although SMRs may technically allow a broader range of locations than conventional NPPs, a voluntary application framework may continue to direct new nuclear projects towards regions already hosting nuclear facilities. In other words, the technological flexibility of SMRs does not necessarily lead to greater geographical flexibility in actual site selection.

If this pattern continues, the benefits and burdens associated with future SMR deployment may remain concentrated in existing nuclear host regions. This issue is particularly relevant because one of the potential advantages of SMRs is their ability to support more flexible deployment, including closer proximity to major electricity demand centres.

3.2. Procedural Justice

Procedural justice concerns how affected stakeholders participate in decision making and how their preferences influence the outcome [4,5].

Public acceptance was assigned 25 of the 100 total evaluation points. Gijang received 21.91 points for public acceptance, compared with 20.03 points for Gyeongju, a difference of 1.88 points that accounted for approximately 74% of the overall 2.55-point score gap. Although public acceptance did not reverse the ranking of the two sites, it substantially widened the final score difference. Excluding the public acceptance category, the difference between the two sites would have been only 0.67 points. The procedural issue is therefore not simply whether public acceptance should be considered, since it already has an explicit role in the current framework. A more important question is how public acceptance is defined and measured.

At the early siting stage, acceptance is mainly represented through local political support and resident opinion surveys. Such surveys can identify the overall level of support but provide limited information on why residents support or oppose the project, under what conditions their preferences may change, or how perceived risks and expected benefits shape their attitudes. Recent empirical evidence on urban SMR siting in South Korea further suggests that community responses cannot be adequately represented by a simple binary distinction between acceptance and opposition, as residents exhibit heterogeneous responses depending on compensation thresholds and perception profiles [8].

A second consideration concerns the stage at which acceptance is measured. As shown in Fig. 1, the resident opinion survey was conducted after the local council had already approved the application. This ordering is consistent with the design of the current framework, in which the survey functions as an input to comparative site evaluation rather than as a mechanism for forming local consent. The relevant distinction is therefore between acceptance treated as an evaluation

variable and acceptance treated as a process of preference formation. Where acceptance is understood only as an evaluation variable, the framework provides limited opportunity for resident preferences to influence the decision before the host jurisdiction has committed to the project.

3.3. Recognition Justice

Recognition justice concerns which populations are acknowledged as legitimate affected stakeholders in the decision-making process [4,5].

In the current siting framework, the local government serves as the primary institutional unit expressing willingness to host a project. This administrative approach provides a clear mechanism for identifying the host community. However, the administrative boundary of the host jurisdiction does not necessarily coincide with the geographical area in which residents may perceive themselves to be affected by a nuclear facility. This creates a potential distinction between the unit expressing consent and the population recognising itself as affected. Residents outside the host jurisdiction may also have concerns regarding nuclear safety, emergency preparedness, environmental impacts, or infrastructure associated with the project.

This issue may become increasingly important if SMRs are deployed closer to metropolitan areas, industrial centres, or other high-demand regions. The greater locational flexibility of SMRs could increase the number and diversity of stakeholders located around future sites. Therefore, a participation framework designed primarily around the administrative host community may not always correspond to the wider range of stakeholders relevant to SMR deployment.

4. Policy Implications

The Gijang case shows that the current SMR siting framework already incorporates public acceptance as an explicit evaluation criterion. The main challenge is therefore not simply to increase public participation, but to reconsider where and how social considerations enter the siting process.

(1) Consideration of Candidate Site Formation

The formation of the candidate pool should itself be considered an important part of SMR siting policy. If future projects continue to rely on a voluntary application framework, SMR deployment may remain geographically concentrated in existing nuclear host regions despite the greater siting flexibility associated with the technology. Siting strategies should therefore consider whether a broader range of locations, including areas associated with major electricity demand, should be examined before or alongside voluntary applications.

(2) Development of Public Acceptance Assessment

Public acceptance should not be assessed only through aggregate levels of support. Although opinion surveys provide useful information, the Gijang case demonstrates that acceptance can have a meaningful influence on site evaluation. Future consultation processes should therefore examine whether residents support a project, why they support it, and under what conditions their support may change. Conditional acceptance, perceived risks and benefits, compensation preferences, and project-specific concerns could provide a more detailed basis for understanding local preferences [8]. Consultation should also consider the stage at which public acceptance is assessed, since information collected after a host jurisdiction has already committed to a project has limited scope to shape the decision.

(3) Expansion of Stakeholder Recognition

The population recognised as affected by an SMR project should not necessarily be limited to the administrative jurisdiction hosting the facility. This consideration may become more important if SMRs are deployed closer to metropolitan or high-demand areas where neighbouring populations and jurisdictions are more densely interconnected. Future consultation and public engagement processes should therefore recognise stakeholders beyond the immediate host jurisdiction, while differentiating the form and degree of participation according to the extent of potential impacts. While the host community may retain a central role in formal site-selection processes, neighbouring populations could be involved through consultative mechanisms for expressing project-specific concerns.

5. Conclusion

This study examined Korea's first i-SMR site selection from the perspective of energy justice. The Gijang case demonstrates that public acceptance already plays an explicit and substantive role in the current site selection framework. At the same time, the analysis identifies three institutional issues concerning the formation of candidate sites, the measurement of public acceptance, and the recognition of affected populations.

First, reliance on voluntary applications may create institutional path dependence by concentrating future SMR projects in existing nuclear host regions. Second, although public acceptance meaningfully widened the score difference between the two candidate sites without changing their ranking, it is measured as an aggregate level of support and is collected after the host jurisdiction has expressed its willingness to participate, which limits both the information content and the timing of its influence. Third, the administrative boundary of a host local government may not fully

correspond to the wider population that perceives itself to be affected by an SMR project.

These findings do not imply that the selection of Gijang was inappropriate. Rather, they indicate that the incorporation of public acceptance alone does not fully address the distributive, procedural, and recognition dimensions of SMR siting. Therefore, a more comprehensive siting framework should consider where candidate sites are formed, how public preferences are evaluated, and whose preferences are recognised in the decision-making process, alongside the level of host-community support. Addressing these issues will be important for developing an institutional framework that reflects both the technological flexibility of SMRs and the social considerations associated with their deployment.

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