From Nuclear to Green: Korea's Energy Policy and Cooperation Outlook with Bulgaria

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1. Beginning of nuclear power plant in Korea:

Korea began its nuclear power era **in 1977 when the Kori Unit 1** supplied electricity for the first time through test operation, followed by a start of its commercial operation next year. Since the Kori Unit 1 was **Korea's first-ever nuclear power plant**, the participation of Korean companies such as Hyundai Engineering & Construction and Dong-A Construction was quite limited as Korea relied on foreign expertise and engineers in almost all areas.

2. Korean Government Policy:

Since then, the development of nuclear energy remains a priority for Korea: it ranks **now the 5th in the world in terms of nuclear power generation following the USA, France, China, and Russia**. Korea is also a major exporter of civilian nuclear technology and expertise as well known.

Like many other countries, in the aftermath of **Japan's Fukushima accident in 2011**, Korea was gearing up to change its nuclear power policy. This led to the 2017 government policy to gradually phase-out nuclear energy over 45 years. However, the climate change crisis and energy security challenges have led the government to reconsider the Korean government's stance and adopt a new approach. Recognizing the essential role of nuclear power for a safe transition from fossil fuel to clean energy as well as for responding to global energy security concerns, especially following Russia's invasion of Ukraine, Korea looks towards **actively utilizing nuclear energy for climate change response, carbon neutrality, energy security and a new growth engine**.

It is also notable that as one of the leading countries in the peaceful application of nuclear energy for development, Korea is **firmly committed to strengthening the global nonproliferation regime, especially the Nuclear Non-proliferation Treaty NPT**.

3. Home-grown technology:

- **APR1400**

Throughout the decades, Korea gradually gained essential experiences, and has become **largely self-reliant in terms of nuclear power plant construction and operations**. Building upon this, Korea has now a third-generation nuclear power plant technology with a light water reactor – **i.e. Advanced Power Reactor 1400 APR1400**, which has established itself as the main feature in our nuclear power plant export.

The APR1400 has **increased the power generation capacity** from 1,000MW to 1,400MW. It has also **extended the period of nuclear power plant operation** from 40 to 60 years. In particular, taking the lessons learned from the Fukushima nuclear accident, it has **multiple safety features to prepare for large-scale natural disasters**. In many ways, the strength of the APR1400 surpasses the technological level of the usual third-generation nuclear power plants.

- **SMRs**

In addition to traditional models, Korea has also been actively promoting the development of next-generation **small modular reactors SMRs**, and actively strengthening national competitiveness in this field.

4. On the international level:

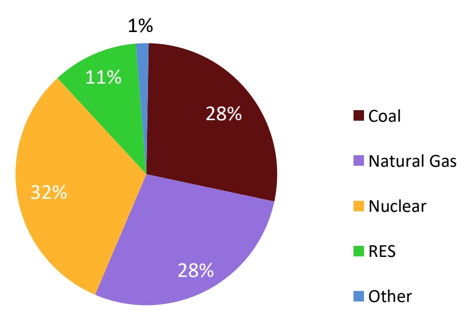
Korea's commitment to expanding nuclear power is fully aligned with the decisions made at the **COP28**, which recognize nuclear power as an essential factor for transition to clean energy. The Republic of Korea, like the Republic of Bulgaria, was also among the 31 countries which supported the **Declaration to Triple Nuclear Energy Capacity by 2050**. This stance was once again confirmed during the **Nuclear Energy Summit in Brussels** in March last year where both Korea and Bulgaria reaffirmed the commitment to make nuclear energy a key component of the overall strategy to reduce greenhouse gas emissions, ensure energy security, enhance energy resilience, and promote long-term sustainable development with clean energy transition.

This commitment is further reflected in **Korea's "Carbon-Free Energy Initiative CFE Initiative"**, presented at the UN General Assembly in November 2023. The CFE Initiative promotes a technology-neutral and cost-effective approach to achieve net-zero by utilizing all carbon-free energy sources, including nuclear, renewables, clean hydrogen, and carbon capture. Already supported by 11 countries and major international organizations, the CFE Initiative aims to encourage global cooperation and the development of shared technical standards for carbon-free energy use. In this regard, Korea eagerly **looks forward to Bulgaria joining the initiative** in pursuit of shared clean energy goals.

5. Nuclear power capacity, energy mix & challenges in Korea:

Units: Currently, Korea **has 26 operational nuclear reactors** with a total power generation capacity of 25,826MW providing about **1/3 of Korea's total electricity demand**. There are 2 new units under construction and the other 2 underway.

Energy mix: In 2024, electricity generated by nuclear energy amounted to 31.7 % of Korea's energy mix; Coal: 28.1%; Natural gas: 28.1%, RES: 10.6%; other 1.5% .



2024 (595.6 TWh)

The Korean government's **11th Basic Plan for Electricity Supply and Demand** foresees the **share of nuclear power** electricity generation up to **35.2% in 2038**.

Power Generation Volume and Proportion Forecast by Energy Source (Unit: TWh)

Year	Category	Nuclear	Coal	LNG	Renewable	Hydrogen/ Ammonia	Others	Total	Carbon	Carbon - Free
2030	Power Generation Volume	204.2	111.9	160.8	138.4	15.5	10.6	641.4	301.9	339.4
	Proportion	31.8%	17.4%	25.1%	21.6%	2.4%	1.7%	100%	47.1%	52.9%
2038	Power Generation Volume	249.7	72.0	78.1	230.8	38.5	32.5	701.7	209.1	492.6
	Proportion	35.6%	10.3%	11.1%	32.9%	5.5%	4.6%	100%	29.8%	70.2%

※ Carbon-free energy refers to nuclear power, renewable energy and hydrogen/ammonia (excluding fuel cells and integrated gasification combined cycle ("IGCC"))

Export & Development: As I mentioned earlier, the **development of Korean SMRs** is another priority of the government. Taking an example, the budget for development and export of innovative small modular reactors (i-SMRs) was recently increased 9 fold (i.e. to 49 billion USD) with the aim to **obtain standard design approval by 2028**.

In addition to that, the recently-inaugurated **SMR Alliance** aims to build a foundation for SMR commercialization by establishing business strategies and regulations. Thus it encourages participation among the private sector.

Some challenges - spent fuel: It is anticipated that **the temporary storage facility for spent nuclear fuel** will reach its capacity by 2030. So there is a pressing need for a permanent disposal facility capable of storing and treating radioactive waste. The Korean government aims to expedite the selection of a site for radioactive waste disposal facility and commence construction soon, subject to the adoption of relevant legislation.

6. Bulgaria and Korea - way forward:

Korea and Bulgaria **share many similarities** in terms of their energy balance, strong commitment to reducing carbon emissions, and efforts to ensure energy security. There is **strong alignment between our two countries** with regard to developing nuclear power that is essential to a safe transition to green energy. Additionally, we already have a good track-record of cooperation in the energy sector - a Korean company pioneered and has been developing **solar panel projects in Bulgaria for more than 10 years now**.

7. Hyundai E&C's participation in Kozloduy NPP Units 7 & 8:

Given the very similar challenges that Bulgaria and Korea face in the field of energy, Korea strongly supports Bulgaria's initiative to build additional nuclear power plant units. I am pleased that a Korean company **Hyundai Engineering & Construction** is going to contribute in that process. Hyundai E&C's vast experience and excellent achievement in the construction of Barakah power plants in UAE will be of great value to Bulgaria. Simply, it can be **Bulgaria's natural partner**.

In the meantime, I hope that our two countries' cooperation in nuclear energy will expand in the future to other energy sectors - such as renewable energy, smart grids, and energy storage systems ESS. Such expanded energy cooperation would not only support our shared goals of carbon neutrality, but also serve as prime water in **elevating our partnership to a higher strategic level** in the near future. /End/