

HKIE Nuclear Division - Annual Report of Session 2020/2021

2020 has been an unusual year not only for the world amid the COVID-19 pandemic, but also a special year at the end year of “13th Five-Year-Plan” (FYP) for the nuclear power industry in China. There are total of 49 nuclear power units in commercial operation in the Mainland at the end of April 2020 with a total installed capacity of nominally 51 GW. Subsequent to the commercial operation in 2019 of Sanmen and Haiyang, as well as Taishan sites adopted Westinghouse’s AP1000 and Areva’s EPR technologies respectively, the world’s first Hualong One (HPR1000) at China National Nuclear Company (CNNC)’s Fuqing Nuclear Power Station in Fujian was successfully connected to the grid in 2020 and commenced commercial operation in January 2021, as the first demonstration unit of China’s indigenous Generation III design. The overseas HPR1000 unit at Karachi Nuclear Power Station in Pakistan also completed its first fuelling milestone last year reflecting the smooth progress of Hualong One in China’s nuclear development. Meanwhile, the State Power Investment Company (SPIC) announced the brand name of its own design CAP1400 as “Guo He One” for the first demonstration unit in Shidaowan last year.

At the start of 14th FYP, the another 17 reactors with a total capacity of 18GW are under construction in the Mainland, including the attainment of First Concrete Date (FCD) milestone of China General Nuclear (CGN)’s HPR1000 Sanao Nuclear Power Station in Cangnan of Xijiang on the last day of 2020, as well as the in-progress Fangchenggang Nuclear Power Station in Guangxi. There are also the “Integrated Version” of HPR1000 at CNNC’s Zhangzhou plant in Fujian; CNNC’s Changjiang plant in Hainan and CGN’s Taipingling plant in Guangdong in their respective stages of construction. The HPR1000 has also been proposed for construction at Bradwell in the UK, where it is now undergoing the 4th stage (the last stage) of Generic Design Assessment with the regulator.

While the above plants employ PWR designs, the Generation IV designs of China Huaneng’s high temperature gas-cooled reactor attained the milestone of hot functional test at Shidaowan plant in Shandong, as well as the second unit of CNNC’s sodium-cooled fast reactor project at Xiapu in Fujian kicked off its construction in last year. Following China’s Commitments in the 75th United Nation General Assembly pledging that its CO₂ emissions would peak before 2030 with carbon neutrality by 2060, the clean and reliable nuclear power is expecting more new opportunities in the near future.

Internationally, while China remains the largest market in the nuclear industry in the coming five years, Russia will be another strong candidate by its integrated stated-owned Rosatom capable of building nuclear power plants locally and internationally and, as well as having world’s first

floating nuclear power plant “Akademic Lomonosov” entering commercial exploitation to supply heat and electricity and nuclear power driven icebreaker fleet “Arktika” set sail last year. Japan did not fully abandon nuclear power after the Fukushima accident. Nine nuclear power plants have gradually restarted since 2015 to meet their demand in energy, and 18 more Nuclear Power Plants (NPPs) are under the review process for restarting. All the restarted plants are PWR types, but none of BWR types which is same as Fukushima’s has been approved to restart. The US still needs to face the challenges of delays in the construction of new NPPs due at least in part to project complexity and insufficient expertise, and the threat of closure to older and smaller plants in the US owing to their relative lack of economic competitiveness against natural gas and new energy. From 2018, four units have been shutdown for decommissioning, with up to 9.3GW are expected to enter decommission in the coming 5 years. Interestingly to noted that those NPPs plan to decommission are mostly located in the states under open electricity market, but for those in regulated market NPPs intend to continuous investment and make their extension application of operating license. France still has the largest share of electricity generated by nuclear power in the world with around 70% nuclear portion in their fuel-mix, even though they published a policy to adjust the nuclear portion to 50% by 2035. They now have 56 units in operation with one EPR unit under construction. Unlike other European countries, Germany plans to shut down all their NPPs by 2022. Nonetheless, their resilient grid connected with other nearby countries and their centralized electricity market are the prerequisites of adopting renewable energy as replacements especially by wind energy. On the other hand, Small Modular Reactor (SMR) is the new technology trend drawing attentions of many countries, such as the US, the UK and Canada to enhance their research and investment in SMR’s development.

In this session, we organized technical seminars and visits for our members to keep abreast of the latest development in the nuclear industry particularly in safety. Virtual technical tours to the Hong Kong Observatory’s Monitoring Assessment Centre and King's Park Radiation Laboratory and the CityU Nuclear Reactor Simulator Laboratory were the new approaches that were successfully held to overcome pandemic constraints with overwhelming participation received. We also offered another professional webinar on “Exploration of Uranium in Nigeria” in December 2020 to enrich the knowledge of our members as an educational initiative. Another technical seminar related to SMR development will also be arranged right after the Annual General Meeting.

The Nuclear Division is committed to promote the understanding and engineering knowledge of nuclear technology for the interest of its members and the public, and for the benefit of the society at large. Finally, we wish to express our sincere gratitude to all those who have helped the Division during the Session 2020/2021 and made it successful in serving the Institution and our community. Members are welcome to visit our Facebook page and website at

<http://ne.hkie.org.hk> or contact us by email to nuclear@ne.hkie.org.hk.

==END==

Ir Ryan Lam
Chairman, 2020/2021
April 2021