

## Development & Measurement of the Nuclear Safety Trust Index in Korea

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### 1. Introduction

Since nuclear power began to be used as an energy source, the safety of nuclear power has been the prime concern. The nuclear safety must be ensured not only during the generation of nuclear power but also after the closure of the nuclear power plant. Safety refers to the 'confidence and freedom from anxiety about a risk or an accident or such a state.' Here, the focus of attention must be on the word 'risk.' Uncertainty that gives rise to risk makes risk considered to be a social construction and to be handled as a matter of perception. The nuclear safety can be assured only when the requirements for the safety in the field of engineering and technology and the relief in sociocultural field met. Here lies the reason why the trust in nuclear safety is important. It is hard to discuss all about nuclear safety in the field of engineering and technology, and risk is a consequence of uncertainty. For these reasons, it is more meaningful practically to deal with the trust in nuclear safety rather than discussing the nuclear power safety itself. Of course, the trust in nuclear safety is discussed on condition that nuclear safety is assured in the field of engineering and technology.

### 2. Nuclear Safety & Trust

For the components of trust from various perspectives have been studied. Trust is a concept that is frequently used in daily life, but its conception can vary in areas and targets depending on a variety of characteristics. For example, information, influence and control[1], responsibility, capacity and reliability[2], or capacity, openness, consideration and consistency[3] are sometimes presented as components of trust.

Nevertheless, the concept of trust can be agreed in the big frame that views trust as a matter of emotional acceptance rather than as a matter of logical understanding.

Components of trust can be varied as requested. Trust comes out explicitly through the characteristics of the target and expectations for the target. Accordingly, trust is conceptualized in this paper as giving a positive value through the subjective value judgement in social relations. The trust in nuclear safety is different from the targets of trust that have been dealt with. In other words, the target of trust in this paper can be defined as 'nuclear safety.' However, nuclear safety as a target can hardly be concrete. Accordingly, it looks desirable to replace the opinion about nuclear safety with the trust in the main bodies that play a pivotal role in nuclear safety. This paper defines the trust in nuclear safety as acknowledging the ability and authenticity of the main bodies and accepting the nuclear safety itself although nuclear safety is not understood logically. Considering the characteristics of nuclear safety, this paper presents the components of trust in the main bodies, such as democracy, responsibility, morality, authenticity, transparency and expertise. Democracy refers to listening to diverse opinions to decide nuclear safety policies, while responsibility is the main bodies' responsibility for nuclear safety. Morality refers to not doing immoral acts with regard to nuclear safety, and authenticity is placing the top priority on the protection of the people. Transparency is opening the information about nuclear safety as it is without distorting it to the public, while expertise is the preparedness of expertise necessary for regulating nuclear safety.

### 3. Development of the Nuclear Safety Trust Index

The nuclear safety trust index tells the level of trust in the nuclear safety, combining logical and

emotional dimensions. This index consists of 6 indicators such as democracy, responsibility, morality, authenticity, transparency and expertise. The index is calculated based on the level of trust in the main bodies that are directly or indirectly responsible for the safety of nuclear power in diverse manners and the importance of the main bodies' roles in the process of assuring the nuclear safety. It is again stressed that the nuclear safety trust index is not for the evaluation of nuclear safety but for the measurement of the trust level for nuclear safety.

$$\begin{aligned} & \text{Nuclear Safety Trust Index(NSTI)} \\ & = (\text{Level of Trust in Government} \\ & \quad \times \text{Importance of Government's Role}) \\ & + (\text{Level of Trust in Regulatory Agency} \\ & \quad \times \text{Importance of Regulatory Agency' Role}) \\ & + (\text{Level of Trust in Nuclear Experts} \\ & \quad \times \text{Importance of Nuclear Experts' Role}) \\ & + (\text{Level of Trust in the NPP Operation Agency} \\ & \quad \times \text{Importance of the NPP Operation Agency's Role}) \\ & \quad * \text{Level of Trust in Respective Bodies} \\ & = (\text{Democracy} + \text{Responsibility} + \text{Morality} \\ & \quad + \text{Authenticity} + \text{Transparency} + \text{Expertise}) \end{aligned}$$

#### 4. Measurement of the Nuclear Safety Trust Index(NSTI)

To measure the level of NSTI, the telephone poll was conducted using the RDD (random digit dialing) of wired and wireless numbers between Jan. 18~19, 2012. The sample proportions of selected demographic characteristics (gender, age and education) were equal to the estimated proportions in regions' population as of Dec. 2011. Korea's level of NSTI as of Jan. 2012 was scored 51.7 points (n=726) out of 100. This level of NSTI does not meet the expectations of Korea, whose nuclear circles are confident of Korea's supremacy in the nuclear safety in the world based on a variety of indexes.

Comparing the levels of trust in respective bodies, the government attained 48.0 points out of 100 (n=855), regulatory agency 50.8 points of 100 (n=850), nuclear experts 55.2 points out of 100 (n=854) and the nuclear power plant operation agency 53.2 points out of 100 (n=878). Citizens showed the highest level of trust in nuclear experts

with regard to the nuclear safety, but their trust level is not satisfactory. Meanwhile, their level of trust in the government is lower than 50 points out of 100, which suggests that citizens are more likely to distrust than trust in the government. Currently, the government offices that are directly related to nuclear safety include the Ministry of Education, Science & Technology, the Ministry of Knowledge Economy and the Nuclear Safety and Security Commission, which was established in 2011. Some might argue for pointing out the one out of the three offices that the 'government' here refers to, but citizens might not evaluate the three offices responsible for nuclear safety respectively. Therefore, it is better to accept the citizens' level of trust in the government as the trust level for all government departments than to discuss who is responsible for the low level of trust. Meanwhile indicators have different effect on the level of trust in main bodies. Authenticity had the strongest effect on the level of trust in the government, responsibility in regulatory agency and nuclear experts and democracy in the NPP operation agency.

#### 5. Conclusions & Discussion

Currently, the NSTI in Korea is low. Accordingly, it is necessary to identify the factors that give rise to lowering the NSTI and to seek ways for enhancing this low level of NSTI to the rational level. Needless to say, it is important that the safety in the field of engineering and technology is the prerequisite for discussing the NSTI.

#### REFERENCE

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