INSC Country Report

Country:	Date:	Author:
Republic of Korea	26 September 2016	C. Y. Lim (Gen. Secretary of KNS)

1. Political situation in nuclear in your country

Decision to shut down Gori unit 1, the oldest NPP in Korea

South Korea's oldest nuclear reactor, Gori unit 1, is expected to be shut down permanently in 2017. The Ministry of Trade, Industry and Energy (MOTIE) recommended to permanently close the Gori unit 1 down, the nation's first commercial nuclear power reactor. Accordingly, the Korea Hydro & Nuclear Power(KHNP) made a final decision to close the Gori unit 1on June 16, 2015.
The Gori unit 1 Nuclear Power Plant(NPP), 580 megawatt reactor built with the U.S. Westinghouse technology, started its commercial operation in 1978. Its designed lifespan of 30 years ended in 2007, but was renewed in 2008 until June 2017.

The decision was rather a result of political consideration because the decision are made, not by the safety or the economic viability of the plant, but by the fact that MOTIE and KHNP had failed to persuade the neighboring residents and the politicians who are representing them. It also has a symbolic meaning that good-old days of nuclear business in Korea is passing away and the public acceptance becomes the most crucial factor in implementing nuclear business in the country.

Korea to Begin Preparation for Spent Nuclear Fuel Management

On July 16, 2015, the Public Engagement Commission on Spent Nuclear Fuel Management (PECOS) recommended that the government should complete the construction of a permanent disposal facility by 2051. In order to achieve the goal, the Korean government will have to find the site for the Underground Research Laboratory (URL) by 2020, and start its operation in 2030. The PECOS also recommended the construction of a safe interim storage facility and related R&D on recycling and disposal methods for spent nuclear fuels discharged from NPPs before disposal. The URL will verify a geologically suitable disposal site to prevent leaks of radiation from the facility. On July 25, 2016, The Korean government announced "the basic plan for High Level radioactive Waste (HLW) management" based on the recommendations of PECOS.

Each year, nuclear reactors in Korea generate about 750 tons of spent nuclear fuel and the spent nuclear fuels are currently stored in a pool inside each reactor to cool them down. Such pools are expected to reach their limit within a decade. The Hanbit & Gori nuclear site is expected to reach its capacity limit in 2024, followed by Hanul in 2037, and Sin-Wolsong in 2038.

2. News on nuclear facilities (NPP's, WSF's etc.) in your country (power upgrades, lifetime extensions, new build etc.)

The Shin-Kori unit-3, which is APR1400, is a pressurized light water reactor with 1400MWe capacity, received the operating license on October 29, 2015. The first fuel was loaded on November 3 and the start-up test including the high temperature operation test and the first critical test was successfully done. As the result, Shin-Kori unit-3 succeeded in connecting to grids and is expected to start commercial operation on October 2016. This nuclear power plant is the reference power plant of BNPP (Barakah Nuclear Power Plant) in UAE (United Arab Emirates).

Life Extension of Wolsong unit 1 NPP Approved

On Feb. 2015, the Nuclear Safety and Security Commission (NSSC) approved the life span extension of Wolsong unit 1 reactor(CANDU type) until November 2022. The Wolsung reactor located in Gyeongju city in North Gyeonsang province originally had a 30-year operating license which was expected to expire in November 2012.

The Korea Hydro & Nuclear Power Corp. restarted the operation of Wolsong unit 1 and it will continue generating power from 2015 to 2022. This is the second time that Korea has renewed the license of an aging nuclear reactor after the Gori unit 1 license renewal in 2007. The Korea Institute of Nuclear Safety(KINS) completed inspection of the refurbished and uprated Wolsong unit 1 reactor and concluded that it can operate for another 10 years from November 2012.

Korean LLW/ILW Repository Officially Opens

Korea's underground low- and intermediate-level radioactive waste (LLW/ILW) disposal facility officially opened in Gyeongju, North Gyeongsang province on August 28, 2015.

The site selection process for the 1.56 trillion won ($1.5 billion) facility began in 1986. Construction of the repository started in early 2006 and was completed in June 2014. The first phase of the repository consists of six underground silos, each 40 meters high and with a diameter of some 24 meters. This first phase can hold up to 100,000 barrels of radioactive waste.

The Korean nuclear regulator - the Nuclear Safety and Security Commission - gave its approval in December 2014 for full operation to begin at the facility's first phase. The first waste - 16 drums of waste within a concrete disposal container - was disposed within one of the facility's silos on July 13, 2015.

The second phase construction of the repository, which will be near-surface, began in January 2012 and is expected to be completed by 2019. This will add capacity to store a further 125,000 drums of LLW/ILW. Ultimately, the facility will be used to dispose of a total of 800,000 barrels of waste.

3. News on companies (projects, financial results, production etc)

An MOU of Joint R&D for SMART between Korea and Saudi Arabia signed

Two South Korean-designed SMART reactors could be built in Saudi Arabia following the signing of a memorandum of understanding (MOU) between the two countries on March 3, 2015. Korea and Saudi Arabia are to jointly promote the reactor in the global market.

The MOU was signed by the Ministry of Science, ICT and Future Planning(MSIP) and Saudi Arabia's King Abdullah City for Atomic and Renewable Energy (K.A.CARE). It was signed in Riyadh following a meeting between South Korean president Park Guen-hye and Saudi's newly-crowned King Salman bin Abdulaziz al Saud.

Under the agreement, the two countries will conduct a three-year preliminary study to review the feasibility of constructing SMART reactors in Saudi Arabia. The cost of building the first SMART unit in Saudi Arabia is estimated at $1 billion, the agreement states.

The MOU also calls for the two countries to cooperate on the commercialization and promotion of the SMART reactor to third countries.

SMART is a 330 MWt pressurized water reactor with integral steam generators and advanced safety features. The unit is designed for electricity generation (up to 100 MWe) as well as thermal applications, such as seawater desalination, with a 60-year design life and three-year refueling cycle. While the basic design is complete, development had been stalled by the absence of any orders for an initial reference unit. It received standard design approval from the Korean regulator in mid-2012 and KAERI plans to build a demonstration plant to operate from 2017.

Jordan Research and Training Reactor(JRTR) built by Korea reached its first criticality

Jordan Research and Training Reactor(JRTR) built by KAERI reached its first criticality on April 26, 2016. The completion ceremony for the JRTR will be held before the end of this year. The JRTR is the outcome of south Korea’s first overseas research reactor construction project. The consortium of Korea Atomic Energy Research Institute and Daewoo Engineering & Construction won the deal in January 2010.

The research and training reactor is housed in the Jordan University of Science and Technology located in Irbid city, 70 kilometers north from the capital city of Amman. It has a thermal output of 5 MW and will be utilized for the purposes including neutron-based basic science research, education and the production of radioactive isotopes for industrial and medical applications.

4. Public opinion towards nuclear (results latest PO polls)

Korea Nuclear Energy Agency (KNEA), dedicated to the public communications of nuclear issues, has been surveying the public opinion on nuclear energy since 1993. The survey items are categorized in 5 topics: necessity of nuclear generation, safety of nuclear reactors, safety of radioactive waste management, approval of building new reactors and approval of hosting nuclear-related facilities in the proximity of residence.

The latest survey was conducted in 2015 and the portion of public's favorable responses of the five topics are as follows (brackets indicate the average including all data since 1993): necessity of nuclear generation 89.4% (86.9%), safety of nuclear reactors 39.1% (42.1%), safety of radioactive waste management 24.0% (37.3%), approval of building new reactors 29.9% (48.6%) and approval of hosting nuclear-related facilities in the proximity of residence 19.6% (20.6%).

The results indicate that most Koreans agree on the necessity of nuclear generation but are doubtful on the safety of nuclear reactors and radioactive waste management. Consequently, this leads to low approval of hosting nuclear-related facilities in proximity of residence.

The output of 2015 survey, compared with the average since 1993, also provides an important implication. While public support on nuclear electricity generation has increased, their confidence on the safety of the nuclear reactors and radioactive waste management has dramatically decreased.

Approval of building new reactors decreased rapidly after the Fukushima Accident and is in decreasing trend. That trend may also be affected by the rising of renewable energy. It should be noted that 59.2% of the respondents selected renewable energy as the most preferred energy source while only 21.8% chose nuclear energy.

Overall, existing nuclear capacity would be maintained with public's agreement on the necessity of nuclear reactors, but it would be difficult to expand them in the future confronting public's concerns on the nuclear safety.

5. Stakeholder dialogue (Attitudes of NGOs, media, local communities towards nuclear)

The stakeholder dialogues changed very much after Fukushima accident. Before the accident, Korea had so called “nuclear renaissance” with export of nuclear power plants to UAE in 2009. However, after Fukushima accident, the opinions of NGOs, media and local communities aggravated.

Firstly, anti-nuclear NGOs, who were relatively dormant for a long time, invigorated and started its activities. These NGOs not only pressure the central and regional governments, but also the parliament. Especially, the members of parliament with NGO background are exerting significant effort (such as attempt to enact anti-nuclear legislations) to oppose nuclear utilization. Furthermore, some leaders of opposition parties have already pledged anti-nuclear (phasing out) agenda for their coming presidential campaign.

Media also have changed their stance significantly from growth engine of Korea to a black box with inherent danger. Majority of influential media are still supporting the necessity of nuclear electricity generation but they are not a strong supporter any more as they were.

Local media in the nuclear site, especially, voice their opposition on nuclear related issues such as continuing operation of existing reactors or building new reactors. Such stance of media could hinder and pressure, to some extent, the expansion of nuclear industry and development of new nuclear technologies.

If this persists, the sustainability of nuclear industry could be at stake in the future. Therefore, regaining public trust becomes the most urgent and important challenge for the nuclear industry in Korea.