Research on Public Acceptance Strategies for EPZ in Small Modular Reactors (SMRs) Enhancing Public Acceptance for On-Site EPZ Licensing Cases

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1. Introduction

Small Modular Reactors (SMRs) are designed to offer enhanced safety features compared to traditional nuclear reactors, allowing for significantly reduced Emergency Planning Zones (EPZs) [1]. The ability to minimize EPZs has the potential to simplify regulatory requirements and make nuclear power more accessible in diverse locations. However, despite these advantages, public acceptance remains a crucial factor in the successful deployment of SMRs. Residents near proposed SMR sites often express concerns about safety, environmental impact, and regulatory oversight.

This study aims to examine international cases where SMRs have received on-site EPZ approval and analyze the factors influencing public acceptance. By investigating the experiences of various countries, we can identify key strategies that enhance community engagement, improve trust, and foster a more positive perception of SMR technology.

2. International Case Studies of On-Site EPZ Licensing

Several countries have made significant progress in obtaining regulatory approval for SMRs with on-site EPZs. The table below provides an overview of selected case studies, highlighting key factors affecting public perception.

Tab	le I: Inter	national	Case	of On-Site	EPZ Licensing

Country	SMR Project	Regulatory Body	EPZ Size	Public Perception
USA	Clinch River SMR	NRC	On-site EPZ (0.32 km)	High engagement, mixed response
Canada	Ontario SMR (OPG)	CNSC	On-site EPZ	Positive, due to strong governmental support
UK	Rolls- Royce SMR	ONR	Under review	Awaiting public feedback
Russia Akademik Lomonosov		Rostechnadzor	On-site EPZ	Limited public input due to state- driven initiative

The Clinch River SMR project in the United States has received significant attention due to its successful application for an on-site EPZ. However, public perception remains mixed, as some residents express concerns regarding long-term safety. In Canada, the Ontario Power Generation (OPG) SMR project has received strong governmental support, which has led to a generally positive public response [2]. In the United Kingdom, Rolls-Royce is currently seeking approval for an SMR design, but public feedback has yet to be fully evaluated. In Russia, the Akademik Lomonosov floating SMR has been deployed with minimal public input, raising questions about transparency and longterm environmental impact [3].

3. Factors Influencing Public Acceptance of EPZ Reduction

3.1 Safety Perception and Risk Communication

Public perception of SMR safety is one of the most significant factors influencing acceptance. In regions where regulators and operators actively engage with communities, residents tend to exhibit a higher level of trust in nuclear technology. Effective communication strategies, including public safety drills and transparent reporting of safety data, can help alleviate concerns.

3.2 Economic and Social Benefits

Public acceptance is also influenced by the economic and social benefits associated with SMR projects. In locations where SMRs are expected to create jobs, stimulate local economies, and provide affordable electricity, residents are generally more supportive. Countries that have successfully implemented economic incentive programs tied to SMR development have observed increased public approval.

3.3 Transparency and Community Involvement

Communities that are actively involved in the decision-making process are more likely to support SMR projects. Establishing independent monitoring programs, holding regular public forums, and ensuring accessibility to radiation monitoring data can improve trust and foster a sense of shared responsibility between the industry and local residents.

4. Proposed Strategies to Improve Public Acceptance

4.1 Public Awareness and Education Programs

One of the most effective ways to improve public acceptance is through education. Countries that have implemented structured awareness programs have seen greater public support for nuclear projects. Providing accessible online resources, conducting site tours, and hosting public forums can help dispel misconceptions about nuclear energy.

4.2 Policy and Governmental Incentives

Governments can play a crucial role in fostering public acceptance by implementing policies that directly benefit local communities. Offering reduced electricity rates to nearby residents, investing in infrastructure development, and creating tax incentives for businesses in SMR regions can contribute to a more favorable public outlook.

4.3 Enhanced Safety Communication

The implementation of real-time radiation monitoring dashboards, accessible to the public, can help build confidence in nuclear safety. Collaborating with respected local figures, including educators and community leaders, can also enhance credibility and foster trust in SMR projects.

5. Conclusion

The successful implementation of on-site EPZ licensing for SMRs is highly dependent on public acceptance. Countries that prioritize transparency, community engagement, and economic benefits tend to experience greater levels of support for SMR deployment.

Moving forward, it is essential to continue refining public communication strategies and ensuring that safety measures remain at the forefront of SMR development.

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