Strategic Approaches to Developing Regulatory Infrastructure for Countries to Embark on Nuclear Power Program

Young-Sung Choi*, Young-Joon Choi and Jae-Cheon Lee
Education and Training Department, Korea Institute of Nuclear Safety
**Corresponding author: cys@kins.re.kr*

1. Introduction

Regulatory infrastructure is an essential component to support the nuclear expansion, which is likely to continue for decades due to the fact that nuclear energy can be a reliable option to mitigate global warming, to provide large-scale electricity and to meet energy demands required for economic and population growth. It is said that it takes 10 – 15 years for a state with no experience of nuclear power to implement its first nuclear power plant (NPP). During the period regulatory infrastructure must be established.

These days, establishment of regulatory infrastructure can be facilitated by a number of guiding documents available from IAEA and proactive assistances from experienced regulatory bodies. This allows new entrant countries, whatever stage they are currently located either with no experience or with experience of operating research reactor, to jump onto the stage in which the country can afford to start fundamental activities for licensing NPP.

This paper examines three strategic approaches that new entrant countries embarking on nuclear power program should consider to adopt in order to facilitate the establishment of regulatory system.

2. Basic Requirements

The basic requirements for regulatory infrastructure commensurate with international standards are already described in several IAEA documents, some of which are listed below:

- Consideration to launch a nuclear power programme (GOV/INF/2007/2)
- Milestones in the development of a national infrastructure for nuclear power (NG-G-3.1)
- Evaluation of the status of national nuclear infrastructure development (NG-T-3.2)
- Basic infrastructure for a nuclear power project (TECDOC-1513)
- Potential for sharing nuclear power infrastructure between countries (TECDOC-1522)
- Nuclear safety infrastructure for a national nuclear power programme supported by the IAEA fundamental safety principles (INSAG-22)
- Fundamental safety principles (SF-1)
- Legal and governmental infrastructure for nuclear, radiation, radioactive waste and transport safety (GS-R-1)
- Organization and staffing of the regulatory body for nuclear facilities (GS-G-1.1)
- Establishing a national nuclear installations safety infrastructure (DS424)

Approaches to developing regulatory infrastructure and constituents of the infrastructure can be derived from the above documents. Detailed check items and evaluation guides also can be made from the views of relevant organizations. These kinds of works could be discussed and implemented within international forum such as Asian Nuclear Safety Network (ANSN) or through a series of workshops organized by an IAEA TC project. It should be noted that since regulatory infrastructure covers a wide range of issues, discussions should be made in such a way to deal with cross-cutting issues and over-arching theme of regulatory infrastructure.

3. Strategic Approaches

Regulatory infrastructure can be established by a leapfrog approach like the commercial transaction of Turn-Key project. However, it can't be totally copied or transferred from vendor country into importing country, because the legislative and governmental frameworks are different. In addition, each country has its own unique culture and personal characteristics, which will affect the establishment of safety culture. Regulatory framework should reflect the country's legal, institutional and cultural factors in a way that contributors to safety are included and obstacles to safety are excluded.

Thus, the focus should be on how to embed the mechanism of continuous improvements in safety and how to promote the use of best practices; how to nurture competencies necessary to operate the institutionalized systems; and how to respond to non-routine safety significant events. These lead to the following topics: institutionalization of regulatory system, education and training system, and establishment of partnership with experienced regulatory bodies.

2.1 Institutional Approach to Regulatory Infrastructure

It is an old discourse whether regulatory authority should require licensees to continuously improve or simply to maintain safety. In practice, most regulatory bodies require improvements to be made to correct deficiencies and development in the state of the art of the relevant science or engineering to be adopted either in the safety standards or in the operating practices. On the other hand, regulatory stability and predictability are also important for successful implementation of nuclear power program.

Mechanism of improving safety continuously while maintaining regulatory stability needs an emphasis on institutional system as well as technical competencies. There is little doubt that the success and sustainability of meeting the two goals depends on strong institutions which ensure checks and balances of regulatory activities. Institutionalization of checks and balances make regulator independent, accountable, effective and mission-oriented. The system of checks and balances deserve consideration when establishing regulatory infrastructure.

3.2 Capacity Building Approach

Regulatory competency model described in the IAEA TECDOC-1254 is a good reference to set up a plan for education and training programs of regulatory body. Several international forum or network is available to get assistance for regulatory capacity building. Based on the competency requirements and training needs identification, a tailored training program could be designed, in which the followings have to be covered at least:

- Nuclear law
- Organization of regulatory body
- International treaties and conventions
- Nuclear safety policy
- Development of technical standards and guides
- Establishment of safety culture
- Utilization of industrial infrastructure
- Safeguards and security

Workshop is more appropriate format to deliver this kind of training so that action plan of infrastructure development could be made during the workshop.

3.3 Partnership Approach

Senior Regulators discussed safety infrastructure at the Senior Regulators Meeting held within the auspices of the 52nd General Conference of the IAEA, 2008. They identified several important aspects regarding establishment of a national nuclear installations safety infrastructure. Among them, the need to establish "partnerships" with the regulatory body of buyer countries was signified.

Partnership can be defined as a commitment to a way of co-operation; it is about finding ways to sustainable and harmonized development with each other, while valuing diversity; it recognizes and embraces the interconnectedness of all the participating organizations; it recognizes the interdependence of all roles, seeks effective and respectful ways to support each role, and values participatory processes.

It should be noted that, in business term, more liable relationship is assumed for partnership than strategic alliance; i.e. partners within partnership may share profits or losses.

In terms of nuclear safety regulation, all the regulatory bodies in the world bear responsibility for assuring a higher level of nuclear safety through international instruments. Several options may be construed to conclude partnership. Through well-designed partnership program, new entrant countries may jump on to mature level of infrastructure and can respond to non-routine events. Partners can share:

- Safety culture of regulatory body
- Supporting experts and peer review results
- Safety review with the assistance of expertise
- Joint activities for regulatory inspection
- Development of safety codes, regulations, guides and standards
- Education and training
- Public communication practices

Figure 1 show an example of partnership model which is adopted from Korean Peninsular Energy Development Organization (KEDO)'s LWR project model. Vendor country's regulator supports import country's regulator through safety review and inspection and provides education and training. Regulatory staff of import country is invited to participate in these activities for building up competence. Partnership may be concluded with other countries in stead of vendor country. If import country wants to choose partner through international bids, then it is the case of Egypt's call for international consultants.

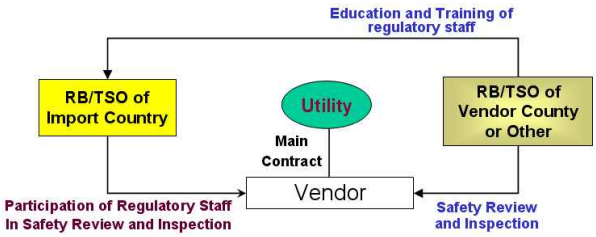

Figure 1. Partnership Model for Regulatory Infrastructure

4. Conclusions

It is well recognized that the early establishment of nuclear safety infrastructure is very important. Particularly important is the support for regulatory capacity, as operators receive significant assistance from vendors, while the regulators do not. To help build up the capacity, it is necessary to enhance bilateral, regional and international cooperation. Ways of organizing support need to be elaborated in terms of legal suitability and implementation possibility, which entails strategic approaches indeed.

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