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Russian Nuclear Power Doubles in Size

"We would like to double in size also," Rosatom CEO Sergei Kirienko in Toronto on 24 August 2010, referring to the International Energy Agency's forecast that the world's electricity-generating capacity will have to double by 2030 compared to 2000.

Rosatom, the Russian State Nuclear Corporation, is becoming a leading international player as nuclear power enjoys a renaissance all over the world; but will Russian nuclear energy production also double in size, and if it does what are the implications?

Russia had 32 nuclear reactors on line in 2010. This makes it the fourth-largest nuclear energy power in the world after the USA, France and Japan. In addition, Rosatom has seven reactors under construction and 17 planned at home up to 2020. Over the same period, Rosatom has a number of reactors under construction abroad and plans to build another twenty reactors for export. The latest Russian *Energy Strategy up to 2030* says that nuclear power capacity in Russia should rise from 23 gigawatts to 52–62 gigawatts by 2030, which corresponds to more than a doubling of capacity in twenty years. Hence, the answer to the first question is yes, Russian production will double, at least according to current plans and strategies.

The reactors that Russia predominantly uses in its nuclear power plants, and is producing for the future, both for domestic use and for export, are of the pressurized water type. Russia has had experience with this type of reactor since 1973. Russia also has a robust programme for breeder reactors, and the nuclear plant at Beloyarsk, near Ekaterinenburg, uses this type. Eleven of the 32 reactors in Russia are of the "Chernobyl-type" (RBMK- *Reaktor Bolshoy Moshchnosti Kanalniy* - 'high power channel-type reactor') a class of graphite-moderated nuclear power reactor, which was unique to the Soviet Union. Since they provide 45 percent of Russia's nuclear-generated electricity they have not been shut down. Instead they have been improved from the safety point of view. After the modifications, their service life has been extended up to 2035. These reactors are found in St. Petersburg, Kursk and Smolensk. The extensive plans to build even larger reactors of this type were abandoned in 1986 and no new reactors of this type have been produced since then.

Furthermore, Rosatom is developing mini floating nuclear power plants, using its long-standing experience of building nuclear icebreakers for its Arctic fleet. By 2015, it is possible that eight mini floating nuclear power plants will be in use in places that are difficult to reach, for example, offshore. Several floating nuclear plants have been commissioned for Yakutia in connection with the Elkon uranium mining project. Others are intended for use by Gazprom for offshore oil and gas field development.

Nuclear power is one of the few sectors where Russia is well in the front line of research and design, and its advanced position is acknowledged internationally. In the drive for modernization and innovation, it is of course very gratifying for Russia's leaders to have an advanced sector with scientists and high-tech products that are already internationally respected. The fact that Russia can compete on equal terms with large Western nuclear technology companies – Areva, Siemens, Toshiba, Westinghouse – and win major contracts in countries like India, China, Turkey, Iran and Bulgaria is a matter of national importance and

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enhances its national pride, prestige and self-esteem.

In addition, Russia controls a large share of the supply of nuclear fuel in Europe and the world thanks to its uranium mines, its abundance of uranium stockpiles and an exceptionally large enrichment industry. As a fuel provider and waste manager we may expect that Russia's role will continue to grow now that nuclear power is making such advances. Russia serves all its exported reactors abroad with fuel and repatriates the waste, besides selling fuel to reactors supplied by other makers. The *Megatons to Megawatts* deal with the USA involved that Russian nuclear warheads were recycled into low-enriched uranium fuel for US nuclear power plants. In 2009, this fuel provided 50 percent of American nuclear power energy or one-tenth of America's overall electric power production

In the Russian domestic energy supply, the role of nuclear power will not gain full momentum until after 2030. Despite the gigantic expansion up to 2020 and beyond, and the fact that nuclear power will have a larger share in total energy production, it will still provide only 20 percent of domestic electricity needs. The remainder will be met by gas and, probably, increasingly by coal. However, even a share of 20 percent nuclear power is vital for Russia's energy balance. Without it even more of the valuable gas would be needed at home rather than generate export incomes. If emission issues become more salient in Russia and if energy efficiency improves, then demand for gas might fall and the share of nuclear energy will increase correspondingly faster.

For the West, the fact that there will be more nuclear capacity, especially in Russia, might feel like a threat and a source of insecurity, remembering that it was a Soviet-built civil nuclear installation that caused the most radioactive damage to Europe ever in 1986. Nevertheless, after a complete nuclear silence of over two decades, civil nuclear power is expanding everywhere, without any particular reaction from public opinion. Not even the fact that Russia has modernized their remaining "Chernobyl-type" reactors and intend to keep them on line in European Russia until 2035 has raised any storm of protests.

This is the case even though more nuclear power automatically increases the chances of accidents or sabotage as well as opportunities to divert fissile materials. After 9/11, nuclear plant security worldwide was increased with regard to the risk of terror attacks, in particular attacks involving a large aircraft intentionally crashing on a plant. Yet the problem with all safety and security arrangements is that they tend only to take account of known risks. Eliminating risks that are unknown remains the key challenge.

Concern about greenhouse gases and the need to limit further increases in the use of fossil fuels in electricity production have made nuclear power – which produces almost no carbon dioxide emissions – a strong alternative. Some people claim it is the only current valid alternative if we are to secure enough electricity supply without polluting the environment. If this is true, we can only hope that the safety and security thinking around this powerful technology will be as advanced and ingenious as the technology itself, whether in Russia or elsewhere.

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