

## Restarting of Nuclear Power Plants and Strengthening Safety in Japan

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### 1. Introduction

Japan in 2011 Fukushima accident decided to stop the operation of all nuclear power plants, but faced realistic problems such as lowered energy supply stability, increased electricity rates, and increased CO<sub>2</sub> emissions. In order to solve these problems METI<sup>1</sup> was approved '3E + S' on the 4<sup>th</sup> Basic Energy Plan and decided to restart the nuclear power plant.

The restart would be based on improved safety. This means 'technical safety' which applies New Regulatory Standards by NRC, and 'social security' such as local government agreements by nuclear power operators.

This paper examines how Japan improved the technical safety and social security of nuclear power plants after Fukushima accident, and draw policy implications for Korea Nuclear policy.

### 2. Energy situation and restarting of nuclear power plants in Japan

Japan in 2016 produced 1025.3 TWh of electricity, 869.8 TWh from fossil fuel, 137 TWh from renewables; hydro, solar, wind, and 18 TWh from nuclear. The percentage of power from fossil fuel had risen from 63.4% to 84.8% over five years, and the increased fuel imports cost due to nuclear shutdowns was JPY 1.7 trillion in FY2010 to JPY 2.7 trillion in FY2014.

This provoked a strong and wide reaction from industry, with a consensus that 20-25% nuclear was necessary to avoid very severe economic effects, not to mention high domestic electricity prices.

Then, the CO<sub>2</sub> intensity of Japan's power generation was increased up to 1395 million tons of CO<sub>2</sub> equivalent in FY2013, the highest since records began in 1990. Among Japan's climate change goals was for the electricity sector to reduce carbon intensity by 20% from 1990 levels, to 334 g/kWh CO<sub>2</sub> on average, over the five years from 2008 to 2012.

In the same context METI has suggested that renewables has at 22-24%, nuclear at 20-22% on the plan for Electricity Generation to 2030. It aims to reduce CO<sub>2</sub> emissions by 25% by 2030 from the 2013 level.

As a result, Currently 42 reactors are operable and potentially able to restart. Five reactors have restart to date, with the first two back online in August and October 2015. A further 21 reactors are in the process of restart approval.

### 3. Strengthening safety of nuclear power plants

In terms of technical safety, the NRC<sup>2</sup> set the 'New Regulatory Standards' for nuclear power plant in July 2013. The new safety standards are said to be more extensive than the two-stage test [Fig. 1] mandated for nuclear power plants in response to lessons learned the Fukushima accident. In order to enhance technical safety, the new standards have established or strengthened the existing safety standards with regard to severe accidents, terrorism, and natural disasters.

Also, in terms of social security, nuclear power facility operators and local governments conclude "Nuclear Safety Agreement (NSA)", so that local residents, related nuclear power companies, and local governments are playing important role in communicating the safety of nuclear facilities together.

Although the NSA is not legally regulation, it can flexibly reflect the characteristics of the local government and the demands of the times.

Sendai 1 was the first reactor to restart and connect to the grid, in mid-August 2015. Kyushu Electric Power had signed Nuclear Safety Agreements with local government to restart Sendai. The Safety Agreement is made up of local governments in the region of the nuclear power plant and surrounding areas, and is composed of contents reflecting the characteristics of the location of the nuclear power plant, although it is not legally binding, in addition to the government regulations for the protection of the health and property of the residents.

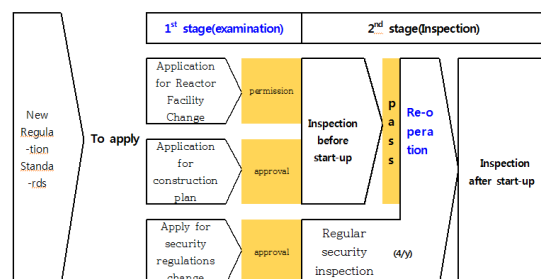


Fig. 1. New Safety Standard Application Process

<sup>1</sup> The Ministry of Economy, Trade and Industry

<sup>2</sup> Nuclear Regulation Commission

#### **4. Conclusions**

In Japan, not only 'technical safety' such as application of new regulatory standards for restarting nuclear power plants, but also 'social security' activities such as nuclear safety agreements concluded by local governments and nuclear power plants are important.

In particular, nuclear safety agreements are meaningful in that they contribute to increasing the flexibility and reliability of the needs of residents and local government in the area where nuclear facilities are located. In addition, the technical safety of nuclear power is a reasonable standard for judging the restart, as can be seen from the court's decision to dismiss some residents in a lawsuit against restart. This suggests that nuclear safety requires a balanced approach to technical safety and social security.

In terms of 'technical safety', Korea has established and implemented measures for 50 improvements such as stress testing of all domestic nuclear power plants and structural safety by earthquake immediately after the Fukushima accident. And in October 2011, the Korean government launched the Nuclear Safety Commission to ensure the independence of safety regulations, and is working to strengthen the nuclear safety law for the management of serious accidents and to improve the system. And in the aspect of 'social security', local governments and related companies are cooperating to reflect local characteristics.

Therefore, in order to secure the credibility of nuclear power, it will be necessary to make continuous efforts to improve understanding of nuclear safety by strengthening public relations activities such as transparency of nuclear and correct information transmission.

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