

Russia and Fukushima

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Summary

Since the accident in Japan's Fukushima power station, Russian officials have consistently reassured the public that Russian nuclear plants are safe. One reason for this position is Russia's desire to export nuclear power technology. The events in Japan might have a detrimental effect on Russian exports. However, the nuclear industry is also experiencing severe problems on the domestic front. According to reports by the "Ekoza-shchita!" (EcoDefense!) environmental group, Russian nuclear plants have numerous defects. The security situation will not improve as long as the presidential administration and the government continue to try and convince the world that there are no problems in Russia's nuclear power stations.

Fukushima in Russia?

In March this year, the nuclear power plant in Japan's Fukushima prefecture experienced a disaster that is still underway at the time of writing. While the earthquake failed to destroy the reactors and the cooling pond containing spent fuel rods, the energy supply was damaged to such an extent that the plant was cut off from external power and the cooling systems broke down. The nuclear disaster that followed was due to the lack of energy supply to the reactors. These are the facts of the matter that must be taken into consideration when dealing with the question of whether the Japanese scenario could repeat itself even in the absence of a similarly strong earthquake. If one assumes that security systems depending on an external power supply might fail, a contingency might arise in any nuclear plant—including a Russian one.

All of Russia's nuclear power plants are in proximity to cities with populations ranging from at least several tens of thousands to several hundreds of thousands of residents. These people would need to be evacuated. At issue here is not a hypothetical scenario, but very real points of fact: In 1993, a storm damaged power lines on the Kola Peninsula, the backup diesel generators of a nuclear power station failed to start, and the plant was on the brink of a disaster that could have reached the proportions of a second Chernobyl. In 2000, a disruption of the power grid caused a shutdown of the reactors in the Mayak industrial complex in the Chelyabinsk region as well as of the Beloyarsk nuclear plant 60km from Yekaterinburg. In both cases, a scenario similar to that currently seen in Japan's Fukushima Daiichi plant was only narrowly avoided.

Russia's Nuclear Discourse

In view of the Fukushima disaster, the situation in Russia appears increasingly ominous, as it closely resembles that in Japan. Until March this year, in Russia as well as in Japan, debates over the "insecurity" of nuclear power plants were perceived as a breach of etiquette. Sev-

eral times a year, leading government officials together with Rosatom chief Sergei Kiriyenko demonstrated their complete support for nuclear energy as one of Russia's safest, most economical, and most ecological technologies, which is also available for sale to other countries. The same reassurances are still heard today.

However, the reality is much more grim that political speechwriters would have one believe. Of Russia's 32 reactors, 22 are old and insecure. They are either at the end of the 30-year lifespan envisaged by their planners or have already exceeded it. Much like Japan, Russia wants to use these reactor blocks beyond the 30-year limit. The usage period is to be extended by 15 years—without consulting ecological surveys, as required by law. One would not hope to see a repeat of the Japanese events in Russia, but it seems that the chances of such a recurrence are increasing.

Notice of Defects for Russia's Nuclear Industry

The Russian nuclear industry, however, has already recovered from the shock of Fukushima. It went onto the offensive by announcing projects for new and highly secure reactors that are able to withstand any earthquake. The reality is different, however. In 2009 alone (the last year for which the records of the *Rostekhnadzor* watchdog agency are available), inspectors noted 491 violations of safety codes and laws in the structures charged with project planning and construction of nuclear power installations. Some companies were threatened with revocation of their licenses due to quality deficiencies in production. While all of the nuclear industry's projects appear to be safe on paper, the de facto situation is that safety begins not on paper but with the very real defects of material as well as human failures, which cannot be ruled out. It is also worth remembering that the Russian nuclear industry was issued with more than 3,000 notices of defects concerning assets delivered in the construction of the Tynvan nuclear power plant in China.

Russia's nuclear industry experiences no pressure that might force the operators to enhance safety. On the contrary, the full support extended by the prime minister and the president to the nuclear industry only enhances the complacency in the sector: If politicians are completely on the side of Rosatom, there is no reason for concern. There may be disagreements over which reactors are safer than others, or as to whether their construction in earthquake zones should be permitted, but it is patently obvious that the situation in Russia is the worst of all possible worlds in terms of nuclear safety.

New Construction and Marketing of Nuclear Power Plants

Rosatom is pursuing at least three projects in zones at risk of earthquakes—in Bulgaria, in Turkey, and in Armenia. There is also a project for a floating power station that is scheduled to be delivered next year to Kamchatka, in proximity to the tsunami zone. Not one of these schemes has so far been reconsidered. Instead, assurances are issued that all is completely safe. The Japanese heard the same assurances for decades and believed that their nuclear plants were designed to withstand earthquakes and tsunamis—as well as airplane crashes and all other manner of events.

Regarding the new VVER-1200 reactors that Rosatom wants to export to other countries, including EU members, it is claimed that construction problems are non-existent. In case of a disruption of the power supply to such a reactor, however, or if the heat removal should be severely affected (e.g., as a result of a disruption in the first cooling circuit), these reactors might also experience a major accident. However, Rosatom cannot discuss the shortcomings of the new reactor type, since that would mean a moratorium on all sales efforts. On the other hand, refining the reactor would be expensive and lead to a complete loss of return on investment.

Even before the Fukushima incidents, the cost of new reactors had reached high levels: while the average cost of a 1,000-MW block in the 1990s was about US\$1 billion, the asking price for Rosatom's VVER-1200 today is around US\$3–5 billion—depending on the geographic characteristics of the project and certain foreign-policy criteria. This price is close to that of the French EPR reactor, but still slightly below it. Nevertheless, expensive though the Russian reactors may be, even completely insolvent customers can still afford them these days, as sales are almost always accompanied by loans from Russia's national budget. This tradition of the seller financing exports of nuclear plants is a comparatively old one. In 2000, ahead of the G8 summit, a special report on export credits offered by developed countries in the area of nuclear energy described

the system of loans in support of reactor exports. At the time, the sum of all such “assistance” from Russia was about US\$5 billion. According to extremely conservative estimates, it is six to eight times as high today. Turkey alone has been promised a power plant at a cost of around US\$20 billion (fully financed by the Russian taxpayer). With all these loans, the conditions for purchasers of the reactors are extremely favorable—including very vague securities for funds whose repayment is deferred for decades to come.

The Development of Nuclear Energy in Russia

As far as the development program for nuclear energy in Russia itself is concerned, there are plans for construction of 20 to 40 new reactors, according to various sources. However, the real-world capabilities of the engineering sector currently only allow completion of one reactor complex a year, which makes it difficult to see how Rosatom can complete this ambitious plan. The question already arose last year when the comptroller's office, having audited the Energy Ministry, announced that 60 per cent of the reactors scheduled to go online by 2015 would not be started up until a later date (which was not specified). At the beginning of this year, Deputy Prime Minister Igor Sechin announced a reduction of funding for Rosatom's investment program. The reason is not, of course, that the Russian government has decided to stop subsidizing the nuclear industry. The problem was rather that the stated deadlines for plant construction inside and outside of Russia could not be met. Nevertheless, nobody intends to withdraw from the comprehensive nuclear planning schedule at this point—at issue is merely a delay, albeit quite a long one.

How is the program financed in Russia? The lion's share is paid from the state budget. Beyond this, Rosatom is to make use of private investors, who are to contribute a considerable part of the funding. Another source is the profit generated by state-owned companies. In 2009, for instance, Kirienko announced that the Baltic nuclear plant currently under construction in the Kaliningrad region, which is designed to export power to the EU, is being built on Rosatom's account and will not receive additional funding from the state budget. In effect, however, it will be subsidized—albeit not in the shape of a lump sum being allocated to the project, but by way of grants to various companies participating in its construction. There is, by the way, one basic factor that could cause the project to fail: a refusal on the part of the European countries to purchase electricity from this power plant. There is no shortage of power in the immediate Kaliningrad area, and even if power consumption were to increase, demand could be met from

non-nuclear sources. The energy generated would thus only be required for export. Therefore, should it transpire that nobody is interested in purchasing electricity, the project would almost certainly be stopped.

Export Problems Post-Fukushima

After Fukushima, Rosatom's prospects of raising private investment dropped to zero. It is very likely that the state company will lose a number of contracts, irrespective of the strong political support extended by the government and the president. At this point, Bulgaria has imposed a three-month moratorium on negotiations with Rosatom over construction of the Belene power plant, pending a review of the project by the HSBC bank. Continuation of this project suddenly seems very unlikely. However, even before the events in Japan, European investors actively boycotted the project: Belene is situated in a seismically active zone that was severely affected by an earthquake in 1977. Since 2008, 13 major banks have refused to issue loans for the project; the last of these was the French BNP Paribas, which is generally quite positively inclined towards the nuclear industry. In order to win contracts with third states, Rosatom is of course trying to convince the world that the new Russian reactors are able to withstand any earthquake. But is this claim based on anything else than purely commercial interests?

The project in Turkey is situated in a seismic zone that is no less dangerous than the Bulgarian one. On the one hand, Turkish Prime Minister Recep Tayyip Erdogan, prompted by his Russian counterpart, has voiced support for Rosatom. However, one would be seriously mistaken to believe that the fate of this project has already been decided. For the past 30 years, public resistance in Turkey has managed to prevent governments from beginning work on even a single nuclear plant. Furthermore, another nuclear plant in a seismically dangerous zone is being planned in neighboring Armenia. It is unclear so far whether the plans for that project will be reconsidered.

The reassessment of nuclear energy in many countries of the world creates problems not only for those plants that are planned in areas at risk of experiencing serious earthquakes. Other reversals are also to be expected. For Rosatom, this means dwindling profits and a loss of resources for the development of the industry in Russia itself. Of all the new plant projects announced, only the most lucrative ones will remain. These are mostly plants from which, owing to their planned sites being close to the EU borders, it is hoped that the Europeans can be convinced to purchase cheap energy. Much will depend on whether large volumes of nuclear power can be exported to Europe. If this is

not the case, the gradual rollback of nuclear energy in Russia itself may accelerate.

Nuclear Safety in Russia

In ten years at the latest, the share of nuclear power produced in Russian nuclear stations will decline due to the deactivation of obsolete reactors, while expenditures on these operations will grow comparatively quickly and reach a volume of several dozen billion US dollars. It will not be possible to replace the old reactors with new ones without a reduction of energy production. Furthermore, from a business point of view, it will be extremely difficult to replace the old reactors with blocks of the latest generation—especially if private investors fail to materialize. In terms of safety, therefore, the question is not which new developments the Russian nuclear industry will be able to present, but what state the currently operational reactors are in.

After Fukushima, many statements were heard in Russia to the effect that safety checks in the nuclear plants had confirmed that they were completely safe. Obviously, the government was afraid to discuss problems in order to avoid panic among Russians, who reacted quite vehemently to the events in Japan. Ultimately, however, information about the true state of the nuclear plants leaked out of government circles, revealing that matters were worse than ever.

On the eve of 9 July, when a session of the State Council met together with President Dmitry Medvedev, the *Ekozashchita!* (EcoDefense!) environmentalist group published a report that had been prepared for that meeting. Usually, such documents are not for public distribution. The information disseminated by the environmentalists was neither confirmed nor denied by the presidential administration, which preferred to remain silent. The report contains data on flaws of Russian nuclear plants revealed during stress testing:

- “The strength (stability) of construction in a majority of nuclear plants does not meet existing requirements for force levels that may occur during extreme environmental events.” In other words: Russia's nuclear reactors are not strong enough to resist various possible natural disasters—including earthquakes.
- “Not all nuclear plants have an automatic emergency shutdown for the case of an earthquake of a given intensity.” This means there is no guarantee that the mandatory security systems would function as designed in order to prevent the type of nuclear disaster that occurred in the case of Fukushima. At issue here are earthquakes of a strength predicted as likely by scientists for the plant location in question.
- “Components of several reactor blocks (e.g., in the Balakovskaya and Kalininskaya nuclear plants) dis-

play evidence of material fatigue as well as unacceptable variations in pressure and temperature, which may lead to their destruction;” also, “the inclination in the foundation slab of the building housing the container for spent fuel rods in the Kursk nuclear power plant, revealed by geodesic observations, may lead to its destruction.” Some reactors and containers for spent fuel rods in Russia could therefore self-destruct all by themselves—without any external influence of earthquakes or other environmental disasters.

- During the crisis at the Fukushima Daiichi reactor, several hydrogen gas explosions occurred, and radioactivity continues to leak to this day. The “hydrogen issue” is also discussed in the report to the Federal Council: “The control systems for monitoring hydrogen concentrations, as well as the systems and elements designed to prevent hydrogen explosions, do not meet the regulations for prevention of hydrogen explosions in nuclear power plants.” This means that while Russia has regulations designed to prevent hydrogen explosions, the existing systems in the power plants do not meet these requirements and can therefore not prevent the occurrence of hydrogen explosions.
- In a separate section, the report of the Federal Council states that “construction flaws and errors” could cause accidents in RBMK-1000 type blocks (one of which exploded in 1986 in Chernobyl). Additionally, a number of specific flaws in various reactor types were identified.
- The report also notes the absence of “effective logging of the operational practices in nuclear plants” as expressed in terms of “quality, defects, failures, and exceedance”. Therefore, the information provided by *Rostechmadzor* about irregularities in nuclear plants can by no means be regarded as comprehensive.

Conclusion

What, then, are the implications? Officials at various levels, all the way up to the prime minister, have claimed

that investigations carried out after the start of the disaster in Japan confirmed the complete reliability of Russian nuclear power stations. These statements are based on nothing but wishful thinking. There is no evidence of Russian plants being sufficiently stable to withstand forces of nature. Instead, individual reactors are in danger of self-destructing even without any impact of natural hazards or major accidents—indeed, it may only be a question of time before this happens.

Today, the situation regarding nuclear energy is worse than even the greatest pessimists could have imagined. And there is no doubt that it will become even more aggravated through the silence on the part of the presidential administration and the government, which continue to try and convince the world that there are no problems in connection with Russian nuclear plants.

On 20 June, Rosatom chief Kirienko stated that the results of the stress testing had shown the advisability of installing new technology to ensure emergency cooling of reactors and emergency power supply. The total costs of such measures are estimated to lie at around 5 billion rubles (approximately €120 million). However, such a measure in no way resolves the problem of instability in various components of Russian power plants that would be unable to withstand an earthquake. Neither would this measure have any effect concerning the lack of emergency reactor shutdown systems in case of an earthquake. It must therefore be concluded that the decisions made in Russia in the wake of the Fukushima disaster are mainly cosmetic in nature. They are by no means sufficient for enhancing the safety of reactors or resolving the existing problems with older first- and second-generation reactors. Twenty-five years after Chernobyl, Russian nuclear plants still pose a great danger to humans and the environment, yet the Russian authorities seem to believe that this is a risk worth taking in the future as well.

Translation from German: Christopher Findlay

About the Author

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Further Reading

On the overall topic of the nuclear industry in Russia, cf.:

- Andreev, Leonid: *The Economics of the Russian Nuclear Power Industry*. Bellona Report 2011, Oslo: Bellona Foundation 2011, 61 p. http://bellona.org/filearchive/fil_Economics-of-the-Russian-Nuclear-Power-Industry-English.pdf
- Kudrik, Igor; Nikitin, Aleksandr; Digges, Charles; Bøhmer, Nils; Larin, Vladislav; Kuznetsov, Vladimir: *Russian Nuclear Industry—The Need for Reform*. Bellona Report 4, Oslo: Bellona Foundation 2004, 198 p. http://bellona.org/filearchive/fil_Bellona_2004_RedReport.pdf