

## **Study on the Nuclear Safety Strategic Plans and Priority Activities in the International Atomic Energy Agency and Regulatory Bodies in Major Nuclear Countries**

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### **1. Introduction**

A strategic plan defines organization's vision for the future and presents its goals and specific measures to reach their goals. It is a road map for guiding decision making and also for evaluating progress and changing approaches when moving forward. As various nuclear safety issues, such as follow-up measures and lessons learned from the Fukushima Daiichi nuclear accident, the aging management and life extension of nuclear facilities, advanced types of reactors, safe disposal of radioactive waste emerge as global challenges, the International Atomic Energy Agency (IAEA) and regulatory bodies of each country have established and developed a strategic plan to effectively respond and achieve a given vision and mission. In this study, we identified the high-priority regulatory issues, challenges, and future tasks of the IAEA and regulatory bodies in major countries by analyzing their strategic plan.

### **2. IAEA Nuclear Safety Review**

The IAEA Nuclear Safety Review includes global trends and the agency's activities for the year and presents priorities and related activities for the following year. This publication gives a general idea of how the international nuclear safety and regulatory environment has changed and how it will evolve in the future. As shown in the table I, the Nuclear Safety Review 2017 consists of four chapters related to nuclear safety: (1) General Safety Areas, (2) Strengthening Safety in Nuclear Installations, (3) Improving Radiation, Transport, and Waste Safety, and (4) Strengthening Emergency Preparedness and Response.

In General Safety Areas, the IAEA set a priority of the revision of safety standards and the strengthening of peer review and advisory services. It is expected that the IAEA will continue supporting member states in establishing, implementing, and improving their management systems to ensure the safe, and reliable operation of nuclear facilities, particularly in developing a safety-oriented culture.

As the median age of nuclear power plants connected to the grid worldwide is increasing, aging management has become an important issue in ensuring the availability of required safety functions throughout service life. Under these circumstances, the IAEA will focus on improving programs for aging management and the safe long-term operation of nuclear facilities, including programs such as the Safety Aspects of Long

Term Operation (SALTO) peer review service and International Generic Aging Lessons Learned (IGALL) program. In addition to existing nuclear power plants, there are approximately 50 small and medium-sized or modular reactor (SMR) designs under development worldwide, and several countries are expressing an interest in developing SMRs in the future. The IAEA will therefore make an effort to develop design-related safety requirements to SMR designs, including the application of passive safety features as well as factory construction and inspection techniques.

The wider use of the application of radiation and radioactive substances and the increased use of sealed radioactive sources demands regulatory oversight, including additional needs for IAEA guidance and assistance. In the Nuclear Safety Review, the IAEA stressed that it is committed to continuing its support of member state in efficiently managing radioactive sources with the application of its Code of Conduct on the Safety and Security of Radioactive Sources. Also, the IAEA will prioritize activities regarding the safe management of radioactive waste, including geological disposal of high-level waste and the development of decommissioning strategies and plans.

As for improving capacity of emergency preparedness and response, the IAEA is expected to continue supporting member states by implementing its Emergency Preparedness and Response (EPR) exercise on an international level as well as develop operational arrangements for notification, reporting, and requesting assistance in nuclear and radiological incidents and emergencies.

### **3. USNRC Strategic Plan 2018-2022**

The Strategic Plan 2018-2022 of Nuclear Regulatory Commission (NRC) summarized in the table I describes how the NRC plans to achieve two strategic goals: (1) ensure the safe use of radioactive materials and (2) ensure the secure use of radioactive materials for the next four years. This plan provides an overview of the NRC's responsibilities and lays out the objectives, strategies, and key activities that will be used to achieve the strategic goals.

The strategic plan is broken down into eight safety strategies, each with a list of contributing activities. Safety Strategy 2 stresses the NRC's effort to improve further risk-inform the current regulatory framework in response to advances in science and technology, policy decisions, and other factors. As the NRC is advancing

Strategic Plan	Strategic Tasks / Priority Activities
IAEA Nuclear Safety Review 2017	<p>Strengthening general safety areas</p> <ul style="list-style-type: none"> <li>• Strengthen Safety standards using lessons from the Fukushima accident and taking into account the Vienna Declaration</li> <li>• Strengthen Peer review and advisory services</li> <li>• Strengthen leadership and management of nuclear safety activities and in fostering a strong safety culture</li> <li>• Strengthen processes for communicating radiation risks to the public</li> </ul> <p>Improving Radiation, Transport and Waste Safety</p> <ul style="list-style-type: none"> <li>• Management of radioactive sources with effective application of the Code of Conduct</li> <li>• Building capacity for the safe transport of radioactive material</li> <li>• Safe management of radioactive waste and the development of decommissioning strategies</li> </ul> <p>Strengthening Safety in Nuclear Installations</p> <ul style="list-style-type: none"> <li>• Improving ageing management and the safe LTO programs</li> <li>• Facilitating the OEF</li> <li>• Application of safety standards relating to the evaluation of external events</li> <li>• Strengthening severe accident management guidelines</li> <li>• Developing safety requirements for SMR design and safety assessment;</li> </ul> <p>Strengthening Emergency Preparedness and Response</p> <ul style="list-style-type: none"> <li>• Implement international EPR exercise program and support national EPR exercise</li> </ul>
USNRC Strategic Plan 2018-2022	<ul style="list-style-type: none"> <li>• Safety Strategy 1: Maintain and enhance the NRC’s regulatory programs, using information gained from domestic and international operating experience, lessons learned, and advances in science and technology</li> <li>• Safety Strategy 2: Further risk-inform the current regulatory framework in response to advances in science and technology, policy decisions, and other factors</li> <li>• Safety Strategy 3: Enhance the effectiveness and efficiency of licensing and certification activities to maintain both quality and timeliness of licensing and certification reviews</li> <li>• Safety Strategy 4: Maintain effective and consistent oversight of licensee performance with a focus on the most safety-significant issues</li> <li>• Safety Strategy 5: Maintain material safety through the National Materials Program</li> <li>• Safety Strategy 6: Identify, assess, and resolve safety issues</li> <li>• Safety Strategy 7: Maintains readiness to respond to incidents and emergencies</li> <li>• Safety Strategy 8: Verify that nuclear facilities are constructed and operated in accordance with permits and licenses and that the environmental and safety regulatory infrastructure is adequate to support the issuance of new licenses</li> </ul>

Table I: Priorities and Related Activities of IAEA Nuclear Safety Review 2017 and USNRC Strategic Plan 2018-2022

the use of risk-information in regulatory decision-making and processes, several related initiatives and activities, such as the NRC’s Risk Informed Steering Committee, and risk-informed improvements to standard technical specifications are expected to continue in order to provide strategic direction to the NRC staff in advancing the use of risk-informed decision-making in licensing, oversight, rule-making, and other regulatory areas in the future.

The NRC launched Project Aim with the intention of right sizing the agency while retaining the skill sets needed to accomplish its mission and function more efficiently. One of the changes described in the Project Aim is improving timeliness in regulatory decision-making and responding quickly to changing conditions. In this context, Safety Strategy 3 focuses on enhancing the effectiveness and efficiency of licensing and certification activities to maintain both the quality and timeliness of licensing and certification reviews.

Safety Strategy 4 emphasizes the importance of developing and maintaining an effective nuclear safety culture for all NRC-regulated activities. The NRC has long recognized the importance of positive safety culture, so as part of this effort the NRC has defined its safety culture policy statement outlining its expectation that all licensees maintain positive safety culture at their facilities. In addition to the safety culture for the licensees, the NRC has conducted a triennial Safety Culture and Climate Survey to assess the effectiveness of new and existing safety culture efforts by the NRC.

Safety Strategy 8 specifies contributing activities to ensure that the safety regulatory infrastructure is established properly to respond to new environmental changes and support the issuance of new licenses. According to this strategy, the NRC is committed to its effort to incorporate lessons learned from construction, licensing, and research activities into design

certification, combined licensing, and early site permits for SMRs, non-light water reactor (non-LWR), for other new and advanced design technologies.

#### 4. UK ONR Strategic Plan 2016-2020

Within the next few years, the United Kingdom is expected to respond to significant changes in the nuclear sector, including the construction of Hinkley Point C, its first nuclear power station in over 25 years, the potential introduction of new nuclear technology, continued progress with the clean-up of the nuclear legacy, the start of the largest decommissioning project in Europe, and the potential extension of operations of first-generation nuclear facilities. In respond to these challenges, the regulatory body in UK, the Office for Nuclear Regulation (ONR), modernized in 2014 as an independent nuclear regulatory authority and public corporation under the Energy Act 2013. After its establishment, the ONR set out a strategic plan that provided a view of the ONR’s intentions for the years 2016 to 2020 along with details of planned activities considering international and domestic factors. The

(GDA) for the UKHPR 1000. Within the time frame of this strategic plan, the ONR is expected to focus on activities to determine whether UKHPR1000, a new reactor design from China, meets safety and security standards to make it suitable for use in the UK, along with the regulating construction of two nuclear power plants.

There is a growing issue related to the regulation of aging management of Advanced Gas cooled Reactors (AGRs) including graphite weight loss and cracking of graphite bricks in the UK. Therefore, aging management programs in the areas of structural integrity and control and instrumentation will remain the ONR’s on-going top priority in the future.

An additional area of challenge is the potential for counterfeit or fraudulent items to enter the nuclear supply chain. Therefore, the ONR has stressed their active participation in collaborative international working groups established to share supply chain good practices and mitigate such risks in strategic plans.

Several first-generation nuclear facilities in the UK are in the defueling and decommissioning phases of their life cycle. Throughout these phases, the ONR will

Strategic Plan	Strategic Tasks / Priority Activities
UK ONR Strategic Plan 2016-2020	<ul style="list-style-type: none"> <li>• Modernizing nuclear regulation</li> <li>• Hazard reduction and remediation at Sellafield’s legacy facilities</li> <li>• Preparing for new nuclear generation, civil and defense</li> <li>• Regulating existing civil reactors</li> <li>• Regulating decommissioning and disposal</li> <li>• Placing stakeholders at the heart of what we do</li> <li>• Providing assurance</li> </ul>
Japan NRA 1st Medium-term target 2015-2020	<ul style="list-style-type: none"> <li>1.1 Ensuring the independence, neutrality and transparency of the nuclear regulatory administration</li> <li>1.2 Continuous improvement of organizational frameworks and operations</li> <li>1.3 Partnership and cooperation with other countries and international agencies</li> <li>1.4 Legal support for the Fukushima Daiichi Accident</li> <li>2.1 Continuous improvement of the regulatory system according to the Reactor Regulation Act</li> <li>2.2 Strict and appropriate implementation of regulations regarding Reactor Regulation Act and the Prevention of Radiation Hazards Act</li> <li>2.3 Efficient collaboration between nuclear safety and nuclear security</li> <li>3.1 Monitoring efforts toward decommissioning of the Fukushima nuclear power plant</li> <li>3.2 Analysis of the Fukushima Daiichi Accident</li> <li>3.3 Monitoring Post of Fukushima Daiichi Accident</li> <li>4.1 Continuous improvement of regulatory standards based on the latest scientific and technical knowledge</li> <li>4.2 Accumulation of the latest scientific and technical knowledge through the implementation of safety research and etc.</li> <li>4.3 Establishing and developing the system for HRD</li> <li>5.1 Enhancing radiation protection measures</li> <li>5.2 Enhancing and strengthening crisis management systems</li> </ul>

Table II: Strategic Plan 2016-2020 of UK ONR and the 1st Medium-term target 2015-2020 of Japan NRA

major strategic tasks of ONR are listed in the table II.

In 2017, the ONR and Environmental Agency started the second stage of the Generic Design Assessment

concentrate on ensuring that the decommissioning of nuclear facilities is carried out safely and securely.

## **5. Japan NRA Medium-term Target 2015-2020**

After the Fukushima Daiichi accident, the nuclear regulation regime was reformed, the Reactor Regulation Act and related legislation were revised, and the Nuclear Regulatory Authority (NRA) was established in 2012. The Medium-term Target 2015-2020, which is summarized in the table II, is the first medium-term strategy of the NRA, presenting its action policy for five years.

Action Policy 1 highlighted the NRA's strategic measures to ensure the independence, neutrality, and transparency of nuclear regulation administration. In this regard, various efforts have been made by the NRA, including independent decision-making from scientific and technological viewpoints, the rigorous operation of codes of conduct, and the establishment of accountability through the public disclosure of full details related to regulations such decision-making processes.

The IAEA Operational Safety Review Team (OSART) Mission and Integrated Regulatory Review Service (IRRS) have already been conducted in Japan, and the NRA is planning to invite the Emergency Preparedness Review (EPREV) service within the time frame of its Medium-term Target. It underlines that the NRA will make an effort to assess and improve its regulatory system and organizational framework through international peer review and advisory service, as outlined in in Action Policy 1.

The Japanese Basic Energy Plan, approved in July 2018, presents nuclear power as "an important base-load power source contributing to the stability of the long-term energy supply-and-demand structure," and affirms that necessary measures will be taken to achieve a nuclear power share of 20-22%. In response to the energy plan and the government's policy to restart nuclear power plants, the NRA will focus on assessing whether the reactor meets the enhanced regulatory requirements to resume operation, including the back-fitting system, conformity review, and pre-service inspection.

Another challenge for the NRA will be a new inspection system which will be launched on a trial basis in October 2018. A reform of the inspection system was suggested by international experts during the IRRS Mission in Japan in 2016. To this end, the NRA drew up a bill to reform nuclear regulations that will seek to clearly define licensees' safety responsibilities and establish new inspection programs which can flexibly set inspection areas and contents according to the magnitude of risk, covering every safety activity by licensees. Inspections will be conducted using the new process for a trial period lasting until March 31, 2020, followed immediately by the complete implementation of the process in the NRA's inspections. The NRA is expected to allocate

considerable regulatory resources to stabilize this new inspection system by 2020.

The Fukushima Daiichi nuclear power plants were designated as Specified Nuclear Facilities by the NRA, and based on the TEPCO's Implementation Plan, specialized safety measures are implemented under the oversight of the NRA. In addition to this, the NRA set a mid-term risk reduction target map in order to clarify items to be solved, with a priority on safety. In the Medium-term Target 2015-2020, the NRA highlighted their on-going and future activities for the safe decommissioning of the Fukushima Daiichi nuclear power plant including providing information the international community with situations related to decommissioning and clean-up activities.

## **6. Conclusion**

As with other foreign regulatory organizations described earlier in this study, the Korea Institute of Nuclear Safety (KINS) has periodically established its medium- and long-term management goals and strategies to present their strategic tasks and specific plans. In line with this, the international cooperation team of the KINS has developed a mid-term strategy for international cooperation to ensure that relevant activities are carried out in alignment with KINS management goals and strategic directions.

The Second Mid-term Strategy for International Cooperation, covering the years 2017 to 2019, was established in 2016 presenting strategic goals; (1) future demands for technical cooperation; (2) strengthen the strategic function of international cooperation; (3) strengthen international competence and infrastructure. And the performance and effectiveness of the strategic tasks which were carried out between 2017 to 2019 are currently being analyzed.

The Third Mid-term Strategy for International Cooperation 2019-2021 will be developed in 2018. The results of this study including strategic plan of other regulatory bodies, overseas regulatory policies, and global cross-cutting safety issues will be reflected into the Third Mid-term Strategy as an environmental factor.

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