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RUSSIA IN THE GLOBAL NUCLEAR ENERGY MARKET: TRENDS TO FORESEE, AIMS TO ACHIEVE*

GLOBAL NUCLEAR ENERGY: ONWARDS AND UPWARDS

Sixty years ago the Soviet Union launched the world’s first nuclear power plant in Obninsk, ushering in the era of global nuclear energy. There are currently 435 power reactors in operation in 30 countries around the world, with a total installed capacity of 370GW. Another 72 power reactors are now under construction.

The global nuclear market has seen peaks and troughs over the past 60 years. Serious nuclear accidents at the Three Mile Island NPP in the United States in 1979, at the Chernobyl NPP in 1986, and finally at the Fukushima 1 NPP in Japan in 2011 had a major depressing effect on that market. Nevertheless, it is now safe to say that the international community has already recovered from the psychological shock of the Fukushima disaster in 2011. Lessons have been learnt from that accident, and additional safety measures implemented. In 2013 Saint Petersburg hosted a high-level international conference headlined Nuclear Energy in the 21st Century. The event was organized by the IAEA and attended by ministers, senior officials, and experts from 87 countries and seven international organizations. The delegates agreed that “nuclear energy will play an increasingly important role in achieving energy security and sustainable development goals in the twenty-first century.”¹

Earlier this year the IAEA released its projections for global nuclear industry development based on an optimistic as well as a conservative scenario. Under both scenarios, the global nuclear energy market is expected to grow substantially by 2030.

The reason for that trend is quite clear. Every state wants energy predictability. Every country wants to be able to make long-term plans for its energy future in order to eliminate the growing energy deficit, preserve the environment, and save the planet’s hydrocarbon resources. More than 60 countries have already made nuclear energy part of their national energy strategies.



C O M M E N T A R Y

RUSSIA IN THE MARKET FOR INTERNATIONAL NUCLEAR ENERGY PROJECTS

Russia is not an exception in that sense. The country currently operates 33 nuclear power reactors, which generated 172.2 billion KWh of electricity in 2013, accounting for 16.8 percent of total Russian electricity generation. Another nine power reactors are under construction, including the world’s first floating nuclear power plant (NPP). Three of these reactors are to be completed later in 2014, including the 3rd unit of the Rostov NPP, the 1st unit of the Novovoronezhskaya NPP, and the 4th unit of the Beloyarskaya NPP; the latter is based on the new BN-800 fast neutron reactor design. In the longer time frame, Russia intends to start building another three BN-1200 units by 2030.

Russia’s Rosatom nuclear energy corporation controls a large share of the global nuclear energy market, despite growing competition. It is the only company in the world that is

currently building nuclear power plants outside its domestic market. Its NPP projects are on a large scale and rely on advanced technology.

Rosatom's foreign NPP projects that are now in progress or have already been completed include:²

- ❑ Tianwan NPP in China, where two reactors have already been delivered and launched, with another two currently under construction;
- ❑ Kudankulam NPP in India, where two VVER-1000 reactors are nearing completion; a contract has already been signed for another two reactors;
- ❑ Bushehr NPP in Iran, where the No. 1 unit is already operational;
- ❑ Akkuyu NPP project in Turkey, where a site has already been selected for four VVER-1200 units to be built by Rosatom;
- ❑ Ruppur NPP project in Bangladesh, where a site has already been selected for two VVER-1000 reactors;
- ❑ Ninh Thuan NPP in Vietnam, where a site was selected for two nuclear power reactors.

As part of these projects, three nuclear power reactors have already been delivered to customers, and six are currently under construction; agreements with Russia have been signed for another 10 reactors.

Rosatom is also working on several other NPP projects in foreign countries:

- ❑ an agreement has been signed with Hungary on building two new reactors at the Paks NPP;
- ❑ a contract has been signed with Finland to build the Hanhikivi-1 NPP;
- ❑ Russia has won the tender to build the first nuclear power plant in Jordan;
- ❑ framework intergovernmental agreements were signed in recent months with Algeria, South Africa, and Argentina. A similar agreement has been initialed with Kazakhstan.

Speaking at the St Petersburg International Economic Forum on May 23, 2014, Russian President Vladimir Putin was upbeat about the Russian nuclear industry's export projects. "We do not merely supply nuclear energy hardware," the president said. "We build entire nuclear industries, including the research component and training specialists. We take part in international projects. We intend to build the most advanced nuclear power plants, and the most protected in terms of safety and security."³

RUSSIA'S COMPETITIVE STRATEGY IN THE GLOBAL NUCLEAR MARKET: STAYING AHEAD OF THE PACK

Clearly, Russian nuclear power plants, reactors, and nuclear services are in great demand in the global market. What, then, are the main reasons for such a success?

One of the key reasons is Russian policy, based on several tried and tested principles.

- ❑ First, Russia provides assistance to the nuclear newcomer countries in putting in place all the infrastructure that underpins nuclear energy programs, including the legal and regulatory framework, spent nuclear fuel and radioactive waste management systems, and specialist training.
- ❑ Second, Russia offers advanced nuclear technologies that meet the highest safety and reliability standards. The reactors offered to Russia's foreign partners are of the latest Generation III+.
- ❑ Third, Russia offers cooperation on the entire range of issues related to implementing complex infrastructure projects in the nuclear industry, including localization, involvement of local subcontractors, industrial cooperation, etc.
- ❑ Fourth, Russia has earned a reputation for diligently fulfilling all its obligations. To illustrate, the Ukrainian nuclear power plants continue to receive Russian nuclear fuel without any disruptions, despite the latest tensions.

At the same time, survival in such a highly competitive environment requires constant innovation. What, then, are the key areas of that innovation?

One of the main priorities at the moment is to extend the service life of nuclear power plants. Earlier this year Russian engineers and scientists completed the development of a new type of high-purity radiation-resilient steel for use in new VVER reactor vessels. This new material will make it possible to keep nuclear power reactors in operation for more than 100 years; the figure for the previous generation of reactors was in the 40–60 years range.

Can anyone predict the political situation 100 years from now? For example, can anyone predict Russia's relations with the United States, Europe, or neighboring countries, especially after periods of extreme volatility in international politics? Obviously, that is an impossible task.

It is, however, entirely possible to make projections and plans for the state of the nuclear energy industry in 100 years' time, including such issues as which nuclear power plants will continue to operate, and which will have been decommissioned. This leads to an obvious conclusion: nuclear energy is a factor of stability and predictability in the international arena.

Another important priority on today's agenda is a transition to a closed nuclear fuel cycle. Russian scientists and engineers are simultaneously working on two different fast neutron reactor technologies, based on sodium and heavy-metal coolant, respectively. This project, whose goal is to bring the nuclear energy industry to a whole new level, is called Proryv (a breakthrough). As part of that project, Russia will build a new experimental nuclear energy center that will host a fast-neutron nuclear power reactor, a nuclear fuel reprocessing and re-fabrication facility, and a facility that will process all types of radioactive waste.

Another very important priority is to improve the technologies of spent nuclear fuel and radioactive waste management. Russia is currently building new industrial infrastructure to deal with the problem of spent nuclear fuel and radioactive waste processing by means of implementing a closed nuclear fuel cycle. That infrastructure is being built at the Mining and Chemical Combine (GKhK) in Zheleznogorsk, which is already being used to store irradiated fuel and manage moderately and highly radioactive waste. Engineers have already upgraded the "wet" storage facility there, and built a new dry storage facility for spent nuclear fuel. Another two dry storage facilities are nearing completion. Russia is also building an experimental demonstration center that will test innovative spent nuclear fuel processing technologies, with an annual capacity of up to 250 tons, and a new facility that will produce MOX (mixed oxide) fuel for fast-neutron reactors.

Finally, in recent years Russia has been pursuing increasingly intensive international cooperation on various issues related to peaceful nuclear energy development.

On January 1, 2013 Russia joined the OECD Nuclear Energy Agency (NEA), an elite club of 34 countries that have a highly advanced nuclear energy sector. Russia's accession to the OECD NEA has created an even more favorable climate for the country's close involvement in formulating decisions on the promotion of nuclear energy technologies in the global markets and on the future shape of the global nuclear energy industry. Rosatom's participation in the NEA databank has provided it with access to a huge amount of useful information, including the properties and characteristics of various reactor materials and advanced nuclear calculations. For its part, Rosatom will contribute its own technical information to the databank.

CHALLENGES AND OUTLOOK

All that being said, the Russian nuclear energy industry must not rest on its laurels. In fact, it is already facing significant challenges, including:

- aggressive competition and attempts to squeeze Russian suppliers out of several national markets;
- political instability, including crises on the Russian borders and farther afield. Are there any guarantees that aggressive extremism will not undermine the nuclear nonproliferation regime? And what should we make of the Ukrainian leadership's recent statements to the effect that Ukraine must "return to the question of creating nuclear weapons" or withdraw from the Non-Proliferation Treaty?

Nevertheless, the Russian nuclear energy industry is making steady progress. It currently holds a record portfolio of export contracts. Russia can offer highly advanced, reliable, and



proven technologies to its foreign partners. These partners are just as interested in cooperation as Russia is. The service life of nuclear energy facilities is getting longer; it will soon reach 100 years or even more. In other words, it will span well beyond the usual time horizons, superseding short-term bouts of political volatility. Meanwhile, Russia is self-sufficient in terms of critical nuclear technologies.

Even more importantly, Russia welcomes open and equitable cooperation based on mutual interest and mutual benefit.

NOTES

* This article is based on remarks made by Mikhail Lysenko, Director of the Department of International Cooperation at Rosatom State Corporation for Atomic Energy of the Russian Federation, at an enlarged meeting of the PIR Center Advisory Board and Dialogue Club International on October 4, 2014. For more details, see: PIR Center, <<http://www.pircenter.org/media/content/files/12/14126200780.pdf>>, last accessed August 24, 2014.

¹ See: "Strengthening the Agency's Activities Related to Nuclear Science, Technology and Applications," Resolution adopted on September 25, 2014 at the 7th Plenary Session of the IAEA, p. 23, <http://www.iaea.org/About/Policy/GC/GC58/GC58Resolutions/Russian/gc58res-13_rus.pdf>, last accessed October 10, 2014.

² For more details on the Rosatom portfolio of foreign NPP contracts, see: "NPP Projects Abroad," Rosatom State Corporation website, <http://www.rosatom.ru/aboutcorporation/activity/energy_complex/designandbuilding/bild_npp_2/>, last accessed August 24, 2014.

³ See: "Meeting with Participants of the Global Business Leaders Summit," official website of the President of the Russian Federation, May 23, 2014, <<http://www.kremlin.ru/news/21078>>, last accessed August 24, 2014).