

Chapter 1

Background and Purpose

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Chapter 1

Background and Purpose

1.1. Background

Many natural disasters hit Asian countries every year, some of which cause serious damage. A huge typhoon hit the Philippines in September 2018 and a magnitude 7.5 earthquake in Sulawesi Island, Indonesia in October 2018 caused much loss in terms of population and the economy.

Several countries in Asia are considering the introduction of nuclear power to meet the rapidly increasing energy demand. If nuclear facilities are damaged by natural disasters, there is a high risk of more serious damage than from other facilities, such as the release of radioactive materials.

Therefore, promoting information sharing to prepare for natural disasters in nuclear facilities in Asia is extremely important to construct best practices for securing safety and resilience – not only in countries that introduce nuclear power but also in neighbouring countries.

The United States (US), which has the largest nuclear power capacity in the world, and Western European countries have accumulated abundant knowledge of and experience in dealing with natural disasters. Most of this information is accessible at the library of the Nuclear Energy Agency (NEA) of the Organisation for Economic Co-operation and Development (OECD). For example, the Working Group on External Events in the NEA focuses on external hazards of common interest amongst NEA member countries.

Japan, the first OECD member state in Asia, introduced nuclear technology from the US in the early 1960s and has learned a lot about preparing nuclear facilities against natural disasters from advanced countries in Europe as well as the US. It would also be useful for non-OECD Asian countries to learn knowledge, experiences and lessons from the US, European countries, and Japan for considering introduction of nuclear power in the future.

1.2. Purpose

The conditions common to and necessary for securing the resilience of nuclear facilities will be put in order and analysed. The type of actions the operator, central government, and safety authorities in the region should take, as well as the requirements for securing resilience, will be summarised in the policy proposal. Good practices from OECD countries will also be considered for developing the best practice for establishing their nuclear policies in Asia in the future.

1.3. Study Methods

1) Literature Survey

The Institute of Energy Economics, Japan (IEEJ) collected information and analysed the measures taken at nuclear facilities by safety authorities, operators, vendors, suppliers, and engineering experts in nuclear industries in OECD countries against natural disasters.

2) Hearing Survey

The IEEJ has chosen the following countries as the study cases because;

- The US has the largest nuclear power capacity in the world and has experienced varieties of severe natural disasters. After the disaster caused by the hurricane Katrina in 2005, the US reviewed National Preparedness Goal for improving and strengthening national preparedness based on lessons learned from the disaster of the hurricane.
- The United Kingdom (UK) has fewer natural disasters. However, it experienced a large-scale flood in 2007. As a result of increasing attention to the need of critical infrastructure protection, the law structures have been reviewed for incorporation of lessons learned from the flood disaster.
- France experienced an incident at the nuclear power plant (NPP) caused by a flood in 1999. After that, all NPPs in France have been examined their design against flooding and operation instruction under the parliament order. Furthermore, Autorité de sûreté nucléaire (Nuclear Safety Authority: ASN) as part of an inspection of French nuclear industry called on Electricité de France (EDF) for founding of Force d'Action Rapide du Nucléaire (Nuclear Rapid Action Force: FARN) to increase safety after Fukushima Daiichi Nuclear Power Station (NPS) Accident.

The IEEJ made a research visit to the US, the UK, and France, in advance to the workshop (explained in detail later), to interview experts in nuclear-related entities for further analysis and identification of best practices. The issues researched were as follows:

- Review of the abundant knowledge of and experience in measures against natural disasters that the US, the UK, and France have accumulated.
- Review of the measures at nuclear facilities against natural disasters having been taken by safety authorities, operators, vendors, suppliers, and engineering experts in the nuclear industry in the US, the UK, and France.

Based on the above research issues, the IEEJ posed the following questions to authorities, research institutes, and experts in the US, the UK, and France:

- US
 - Regarding the emergency preparedness and response of nuclear facilities to natural disasters, the Nuclear Regulatory Commission (NRC) website states that 'our emergency preparedness programs enable emergency personnel to rapidly identify, evaluate, and react to a wide spectrum of emergencies' and that 'our incident response program integrates the overall NRC capabilities for the response and recovery of radiological

incidents and emergencies involving facilities and materials regulated by the NRC or an Agreement State' (NRC, 2018). How have all these programs been constructed, governed, and operated?

- After Fukushima Daiichi NPS Accident in 2011, the Nuclear Energy Institute (NEI) developed a "Guideline for Assessing Beyond Design Basis Accident Response Staffing and Communications Capabilities" (NEI, 2012), outlining the process to be used by licence holders to define and deploy strategies that enhance their ability to cope with conditions resulting from 'beyond design basis' external events. How did they agree to comply with these guidelines?
- In 2017, the US Department of Energy (DOE) started discussions on evaluating the stability and resilience of the electricity system against extreme events, including natural disasters, with numerous related parties. Are these indicators to evaluate the resilience suitable and appropriate? Can they be adapted to Asian developing countries?
- In emergencies, the NRC dispatches expert teams to the site to evaluate the progression of the accident and to verify recommendation to local governments are adequate. How NRC and/or the stakeholders put together their opinions? In Title 10 of the Code of Federal Regulations (CFR) 50 and US Nuclear Regulatory Commission Regulation guidance (NUREG) stipulated the responsibilities and roles of the federal government, local governments, and private companies. However, it is unclear which law stipulates these responsibilities or roles. Which law stipulates these responsibilities or roles (the National Infrastructure Protection Plan (NIPP) or The Sector-Specific Plans)?
- UK
 - "The Strategic Framework and Policy Statement on Improving the Resilience of Critical Infrastructure to Disruption from Natural Hazards" (Cabinet Office, 2010b) is primarily directed at central government departments, regulators, relevant public sector bodies, and critical infrastructure owners. It describes the policy intent, scope, aims, work streams, and timescales of the Critical Infrastructure Resilience Programme. How has this program been constructed, governed, and operated?
 - "Keeping the Country Running: Natural Hazards and Infrastructure" (Cabinet Office, 2011) is a guide to support infrastructure owners and operators, emergency responders, industry groups, regulators, and government departments to improve the resilience of critical infrastructure and essential services. How did infrastructure owners and operators, emergency responders, industry groups, regulators, and government departments agree to comply with these guidelines?
 - The floods in 2007 and more recent events have highlighted the vulnerability of the UK's national infrastructure and essential services. Following such events, the UK has started to build resilience in its infrastructure to reduce its vulnerability to natural hazards. What process to build resilience and state are contributed to public health in the UK, including stakeholder involvement?
Under the "Revised requirements for radiological protection: emergency preparedness and response" (Government of the UK, 2018), a guide to the Radiation (Emergency Preparedness and Public Information) was established. In emergencies, "the London

Resilience Partnership Strategic Coordination Protocol” stipulates measures based on discussion (London Resilience Group, 2017). Have these measures worked so far, and how has their effectiveness been evaluated?

- The Civil Nuclear and Resilience Directorate (CNRD) in the Department for Business, Energy and Industrial Strategy (BEIS) developed a guide for applicants “Civil Nuclear & Resilience, Candidate Pack” (BEIS, 2017) for recruiting talented, highly motivated people. What are the major responsibilities and roles of the UK Cabinet Office, ministries, and private companies regarding human resource management?
- France
 - As parts of inspection of France’s nuclear industry following Fukushima Daiichi NPS Accident in 2011, the Nuclear Safety Authority (ASN) called on Electricité de France (EDF) to establish the Nuclear Rapid Action Force (FARN) to increase safety – providing emergency support, in terms of personnel and equipment, at any nuclear power plant in France within 24 hours. How was this program constructed, governed, and operated?
 - FARN consists of headquarters in Paris and other offices at NPP sites. How does the operator/supplier put together their opinions? What is the evaluation of this program?
 - French nuclear industry experienced flooding at Blayais Nuclear Power Plant in 1999 due to a severe storm. What kind of discussions were raised following the event and what was changed in the Emergency Preparedness and Response Programme?
 - In the UK, the Department for BEIS developed a guide for applicants for recruiting talented, highly motivative people (BEIS, 2017). Does the French government have a similar process? If so, which authority deals with it?
 - The UK stipulates the responsibilities and roles of the Cabinet Office, ministries, and utilities. Does France designate clear responsibilities and roles for ministries and utilities?

3) Workshop

Energy policymakers and government officials in ASEAN countries and in Japan, experts from the US, and the IEEJ held a workshop on 13th December 2019 to share information, discuss, and identify best practices for measures against natural disasters.

In the workshop, the IEEJ and experts in the US and in Japan provided information on measures taken against natural disasters in OECD countries. Then ASEAN member countries which consider introduction of nuclear power gave presentations about natural disasters in each country.

4) Compiling Best Practices

The IEEJ compiled the best or good practices from the literature survey, hearing survey and the workshop to share with participants to secure the resilience of nuclear facilities against natural disasters, in cooperation with experts in nuclear-related entities in OECD countries.