

Comparative analysis of regulatory strategies for assuring safety in new entrant countries to nuclear power program

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1. Introduction

A large number of countries are willing to have new nuclear power plant (NPP) by the next few decades for electricity production without previous experience with NPP. Although they meet minimum required safety standard set by IAEA but to achieve the operating excellence in a more internationally coordinated manner still they need further efforts to improve their national regulatory safety strategy. Being taken proper initiatives towards retransformation of existing regulatory strategy based on well reputed internationally standard regulatory strategies could play significant role for assuring safety in new entrant countries. In this paper, regulatory frameworks and strategies of four regulatory bodies (USA, ROK, France and Japan) are considered and analysed. Advice from international organizations is summarized. The paper concludes with summary recommendations for best practice.

2. Nuclear safety regulation strategy

The nuclear safety regulatory strategy is to regulate nuclear installations in such a way that nuclear facilities are operated at all times in an acceptably safe manner including the safe conduct of decommissioning activities. The nuclear regulator's responsibility is to oversee the operator's activities in order to assure that the facility is operated safely.

3. Safety challenges at early stage

Developing an effective regulatory strategy for ensuring safety in nuclear installation is a time dependent program. The fulfillment of present safety obligations is challenging for the existing nuclear countries and will likely be even more challenging for many of the new entrants. The new entrants should understand that their responsibilities are extensive and endure throughout the life of the NPP. The international regulatory community should assist in developing a new entrant's regulatory competence.

More recently, a number of regulatory bodies have started to develop more systematic ways of measuring, recording and analysing safety information in order to arrive at a more quantitative

and transparent assessment of the safety level achieved. The principal advantages of using such a systematic approach are that it gives an objective, transparent and reproducible snapshot of the safety performance of a facility or a licensee, it provides a basis for trending safety performance at individual facilities, and it assists the regulator in setting safety priorities for future regulatory actions. In addition, it should improve the efficiency of the regulator and, if applied correctly, it should also make the regulator more effective.

4. International standard factors for assuring safety

Many safety related events particularly the accidents of Three-Mile Island and Chernobyl and the Post-Cold-War context and present growing concern of general public have driven most nuclear countries in recent years towards improved international policy coordination.

At the international level, the International Atomic Energy Agency (IAEA) and the Nuclear Energy Agency (NEA) are the main organizations generating nuclear regulations. The IAEA is a United-Nation autonomous body, while the NEA is an Organization for Economic Cooperation and Development (OECD) agency. All countries under review in this paper participate in both forums. At the regional level, some regulators have gathered into associations to share best practices. The Asian Nuclear Safety Network (ANSN) is based on a common understanding that communicating, exchanging, pooling, analysing and sharing the existing and new knowledge and practical experience in the field of nuclear safety is an essential tool to facilitate sustainable nuclear safety activities, to establish, improve and maintain nuclear safety infrastructures and to achieve a high level of safety of nuclear installations in the Asian region.

The international binding agreements: (i) the Convention on Nuclear Safety (1994) (ii) The Paris Convention (1960). The international non-binding standards set by the IAEA: Safety Fundamentals on The Safety of Nuclear Installations, Safety Requirements, particularly on the Legal and Governmental Infrastructures for Nuclear Radiation, Radioactive Waste and Transport Safety (IAEA GS-

R-1 2000) and its related Safety Guide on Organization and Staffing of the Regulatory Body for Nuclear Facilities (IAEA GS-G-1.1 2002), Most countries have integrated all these factors. However, these requirements are not prescriptive and national differences are expected and accepted.

5. National regulatory system

Republic of Korea: Ministry of Education, Science and Technology (MEST) is responsible for nuclear regulatory decision making.

Japan: The Prime Minister's Nuclear Safety Commission (NSC) has full power for evaluating Nuclear and Industrial Safety Agency (NISA) decisions. *USA:* The Nuclear Regulatory Commission (NRC) is absolutely independent from the government. The US President appoints the commission's chairman who is confirmed by the Senate. *France:* Nuclear Safety Authority (Autorite de Surete Nucleaire - ASN) - an independent body with five commissioners.

It is noticed that the independence of the French ASN is constitutionally weaker than that of the US NRC.

6. Analysis of safety regulation strategies

USA and Korea both, use risk-informed and performance based regulation and adequate safety culture policies toward continuous improvement as well as to maintain high level of safety which led them to achieve more effective regulatory efficiency compare to France and Japan although they are in way to implement risk-informed regulation strategy together with traditional deterministic approach. It is noted that Korea achieved excellent regulatory capacity in a short period of time compare to others being taken a decision to build a Safety Expert Organization (KINS) under regulatory body. NRC has enhanced safety as well as safety culture initiatives significantly after Three Mile Accident-1979 (TMI) accidental experience. France recently reformed its regulatory body and many safety initiatives are in consider rather than in implementation whereas Japan's safety directives are more declined to research based rather than assessing evaluation reports prominently.

7. Best Practice in Regulation Strategy for New Entrants

It is advisable to have an independent regulatory organization. The structure of regulatory organizations appears to be greatly dependent on the extent of government's direct involvement in nuclear policy and the regulatory organization is usually integrated within the government and is found relatively weak.

It is also advisable that the nuclear safety regulatory organization be a specialized expert agency. Nuclear regulators should consult extensively with external expert bodies.

The new entrant should take the opportunity from all possible channels offering assistance available as well as applicable to them. International organizations, including in particular the IAEA, provide training and review services that are tailored to the needs of new entrants. Harmonization of safety standards with IAEA and advanced countries should be in place at the early stage.

Finally, it is recommended that risk-informed and performance based regulation strategy should be in place step by step as it help to quantify the safety and identify points where and how extent of measures to be needed to maintain acceptable level of safety nationally as well as internationally.

8. Conclusion

It may very helpful to incorporate international best practice in national nuclear safety strategy. The international cooperative activities should be taken as an opportunity to improve all regulatory processes. In this way, I trust improved policy procedures may be identified.

After reviewing the national regulatory systems of four developed countries with nuclear power experience, and their common international basis, I put forward recommendations for building a reference regulatory system in new entrant countries. The regulatory organization influences the perception by the public and environmental groups of regulatory and political decisions. I recommend therefore the creation of an independent specialized regulatory body. It should consult extensively with other expert bodies as a way to ensure the soundness of its decisions.

This paper hopes to improve the effective implementation of nuclear regulatory strategy by examining what those involved in nuclear safety can learn from each other's practices.

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