



Research on Public Communication of Small Reactor

Rongxu Zhu^(✉), Feng Zhao, Xiaofeng Zhang, Jiandi Guo, and Meng Zhang

Suzhou Nuclear Power Research Institute, Suzhou, Jiangsu, China
zrx441@163.com

Abstract. Based on the conclusions of small reactor environmental impact assessment and social stability risk assessment of small reactors, this paper conducts a special study on the public communication of small reactors. This article discusses the work content, scope and form of public communication of small reactor, and give suggestions on the scope and form of public publicity, public participation and information disclosure. It is matched with small reactor public communication theoretical system and operation manual.

The research on the public communication work of small reactor can provide necessary theoretical basis and technical support for the specific public communication work of small reactor. Provide decision support for local policies and construction departments to implement public communication. It is hoped that this study can provide some reference for the public communication of small reactors in the exploratory stage.

Keywords: small reactor · public communication · NIMBY · EIA · SSRA

Nomenclature

EIA	Environmental Impact Assessment
SSRA	Society Stability Risk Assessment
MEE	Ministry of ecological environment of the people's Republic of China
NDRC	National Development and Reform Commission of the People's Republic of China
PWR	Pressurized Water Reactor
PAZ	Precautionary Action Zone

1 Introduction

In order to expand the application scope of nuclear energy, ensure energy security and meet the needs of low-carbon energy development, China has invested a lot of human and material resources in the development of small reactors in recent years, and has achieved a series of results. The natural avoidance effect of nuclear related projects and the particularity of the utilization of small reactors, such as being close to cities and residents, bring new challenges to public communication. If we simply copy the guidelines

for public communication of nuclear power projects to carry out public communication of small reactors, it is difficult for enterprises and local governments to bear such a huge workload and resource investment, Therefore, it is necessary to study the public communication of small reactors.

2 Relevant Background

In 2012, in order to promote scientific decision-making, democratic decision-making and legal decision-making, prevent and resolve social contradictions, NDRC issued the notice of the national development and Reform Commission on the Interim Measures for social stability, risk assessment of major fixed asset investment projects, requiring NDRC to approve or report to the State Council for approval. Fixed asset investment projects constructed and implemented within the territory of the people's Republic of China shall be subject to SSRA.

The measures for public participation in environmental impact assessment issued by MEE stipulates that the construction departments of reactor facilities and commercial spent fuel reprocessing plants with a core thermal power of more than 300 MWth shall listen to the opinions of citizens, legal persons and other organizations within a radius of 15 km of the facilities or reprocessing plants; The construction departments of other nuclear facilities and uranium mining and metallurgy facilities shall listen to the opinions of citizens, legal persons and other organizations within a certain range according to the specific conditions of environmental impact assessment[1].

The guidelines for public communication of nuclear power projects issued by MEE stipulates that public communication of nuclear power projects should pay attention to the public within a certain range around the plant site (usually 30 km radius of the plant site) that may be directly or indirectly affected by the project construction and operation, and focus on the public within 5 km radius of the plant site [2].

In 2017, the national nuclear accident emergency office issued the guidance on nuclear emergency work of onshore small PWR, which clearly put forward that “the recommended range of small PWR emergency planning area shall not be greater than 3 km, and the specific range shall be proposed by the operating unit after systematic demonstration and scientific calculation, and determined according to the specified procedure”.

In the draft for comments on the principles and requirements for the division of nonresidential areas and planning restricted areas of small nuclear power plants, for light water reactors with a single reactor thermal power of less than 300 MWth, the boundary of nonresidential areas can generally be consistent with the plant boundary of nuclear facilities, and the distance from the reactor is generally not less than 100 m; The distance between the boundary of the planned restricted area and the reactor shall not be less than 1 km.

Arrangements for preparedness for a nuclear or radiological emergency (IAEA GS-G-2.1) recommends that the PAZ with reactor thermal power of 100–1000 MWth is 0.5–3 km away from the plant site [3].

3 Small Reactor SSRA

The 6×200 MWth small reactor project is planned and arranged at one time and implemented by stages. Phase I project construction 2×200 MWth small reactor. The social stability risk investigation scope of the project includes the interest related groups directly and indirectly affected by the project, mainly including: residents, heating enterprises, relevant heat users and other social organizations directly affected by the siting, construction and operation of the project within 5 km of the project site, sensitive objects around the project, including planters, farms, industrial and mining enterprises, schools, hospitals, etc. And government departments in the project location and village committees in the area around the plant site; Mass media and online new media in the project site; Pay due attention to the opinions, suggestions and demands of non-local residents on the project.

The personal questionnaire survey is mainly organized within 5 km around the plant site and the urban area where the project is located. A total of 720 questionnaires were distributed and 720 questionnaires were collected, of which 687 were valid questionnaires (invalid questionnaires were mainly due to lack of ID number, incorrect contact information or incorrect information, etc.). The respondents are mainly men. The main reason is that the household survey is generally filled in by men. The age distribution is mainly middle-aged and young people, taking into account the actual situation of many lefts behind elderly people in rural areas. The occupation is mainly farmers, taking into account the distribution of enterprise and institution employees, individual industrial and commercial households and other professionals. The education level is mainly from junior high school to senior high school, which can effectively reflect the real opinions and demands of the respondents. At the same time, there are a small number of highly intelligent elements, which are representative and extensive. The main findings are as follows [4] (Table 1).

Table 1. Classified statistics outcome of public's attitude to project

Question	Outcome	Proportion	Remarks
Do you understand that this project is a nuclear project	YES	62.6%	1 person did not fill in
	NO	37.3%	
How well do you know the project	Very well	8.2%	2 persons did not fill in
	Basic	28.4%	
	A little	38.4%	
	NO	24.7%	

(continued)

Table 1. (continued)

Question	Outcome	Proportion	Remarks
Channels of understanding of the project	meeting	4.7%	This topic is multiple choice, and 3 persons did not fill in
	Notice	4.8%	
	Public discussion	76.6%	
	TV	0.9%	
	website	1.3%	
	Nuclear science popularization activities	8.2%	
	micro-blog	0.6%	
	WeChat	11.6%	
	other	1.6%	
Issues most concerned about project construction	environmental effect	39.7%	This topic is multiple choice
	Land requisition compensation	56.6%	
	Providing employment opportunities	57.2%	
Issues most concerned about project construction	conserve energy, reduce emissions	3.5%	This topic is multiple choice
	Nuclear safety issues	40.5%	
	Economic drive	23.0%	
	Safety and quality during construction	11.8%	
	Stability of heating	24.0%	
	other	0.4%	

The construction departments has carried out a small amount of popular science publicity before this questionnaire survey, but the coverage is limited. According to the questionnaire survey, more than half of the respondents understand that the project is a nuclear power project, most of the respondents have a certain understanding of the project, and a few respondents do not understand the project. The respondents understand the project mainly through public discussion, WeChat and nuclear science popularization activities; Respondents focused on land acquisition compensation, employment opportunities, environmental impact, nuclear safety issues, stability of heating, etc.

4 Small Reactor EIA

The environmental impact assessment of the small reactor shows that the radioactive waste gas generated during normal operation is discharged into the atmospheric environment through the chimney after being treated to meet the annual total emission limit

specified in GB6249. The radioactive waste liquid generated is reused after being treated to meet the radioactivity level and annual total emission limit specified in GB6249. If it cannot be reused completely, it is discharged into the atmospheric environment through carrier evaporation. The maximum individual effective dose caused by the discharge of airborne effluent is less than 0.25 mSv, which meets the provisions of GB6249 and the safety review principles of small pressurized water reactor nuclear power plant. At the same time, it meets the public individual effective dose constraint value (0.02 mSv/a) caused by two small reactors, and its radiation impact on the environment is acceptable [5].

Within the duration of the site selection accident, the effective dose of public individuals (adults) at the site boundary is less than 10 mSv, and the thyroid equivalent dose is less than 100 mSv, which meets the safety review principles of small PWR nuclear power plant.

The emergency planning area is preliminarily divided into a small reactor centered area with a radius of 1 km of the plant site. The feasibility analysis results of implementing emergency plan at the plant site show that there are no insurmountable difficulties in implementing off-site emergency plan for nuclear accidents.

5 Small Reactor Public Communication

According to the conclusions of EIA and SSRA of small reactor, special research on public communication of small reactor is carried out, discussing the work content, scope and form of public communication of small reactor, and suggesting on the scope and form of public publicity, public participation and information disclosure. So Finally, a complete theoretical system of small pile public communication is developed..

5.1 Work Scope

The public communication scope of small reactor includes the public, enterprises, institutions and social organizations that may be directly or indirectly affected by the project construction and operation within 5 km of the plant site, focusing on the public, enterprises and institutions within 3 km. For nuclear heating reactors, attention should also be paid to the residents around the heating pipeline and end users (relevant residents and enterprises, etc.).

5.2 Work Content

The contents of public communication include public publicity, public participation, information disclosure and public opinion response. The public communication work should be guided by the local government, the construction company shall provide relevant resource guarantee, and the professional technical company shall be responsible for the whole process of technical consultation.

The public publicity shall be based on increasing the public's understanding of nuclear energy and the project, with the purpose of improving the public's acceptability. A combination of visits, exhibition halls, expert lectures and other means shall be adopted

to ensure the full coverage of the public publicity objects. Before the publicity work is carried out, the publicity objects should be reasonably and scientifically classified, so as to make the publicity work more targeted, so as to achieve twice the result with half the effort. At the same time, in combination with the social conditions and historical contradictions of the project location, the local public's acceptance of publicity contents and methods should be fully considered, so as to achieve the purpose of both publicity and risk control.

In principle, public participation should include questionnaire survey and symposium. The questionnaire shall be designed according to the project impact and public concerns to ensure easy to understand and comprehensive content. The questionnaire survey shall be determined according to the distribution of the resident population of the public near the plant site and the impact of stakeholders. Generally, the individual questionnaire shall be distributed by household. The questionnaire survey shall include stakeholders, especially direct stakeholders (residents of land acquisition and demolition, enterprises and institutions affected by the project construction), and shall include expert representatives of relevant government departments and professional institutions. When selecting the respondents, we should consider the selection of individuals and organizations with certain professional knowledge background and social level, and also pay attention to the wide representation of the respondents in terms of age, gender, educational background, occupation, etc. The specific number of individual questionnaires shall be decided based on the number of resident households around the project site. Generally, it should not be less than 300.

Information disclosure shall be implemented with reference to the measures for public participation in environmental impact assessment, guidelines for public communication of nuclear power projects and other relevant documents. It needs to be carried out in the form of newspapers, websites and paper posts. The scope of paper posting suggestions is the scope of public communication of the project. The posting place is the bulletin board of relevant administrative village committee and township government, and the postings last for 10 working days.

The construction company and local government shall establish a stability maintenance linkage mechanism and a public opinion response system. Carry out daily public opinion monitoring, conduct 24-h supervision during the information announcement, study and judge the public opinion of the project as soon as possible, and report the negative public opinion as soon as possible. During the publicity period, increasing the update cycle and amount of information of government official websites, microblogs, forums and popular science news can strengthen the effect of online popular science publicity.

5.3 Work Suggestion

(1) Strengthen public publicity

Strengthen the popularization and publicity of the basic knowledge of nuclear energy utilization, reduce and eliminate the public's anxiety and fear about nuclear safety. In view of the public's doubts and concerns about nuclear safety and the impact of

radiation on the environment, take the government as the leading role and cooperate with enterprises, do a good job in the publicity, education and public opinion guidance on nuclear safety and the impact of nuclear radiation, and constantly strengthen the communication with the residents near the plant site. Carry out popular science publicity in a way acceptable to the local public. Pay attention to further strengthen popular science publicity for heat users, carefully listen to the opinions of the public, answer questions or questions in time, and improve the public's understanding of nuclear heating reactor. The public's awareness and acceptability of nuclear heating will be improved through visits and field visits. Strengthen information disclosure, ensure the public's right to know and participate in the safe production of nuclear heating reactors, and strive for the public's understanding and trust.

(2) Strengthen public opinion information monitoring

Strengthen the monitoring of public opinion information, especially pay attention to the possible cross regional avoidance effect and a wide range of public opinion risks; Reduce the dissemination and diffusion of negative public opinion of relevant projects through the supervision and guidance of media public opinion.

(3) Mutual trust and benefit sharing among the three parties

Strengthen public relations management. Strengthen mutual communication and consultation with the government, groups affected by the project construction and surrounding residents. Strengthen the publicity of nuclear safety knowledge, optimize the ways of information disclosure, improve the efficiency of information disclosure, and enhance the public's cognitive trust in the project. The construction company shall actively fulfill its corporate social responsibility, strengthen the development assistance of villages near the plant site, and try to localize the employment as much as possible, so as to make the development benefits more benefit the surrounding people. On the premise of law and regulation, local governments take the initiative to communicate and exchange with construction units, timely inform public needs, and promote the construction of benefit sharing mechanism among the government, enterprises and the public; We will promote the reemployment of landless farmers and ensure that the quality of life of landless farmers does not decline.

6 Conclusion

Through the research on the public communication work of small reactors, we can provide necessary theoretical basis and technical support for the specific public communication work of small reactors, also provide specific support for the implementation of public communication work by local policies and construction company, and give opinions and suggestions for the follow-up public communication work of small reactors.

References

1. MEE. Measures for public participation in environmental impact assessment (2018). (in Chinese)
2. National Nuclear Safety Administration. Guideline of public communication for nuclear power projects (2015). (In Chinese)
3. Arrangements for preparedness for a nuclear or radiological emergency ,IAEA GS-G-2.1
4. Project social stability risk assessment report. SNPI (2021)
5. Regulations for environmental radiation protection of nuclear power plant. GB6249 (2011)

Open Access This chapter is licensed under the terms of the Creative Commons Attribution 4.0 International License (<http://creativecommons.org/licenses/by/4.0/>), which permits use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons license and indicate if changes were made.

The images or other third party material in this chapter are included in the chapter's Creative Commons license, unless indicated otherwise in a credit line to the material. If material is not included in the chapter's Creative Commons license and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder.

