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## Russia is planning new reactors but prospects are murky (V. Slivyak)

By Vladimir Slivyak – WISE-Russia, Ecodefense

The Russian government published a new decree on 1 August 2016 outlining plans to build various energy facilities over the next 14 years. The new plan includes mostly fossil fuel plants, but also renewable and nuclear facilities along with final storage facilities for radioactive waste and spent nuclear fuel. The plan is not final – the section on new nuclear reactors says the timing and type of new reactors can be changed.

**Russian authorities like to announce big plans but those plans never get implemented the way they were originally announced.** In 2008, the Russian government approved the 'General Layout Plan for Siting Power Generation Facilities for the period until 2020', which included 13.2 gigawatts (GW) of new nuclear capacity over the next five years. By March 2010, this goal had been downscaled to just 5.2 GW. In July 2012, Russia's overall nuclear power development target for 2020 – 44 GW – was reduced to 30.5 GW. Currently, Russia has 35 reactors with a capacity of 26 GW.

The new plan includes 11 new reactors to be built by 2030. This figure doesn't include several reactors already under construction – the second Leningrad plant (2 units), second Novovoronezh plant (2 units), Rostov plant (1 unit), and the floating nuclear plant Lomonosov. The latest deadline for completion of the floating nuclear plant is 2019.

The second Leningrad and second Novovoronezh plants are both close to completion. Commercial start-up of the second Leningrad plant has been delayed until 2018 as there is no growing demand for electricity due to economic crisis.

The new 2030 plan also doesn't include the second Kursk nuclear plant, where construction

was licensed on June 2, 2016. And it does not include the nuclear plant near Kaliningrad, where construction was frozen in mid-2013. While Rosatom officials repeatedly confirmed that construction of the Kaliningrad plant was indefinitely suspended, they listed it as under active construction in various documents over the past three years, hoping to attract European investment and then to restart construction. The Kaliningrad nuclear plant was originally designed to export all of its electricity to European neighbors. For internal energy supply of Kaliningrad region, wind, gas and coal plants are proposed in the new governmental plan.

### **All of the 11 proposed new reactors belong to new designs. Three**

**breeders** : BREST-300 near Tomsk in Siberia, and two units of BN-1200 design near Ekaterinburg and Chelyabinsk, near the Ural mountains. For a long time, the idea of a nuclear plant near Chelyabinsk was thought to be dead. The local population voted against it in a local referendum over 25 years ago. In the past, Rosatom repeatedly tried to restart this project but unsuccessfully. Here we are witnessing another attempt.

In 2014, it was announced that the first BN-1200 fast reactor would be completed by 2025. But the fast breeder program has already been delayed, and construction of new reactors under this program hasn't started yet.

The remaining eight new reactors belong to VVER-TOI design (7) and

VVER-600 (1). The VVER-TOI was first presented in 2010, but there is not a single reactor of this design under construction or in operation in Russia or anywhere in the world.

A VVER-TOI nuclear power plant – also referred to as AES-2010 (or

NPP-2010) – is a two-unit plant with VVER-1300/510 pressurized water reactors. The plant's estimated operating life is 60 years and power output is 1.26 GW per reactor. The designers of the VVER-TOI project claim it includes a combination of passive and active safety systems which makes the plant safer compared to previous designs. However, according to former Russian deputy Minister of Atomic Energy, Bulat Nigmatulin, passive safety systems are not fully passive and still require automatic system response. With concern over their effectiveness, improvement in this field would make both construction and operation more expensive.

The accident control facility of the VVER-TOI project includes a corium trap. It is expected that this trap will capture the molten core material (corium) of the reactor in case of a nuclear meltdown.

But Nigmatulin points to a discussion among reactor experts concerning **the risk of the trap itself melting if the corium reacts with the material the trap is made of, and hydrogen being released.**

VVER-TOI reactors are proposed to be built near the city of Nizhny Novgorod, where a previous attempt to build nuclear reactors met with mass protests which stopped construction. More such units may be built near the cities of Smolensk, Kostroma and in Tatarstan republic. A previous attempt to build a reactor in Tatarstan was cancelled about 25 years ago after mass protests. In Kostroma, a local referendum was held in 1997 which stopped construction.

A VVER-600 reactor is under consideration for Kola peninsula, close to the border with Norway. The existing Kola nuclear plant has four

VVER-440 reactors, two of them belonging to the first generation of Soviet designs (the World Nuclear Association notes that the EU has paid to prematurely shut down reactors of this design in countries outside Russia). Kola reactors, some of the oldest in Russia, will be partly replaced by the proposed new VVER-600 unit.

While Russian plans looks big on paper, it is unlikely that this program will be implemented. **It's very likely that the current economic crisis, the deepest in history since the USSR collapsed, will axe the most of new reactors.**