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Akademik Lomonosov: Floating Chernobyl or the Floating Light Bearer?

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On September 14, 2019 Russia's *Akademic Lomonosov,* the world's first floating nuclear power plant (NPP) reached Pevek- the northernmost, remote town in Russia after a 4000 mile journey from the port city of Murmansk. This vessel, named after the 18th-century Russian writer and scientist consists of two nuclear reactors of 35 megawatts capacity. [1]

If successful, this floating nuclear power plant would provide electricity to Pevek by replacing a coal plant and the Bilibino nuclear power plant in Chukutko, which is expected to end its design life soon. The FNPP also aims to support mining operations in this region and is planned to go operational by the end of this year. The launch of the FNPP is a part of a bigger strategy of Rosatom, Russia's State Nuclear Energy Corporation. To begin with, it plans to replicate this project to provide electricity to far-flung places with electricity accessibility issues, not just in the Russian Federation but across the world. In addition, it also plans to use this technology for desalination plants for countries which have a dearth of fresh water resources. With the intention of commercialising floating nuclear power, Rosatom is already in talks with Sudan to explore such a project. Countries in West Asia, North Africa and South East Asia too have expressed interest in adopting this technology with the help of Russia.[2] In addition, Rosatom is also working on Optimized Floating Power Units (OFPUs) for exports.

Prima facie, the FNPPs provide several benefits. First, it appears to be a promising solution to provide electricity to far flung places which face energy deficit. Second, it would do so in a sustainable manner. Third, it eludes the problem of finding apt sites on land for the construction of atomic power stations. In addition, these reactors can operate without refuelling for up to 5 years. In this regard, Alexei Likhachev, the head of Rosatom stated, "…It is perhaps a small step towards sustainable development in the Arctic - but it's a giant step

towards decarbonisation of remote, off-grid zones and a turning point in the global development of small modular nuclear plants…."[3]

Chernobyl on Ice?

However, the FNPP is also facing a lot of reproval. While Rosatom asserts that the FNPP is "virtually unsinkable", its claims are assessed under the weight of its nuclear catastrophes such as the 1986 Chernobyl accident, which is still fresh in public memory. The recent, initial denial of the Nyonoksa radiation accident by the Russian government which killed seven people and resulted in the radiation levels to spike in three cities has only furthered apprehensions about Russian nuclear safety standards.[4] In the past too, there have been several accidents concerning nuclear sea vessels such as the Gargantuan Kurk Submarine that sunk in 2000 and the radiation leak from a Russian icebreaker, earlier this decade. Apprehensions are also voiced with regard to the dangers of natural calamities such as cyclones, tsunamis and ice berg collisions on the FNPP as well. In fact, Greenpeace - a nongovernmental, environmental organisation has even called it "Chernobyl on Ice", drawing attention to the vulnerability of the project.

There are several other obscurities regarding various aspects of the project too for example, it's not yet clear as to who would take responsibility in the case of an accident in international waters; Security of the vessel is another concern. How does one secure the nuclear facility in the ocean and minimise the risk of it becoming a target for terrorist attacks? How much is Russia investing in ensuring security and safety of the FNPPs? There are also questions of practicability. How will the International Atomic Energy Agency conduct inspections of the FNPPs and do they have the budget for it? In this regard, there are many questions around the project which don't yet have clear answers.

Feasibility

The feasibility of this minor league nuclear power plant could be determined by assessing two important factors: economic viability and safety assurance. However, both seem dubious. In fact, the idea to create a floating nuclear power plant by the Russians is neither new nor original. In the 1960s the United States experimented with a similar project but it was forsaken in 1974 due to its high costs and public safety concerns. In 2011, the Bellona Foundation, an organisation that works on environmental and human rights issues came out with a report in reaction to the Rosatom's engagement "… in a massive propaganda campaign extolling the virtues of low-capacity nuclear power plant…"[5] The report states that "…it is an undisputed fact that any nuclear power reactor presents a potential nuclear and radiation danger. In the case of a floating nuclear power plant, added to these hazards are risks and dangers that arise necessarily with operation of a marine vessel.

Other potential risks that all have to be considered when analysing such a facility's safety have to do with the fact that the floating power unit will also be a floating storage facility of sorts, with a concentration of spent nuclear fuel and radioactive waste accommodated on board..."[6] However, proponents of the FNPP state that floating nuclear power plants have a lot of benefit from operating in water. Dr Jacopo Buongiorno, Director, Center for Advanced Nuclear Energy Systems (CANES) in this regard says "in case of an additional benefit of a nuclear plant being offshore is that the reactor could use the sea as an "infinite heat sink. " [7]

The second factor that could determine the future of this project is its economic viability.

However, there isn't much clarity on the economics behind this. Rosatom officials have declined to comment on the cost of *Akademik Lomonosov.* However, in 2016 an official estimated the price to be around 21.5 billion rubles (327. 58 million USD) with an additional 7 billion rubles.[8] Some researchers however claim that this project could be economically feasible for reasons such as not requiring the reactors refuelling for 3-5 years. This could reduce the cost of electricity production and the cost of a FNPP is also expected to decrease as more such power plants get constructed.

Nuclear Energy: A Foreign Policy Tool for Russia

Nuclear energy for Russia is not only about generating electricity. It is an important component of their foreign policy stratagem too. Firstly, it helps in cementing economic ties with various countries around the world. In terms of construction, Rosatom has the highest number of foreign nuclear power projects. As of 2017, it has more than 20 nuclear power reactors being constructed for exports and the overseas orders estimation being about 130 billion dollars![9] In addition, it helps Russia to gain eminence in global nuclear energy industry. The Rosatom established as recently as 2017 has developed rapidly. It already includes more than 360 enterprises including nuclear weapons program, electricity generating capabilities, nuclear medicine, supercomputers etc. The FNPP would also further its plans of expanding and developing the Northern sea route. Nuclear energy thus, is an important component in developing Russia's repute and influence internationally.

In conclusion, it may be said that the future of the FNPP seems quite unclear as of now. It certainly does have its appeal in terms of providing clean, stable source of energy to energy-starved countries around the world. If successful, this could help Russia become a superpower in nuclear commerce. However, at the same time, Russia cannot afford another

Chernobyl. The jury is still out on the future of FNPP.

(Disclaimer: The views and opinions expressed in this article are those of the author and do not necessarily reflect the position of the Centre for Air Power Studies [CAPS])

Notes

[1] "Russia launches floating nuclear power plant Akademik Lomonosov", Al Jazeera, August 23, 2019. https://www.aljazeera.com/news/2019/08/russia-launches-floating-nuclear-power-plant-akademik-lomonosov-190822145809353.html. Accessed on August 27, 2019.

[2] "First-of-a-kind floating nuclear power unit Akademik Lomonosov leaves Murmansk for Pevek", Rosatom, August 23, 2019. rosatom.ru/en/press-centre/news/first-of-a-kind-floating-nuclear-power-unit-akademik-lomonosov-leaves-murmansk-for-pevek/, accessed on August 27, 2019.

[3] "Russia's World-First Floating Nuclear Plant Arrives In Port", NDTV,September 14, 2019. https://www.ndtv.com/world-news/russias-world-first-floating-nuclear-plant-arrives-in-port-2100926, accessed on September 15, 2019.

[4] Andrew E. Kramer, "In Russia, After the Radiation Came the Rumors", *The New York Times*, August 16, 2019. https://www.nytimes.com/2019/08/16/world/europe/russia-nuclear-radiation-rumors.html, accessed on August 25, 2019

[5] Alexander Nikitin and Leonid Andreyev , "Floating nuclear power plants", *Bellona Report 2011,* Bellona Foundation, https://bellona.org/publication/floating-nuclear-power-plants, accessed on September 02, 2019.

[6] Ibid.

[7] "Here Are The Advantages Of Floating Nuclear Power Stations", *Business Insider,* https://www.businessinsider.in/Here-Are-The-Advantages-Of-Floating-Nuclear-Power-Stations/articleshow/34214424.cms?utm_source=contentofinterest&utm_medium=text&utm_campaign=cppst, accessed on September 11, 2019.

[8] "Chernobyl on ice: Russia's floating nuclear power plant", *Dhaka Tribune,* August 26, 2019. https://www.google.com/search?q=advantages+of+floating+nuclear+power+plant&oq=advantages+of+the+floating+nuclea&aqs=chrome.1.69i57j0l2.6390j0j7&sourceid=chrome&ie=UTF-8, accessed on August 29, 2019.

[9] Ben Arris, "Russia's Nuclear Power Exports Are Booming", Moscow Times, May 9, 2019. https://www.themoscowtimes.com/2019/05/09/russias-nuclear-power-exports-are-booming-a65533, accessed on September 05, 2019.