

Legislations and Policies in the “Nuclear Renaissance” Era; Cases of the United States, France and Japan

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1. Introduction

Over the recent several years, climate change has sparked a revival of nuclear energy globally. The so-called “nuclear renaissance” brought about active legislations and policy-makings in countries. The United States, France and Japan are, among others, at the forefront in transforming the old institutions of the nuclear establishment, such as long and costly licensing process. Life extension of operating power plants is also an issue in connection with the ever increasing electricity demand under net-zero policy. Securing low-carbon energy generation, restoring market influence, building supply chain and creating better jobs are security and economic drivers behind the recent legislative and administrative initiatives in those countries.

Examination of these three countries will shed light on what Korean legislators and policy-makers have to consider in shaping future energy and nuclear strategy. By studying recent cases of legislation and policy in the United States, France and Japan, this paper will suggest common implications, which will hint how Korea’s competitors define competitiveness of future energy.

2. The U.S.: Making American Nuclear Great Again

The United States is leading the revitalization of nuclear energy in the Western Hemisphere. Since the inauguration in 2021, the Biden-Harris Administration differed from its predecessor in the approach to climate change and energy. On his first day in the office, President Biden declared the United States would be brought back into the Paris Framework [1], which necessitated substantially effective measures to reduce carbon emissions in the US industries and homes. Against this backdrop, nuclear energy made a return to play a role in the country, resulting in remarkable legislative and administrative measures.

Over the past years, a number of legislations and policy tools have been made to revive the aged nuclear fleet and restore the regressed nuclear industry. The Inflation Reduction Act included tax credit programs for existing fleet as well as deployment of new power plants. In June 2024 the Congress passed a milestone legislation, the “*Accelerating Deployment of Versatile, Advanced Nuclear for Clean Energy (ADVANCE) Act*”,

with bipartisan support. The Act highlights empowerment of regulators and improvement of process in making the US nuclear industry stronger. It includes substantial measures, such as giving more resources and roles to the Nuclear Regulatory Commission (NRC), easing restricted international investment into nuclear infrastructure, directing the NRC to make a better licensing process for coal-to-nuclear transition as well as new builds, lowering licensing fees for advanced reactors, and so on [2].

The Department of Energy (DOE) is another critical player in Washington’s efforts to take the global nuclear leadership back. In recent years, the DOE’s efforts have centered on development and deployment of advanced reactors, or small modular reactors (SMRs). Most importantly, the US advanced reactor developers are making bold progress in demonstration and deployment projects under the “*Advanced Reactor Demonstration Program (ARDP)*”. This year TerraPower, the US technology firm founded by Bill Gates, took the first step for construction of its innovative reactor, named *Natrium*, at an old coal power plant site in Wyoming. This is one of the ten projects funded by the ARDP. Another SMR firm, NuScale, is also making progress overseas, particularly in Romania and Poland, under the patronage of the US government.

Besides climate change, geopolitical consideration is making a strong case for nuclear enactment. While the Western countries are losing competitiveness in nuclear industries, Russia rapidly increased influence in the global nuclear market, both for new builds and fuel supply. As the US-Russia relations were breaking its lowest record, the Western reliance on Russian fuels sparked fresh concerns in Washington and its allies. In May 2024 the US Congress passed a bill that would bring an end to the decades-long import of Russian enriched uranium (“*Prohibiting Russian Uranium Imports Act*”) and the DOE is now supporting the industry to scale up enrichment capacity for HALEU (high-assay low-enriched uranium) production.

3. France: No Other Option But Nuclear

France had long been a frontrunner of nuclear energy in the European Continent before the introduction of the “*Energy and Climate Law*” in 2019. Under pressure from the Green Party and repercussion of the 2011

Fukushima Accident, President Hollande defined France as “nation of environmental excellence”, in his 2013 speech and declared energy transition mainly based on renewable energy [3]. In 2019, the French Parliament adopted the law providing share of nuclear power in electricity production (currently accounting for almost 75 %) to be reduced below 50 % by 2025.

President Macron, however, declared a dramatic turnaround in 2022, calling for “the most carbon-free, safest and most sovereign way” of electricity production. Stating that “we have no other choice but to bet on these two pillars (renewable and nuclear energy) at the same time”, he announced extension of existing fleet, building of six European Pressurized Reactor 2(EPR2) and study on the construction of eight EPR2 [4].

The presidential initiative was followed by a bill on “*Nuclear Acceleration*” passed by the French Parliament in May 2023. The bill revised existing legal framework regarding energy transition and licensing processes for nuclear power plants. First, it abolished the target of reducing the share of nuclear energy in power generation to 50% by 2025, as well as the limitation on the total capacity of nuclear power plants of the country. Second, it also directed the revision of “*PPE (programmation pluriannuelle de l'énergie)*”, a gradual shut-down program for 14 nuclear power plants. Third, the French government should report to the Parliament by the end of 2026 whether life extension of nuclear power plants beyond 60 years is feasible without compromising safety, health and environmental protection standards. Fourth, a number of licensing procedures for new nuclear plants are to be streamlined, enabling a faster and more cost-efficient licensing process for new builds [5].

4. Japan: Cautious Return of Nuclear to the Stage

Since the 2011 Fukushima Accident, strengthening safety and regulations characterized Japan’s nuclear policy. Although it is a natural result of disastrous accident, the ever strengthening of safety reviews resulted in de-facto suspension of a dozen reactors [6]. Furthermore, the 2012 amendment of nuclear regulation law set the operation period of nuclear power plant at 40 years allowing only one-time extension up to 20 years. Ten of operating reactors were to reach the operation period of 40 years by 2030, which would inevitably bring about challenging situation to the country.

Since the inauguration in 2021, Prime Minister Kishida and the ruling party have moved towards restarting of the dwindled nuclear power generation, as part of “Green Transformation (GX) Policy”. Although public concerns over safety issues remained, the Parliament passed the “GX Act” in May 2023, which allows operation of nuclear power plants beyond maximum lifespan of 60 years. This is marked as a huge transition from the post-Fukushima regime.

Under the new law, mandates regarding life extension of nuclear power plants is transferred from the Nuclear Regulation Authority (NRA) to the Ministry of Economy, Trade and Industry (METI). With the caveat that the NRA’s safety review is not exempted, operators will now request approval of METI (not the NRA) when an extension is needed. Extension beyond 60 years is made available by separating any off-line periods (caused by safety review, judicial injunction or administrative guidance) from the total service life [7, 8].

5. Implications and Common Features

The cases of the United States, France and Japan suggest three common pictures.

First, life extension of nuclear power plants are somehow considered seriously in the course towards carbon-free future. Nuclear energy is not a one-size-fits-all solution, as a matter of course. Still, if nuclear energy is an inevitable choice for carbon-reduction and energy security, life extension is the realistic way; construction of new nuclear plants typically takes more than ten years and construction costs are rising worldwide, that is a reason why extension of operational period will help the countries meet their net-zero goal in timely manner. While new builds promise future capacities, existing fleet will continue working to fill the gap between carbon-free energy demand and supply.

Second, nuclear industries will face a more intense competition as the United States and France, massively invest in nuclear new builds and advanced nuclear reactors. The United States is taking the lead in the emerging SMR market with advanced reactor and fuel technologies. The US dominance in technologies, strong export control as well as abundant public and private investment capabilities will work in favor of the US companies in the market. The French government’s clear plan of new nuclear power plants will help the French industries maintain supply chain and jobs, which will enable their continuing overseas bidding. Although Japan is behind the competition in new builds, Japanese industries are closely associating with US allies.

Third, streamlining of licensing process is key in revitalizing the nuclear industries. While safety is paramount value, rational approach is necessary at the same time. The cases examined in this paper show that the frontrunners are all moving towards an efficient and balanced licensing and regulation. Energy security and industrial considerations should not be segregated from regulatory framework.

6. Conclusion

Old champions are coming back to the ring, reshaping the market. In contrast, the Korea nuclear industry is still suffering from the legacy of the previous

government as well as the deeply polarized politics. Although the incumbent government has been in favor of nuclear energy, substantial changes will not occur unless critical bills are legislated. Where to go is clear; life extension, new builds and better regulation. For the Korean nuclear industries, time is not on its side.

In discussions on energy mix as well as electricity supply plan, utilizing the existing capacities and adding new capacities should be taken into consideration in a balanced way. Life extension should be given consideration in the Government's on-going long-term planning, while new projects at home and overseas are indispensable pieces for maintaining supply chain and jobs. Last but not least, legislators should work for a faster, efficient and agile regulation.

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