

COUNTRY REPORT 1: SOUTH KOREA



Korea Wolsong Nuclear Power Plant

Korea wields double-edged nuclear sword

Korea's national government is intent on deploying more nuclear plants; Seoul's local leadership has other ideas.

If you think that South Korea's nuclear prowess will wane as plants near the twilight of their life, then you underestimate just how crucial nuclear power is to the country's day-to-day operations. With the nation being the 11th largest energy consumer in the world and the ninth largest carbon dioxide emitter, Korea is looking towards nuclear energy as the most realistic solution to its energy woes.

"We believe that new-build nuclear reactors will continue to come online in South Korea over the coming years, despite safety concerns and nuclear opposition," says Georgina Hayden, a Senior Energy and Infrastructure Analyst at BMI Research. She cites the country's dilapidated reactors, increasing energy demand, cost of other power sources and the growing concern for toxic emissions as the key factors backing the government's nuclear agenda.

Nuclear emergency

Hayden hails nuclear power as the most realistic solution that will not only answer South Korea's energy needs, but will also present a cleaner, low-carbon power source. Out of South Korea's 23 active nuclear reactors, about a third will reach their estimated 30-year efficient operational lifespan by 2020 and another third will have reached the same status after ten years. Hayden predicts that

The renewed initiative details a strategy to increase the country's nuclear generation capacity by as much as 29% by 2035.



many of these veteran reactors will apply for extensions, but as of right now, it is unclear how many will continue running for a further prolonged stretch.

The anticipated retirement of a significant number of reactors will obviously create a huge discrepancy between energy supply and demand. Analysts expect that electricity consumption will continue on a skyward trajectory and though the government has taken steps towards curbing unnecessary power depletion, a long-lasting solution is still needed to support economic growth.

Meanwhile, the continued importation of most of the country's energy feedstock—an expensive endeavor—is expected to lose its steam in a few decades, not only because of the rising prices of petroleum, coal and liquefied natural gas, but also because of their degenerative impact on the environment. The country has doubled its annual carbon emissions in metric tonnes per capita in a mere two decades (from 1990 to 2010), as well as increased its coal consumption by around 50% throughout the same period.

Dr. John Byrne, founder and chairman of the Foundation for Renewable Energy and Environment, notes that these are the main reasons behind Korea's second National Energy Master Plan. The renewed initiative details a strategy to increase the country's nuclear generation

capacity by as much as 29% by 2035. To complete this goal on time, a total of 16 additional reactors have to be constructed, with 11 of these needing to be up and running by 2024.

Through this effort, South Korea will be hoping to cut its total carbon emissions by 30% before 2020, with the power sector pegged to lessen emissions by 26.7% in the same year. Coupled with an improved emission trading scheme and renewable energy standard, nuclear power will be a crucial player in achieving the aforementioned goals given the scalability of technology.

Radioactive roadblocks

"Another outbreak of concern over the safety of nuclear energy (in South Korea or the wider region) would temporarily halt the move towards nuclear power in South Korea," says Hayden, citing the recent Fukushima nuclear disaster in Japan and the country's own safety scandal in 2012 as the main obstacles to large-scale nuclear deployment.

"When arguably the most technically sophisticated nuclear society could not avert disaster and could not control of its consequences, we must reflect on our reliance on this source of energy," adds Byrne.

Despite these issues, the nuclear industry has been experiencing an upward swing as of late, with two nuclear

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power plants already in the pipeline. However, the suburban location of current and planned facilities, in addition to the populated areas surrounding high-voltage transmission lines that connect large-scale plants and urban areas, have drawn the ire of affected citizens. “Recent conflicts over the construction of transmission towers in Milyang show one of the potential justice issues emerging from the country’s expansion plans,” comments Byrne.

Additionally, plants that will be built in Samcheok are drawing flack from local citizens who would rather be as far away as possible from a meltdown. The populace is also protesting the expected growth of radioactive waste stockpiles.

Though nuclear power is stereotyped as bringing low cost energy and reduced greenhouse gas emissions, it bears another hidden problem. According to Byrne, “Lazard Investment Bank finds the unsubsidized cost of nuclear power to be among the most expensive options for electricity supply.” Indeed, even as nuclear power provides 40% of the country’s electric load, imported energy figures have been largely unchanged during the last three decades.

Surprisingly, Korean emissions are also continuing to rise despite a huge chunk of the country’s power needs coming from “clean” nuclears. “The explanation for these empirical contradictions is simple: nuclear power has enabled Korea to become one of the most energy-intensive economies in the OECD. Using more energy cannot solve the problem,” says Byrne.

Due to these factors, Byrne is skeptical about the national government’s nuclear plans. He says, “Considering the country’s limited storage for nuclear wastes, growing social opposition to new nuclear power plants and the much lower cost and less risky alternatives for low-carbon development, I doubt the country will build 16 new plants in the next 20 years.”

Meanwhile, Hayden admits that it will be difficult to predict the program’s long-term success due to logistic, technical, and political challenges, but she’s certain that most reactors will file for extensions when their 30 years are up. “However, whether the new nuclear reactors will be built on schedule is debatable, given the history of delays in the global nuclear industry.”

One less nuclear power plant

While Korea’s national government is dead set on erecting as many nuclear plants as the country needs, Seoul’s metropolitan government is headed in a completely different direction as it launches the “One Less Nuclear Power Plant” initiative.

The newer power plants in Korea are

located in the east (nuclear) and west coasts (thermal). Connecting these generators to the mainland cities are 69 newly-built transmission towers carrying 765kV spanning from Singori to Miryang to the third largest city, Daegu. Then-mayoral candidate Won-Soon Park emphasized that the deployment of nuclear plants and transmission lines in the countryside, while benefiting large cities, are debilitating to people living in the countryside. “Seoul must come up with responsible energy policies in order to seek mutual co-existence with rural areas.”

OLNPP seeks to relieve the city of dependence on one nuclear power plant by 2020 in an effort to rethink energy policy while leading Korea’s transition to a more sustainable and equitable power structure. It emphasizes critical efforts in energy conservation, energy efficiency and renewable energy to strike the disproportionate supply-demand ratio from the country’s power-producing regions.

Seoul’s OLNPP initiative was borne out of four main reasons: the mass blackout which affected 656,000 homes in 2011; the nuclear phase-outs legitimized by other countries; the misfortune of having those in far flung areas live near nuclear plants and transmission lines and lastly, the election of civic activist Won-Soon Park who strongly opposes the government’s plan to build nuclear waste repositories in rural locales. It is unique in that, while most countries measure change targets via greenhouse gas emissions, Seoul will be advocating the need for fewer nuclear plants.

Through the OLNPP initiative, a couple of end-games have been set. First is the replacement of one nuclear plant (equivalent to two million tons of oil) with renewable energy sources. This



Georgina Hayden



John Byrne

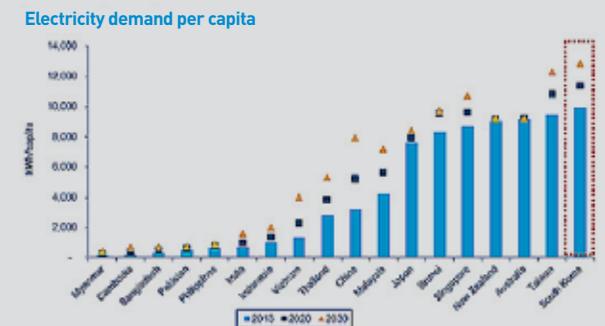
includes the decline of 790,000 toe from electricity plus 1,210,000 toe from oil and city gas. Additionally, the city will be made more self-sufficient from the current 2.95% self-energy production to 20% independence in 2020.

OLNPP will utilize low head hydropower technologies, food-waste driven biogas plants, solar farms on rooftops and unused land, and wood and pellet heating to increase their share of renewable power, with subsidies given to small- and medium-sized owners to offset initial operating costs.

“We suggest that Seoul’s energy experimentation provides important policy implications for other cities and national governments to reorient their energy policies towards a sustainable energy future,” says Dr. Taewah Lee, a research professor at Yonsei University’s Institute for Legal Studies.

“The nuclear option is no longer economically and environmentally sustainable. Rather, investments in emerging renewable energy options like distributed solar photovoltaic generation and in conservation can be more beneficial for sustainable energy development in Korea,” says Byrne.

South Korea: Number one electricity consumer per capita in the Asia Pacific region



Source: Wood Mackenzie Energy Markets Service



Shin Kori Nuclear Power Plant