
# RUSSIAN NUCLEAR MONO-TOWNS

Report by Decommissioning network 2015

Oslo - Sosnovyi Bor - Chelyabinsk 2015

# Russian Nuclear Mono-Towns

## Report by Decommissioning Network

DECOMMISSION
WITHDRAWAL OF OLD NUCLEAR POWER PLANTS
International Network of Non-Governmental Organizations


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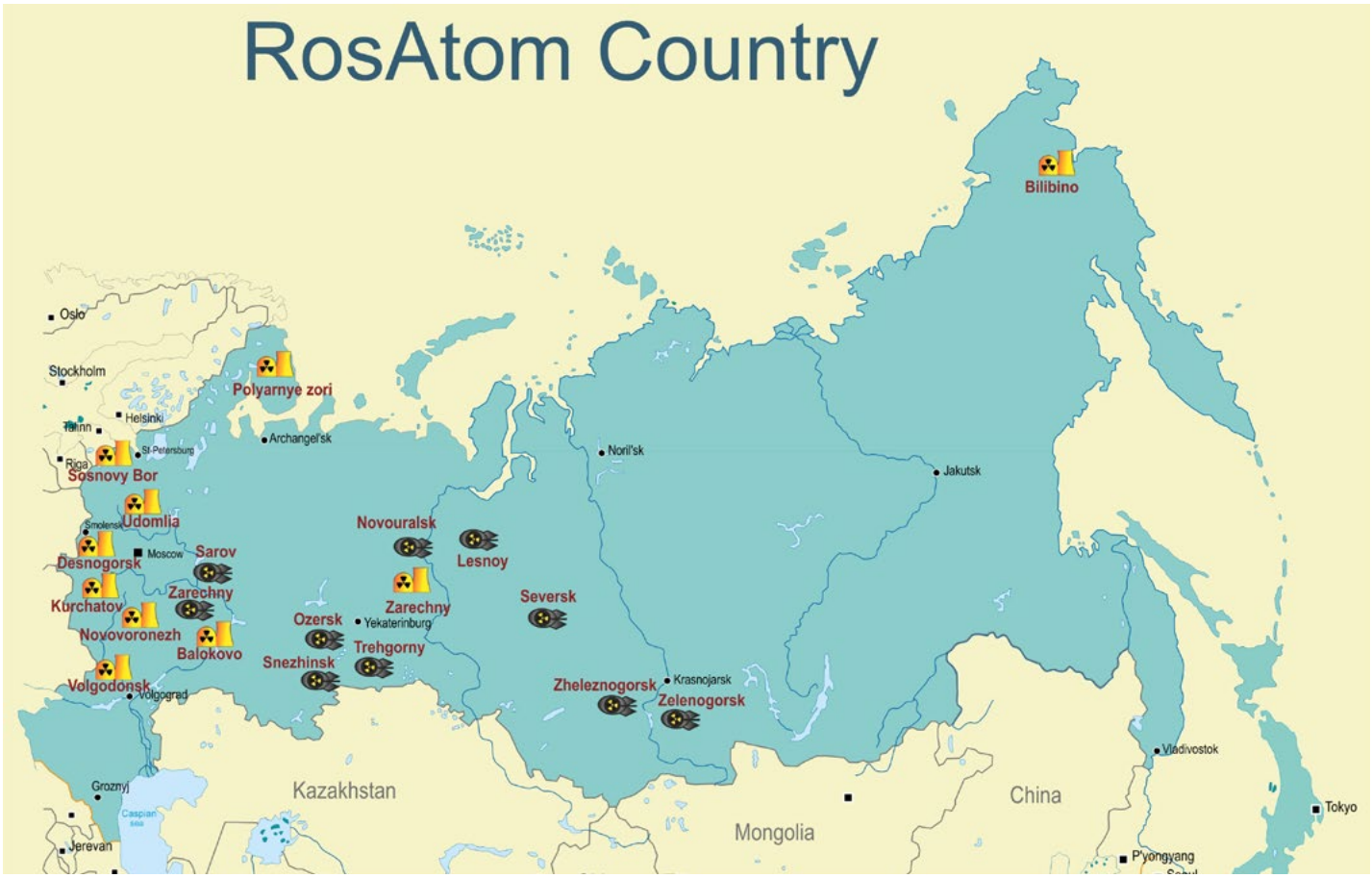
# Past and future of Russias nuclear mono-towns

One of the biggest secrets in the Soviet society was its closed towns and towns. Some of them were well known, but others were so secret that they did not seem to exist. Existing towns that were turned into a closedtown ceased to exist on maps. In other places big towns grew up without any trace on maps or any other official records. Very few except those who lived there knew about their existence. Often they were known to the outside world only by their postcode, for example Krasnoyarsk-26, which stands for Zheleznogorsk.

The closed towns and towns were established in the period 1946-1953, and most of them were linked to the development of the nuclear industry. Some were organized around nuclear weapon development, some around nuclear electricity production, some on handling of nuclear waste, while others had more a strategic military character. They went under the name ZATO (ЗАТО - **Закрытое административно-территориальное образование)**, or Closed administrative-territorial unit. Most of them were literally surrounded by fences, and the admission was heavily restricted. Today Russia has around 40 closed towns and towns left, but in the Soviet Union the number of closed ZATOs was twice as many. Rosatom, the Defense Ministry, the Russian Space Corporation and the Ministry of Industry and Trade are responsible for the remaining ZATOs. To enter a ZATO often requires a written permission, but how the admission policy is handled varies fromtown totown. Some of the former closed ZATOs have been opened up and do no longer require written permissions to visit for both Russian citizens and foreign citizens; some are only open for Russian citizens.

**Rosatom is a Russian government organization responsible for both civilian and military nuclear activities. Rosatom states this on the website:**
**"ROSATOM's mission is to maintain national interests in defense, nuclear safety and nuclear power by achieving global leadership in advanced technologies, competencies and innovations."**

20 of the close nuclear towns are central to the nuclear industry. They have in common that they are all centered round one major industry, the nuclear industry, to the exclusion to almost everything else. These are the nuclear mono-towns of Russia. In these towns, the running of nuclear electricity production reactors, production of nuclear fuel and/or the handling of spent nuclear fuel and nuclear waste is the dominating activity. 10 nuclear mono-towns in the western part of Russia are organized round civilian nuclear power plants. 10 more are located in the eastern part of Russia, in the Ural region and further east in Siberia. In the nuclear mono-towns in the east, some have facilities for military nuclear weapons production, some for nuclear fuel for civilian reactors and some for radioactive waste handling.




Map over nuclear mono-towns. The yellow symbols shows mono-towns with nuclear power plants, the other symbols are towns with nuclear fuel cycle operations and nuclear weapons production facilities.

## Closed towns struggling in a new political and economic environment

Today, the nuclear mono-towns in Russia are struggling with lack of money and investment. While privileged under the Soviet era, the mono-towns faced the same challenges as other industrial towns and towns after the breakdown of the state in 1990ies. Back then subsidies and state contracts diminished, salaries decreased and workers were fired. In the nuclear mono-towns it was even harder to reorganize and establish new activities than in most other places. State programs and investment schemes have provided some new opportunities, but most of the mono-towns dominated by nuclear power plants remain as dependent on their corner stone enterprise as earlier. This is an important reason for the Russian authorities` search for new ways to maintain the infrastructure of the closed nuclear towns. Another reason is a national strategy to be a major exporter of nuclear energy, in the form of electricity, nuclear power plants and nuclear fuel, as well as handling of nuclear waste from other countries. In many cases, the restricted admittance to many of the nuclear mono-towns is a barrier to the establishment of other types of business not connected to the nuclear industry. Despite this, business incubators have been set up in several of the nuclear mono-towns to help establish new industries and businesses. Zheleznogorsk is an example of a partly successful transition (see p. 12).

**Table 1. Nuclear mono-towns around civilian nuclear power plants.**

| Nuclear mono-town (Region) | Town population (thousands) | Name of NPP | Number of units x type=capacity (MWe) | Percentage of average NPP worker's salary to average salary in region | Tax payments to the budget of region/ Municipality in 2010 ($ mln) |
|---|---|---|---|---|---|
| Balakovo, (Saratov) | 197 | Balakovo | 4xVVER-1000=4000 | 310 | 37,3 / 3,7 |
| Zarechny, (Sverdlovsky) | 30,4 | Beloyarsk | 1 x BN-600 = 600 | 250 | 20,1 / 1,8 |
| Bilibino (Chukotka) | 5,1 | Bilibino | 4 x EGP-6 = 48 | 220 | 30 / 1,6 |
| Udomlya (Tver) | 31,8 | Kalinin | 4 x VVER-1000 = 4000 | 300 | 63,1 / 2,9 |
| Polyarnye Zory (Murmansk) | 18 | Kola | 4 x VVER-440 = 1760 | 370 | 27,3 / 2,7 |
| Kurchatov (Kursk) | 47,2 | Kursk | 4 x RBMK-1000 = 4000 | 330 | 58,8 / 3,7 |
| Sosnovy Bor (Leningrad) | 67,1 | Leningrad | 4 x RBMK-1000 = 4000 | 200 | 74,8 / 4,5 |
| Novovoronezh (Voronezh) | 34,9 | Novovoronezh | 2 x VVER-440 + 1 x VVER-1000 = 1834 | 290 | 25,6 / 5,2 |
| Volgodonsk (Rostov) | 170,8 | Rostov | 2 x VVER-1000 = 2000 | 320 | 35 / 6,4 |
| Desnogorsk (Smolensk) | 32 | Smolensk | 3 x RBMK-1000 = 3000 | 320 | 35 / 37,2 |
| Total: 10 towns | 634,3 | 10 NPP | 33 units, total capacity = 25,243 MWe | average 291 | total: 396,1 / 37,2 |

## Privileged life in the closed nuclear towns.

The employees of the nuclear industry, labor unions and politicians in the nuclear mono-towns are struggling to keep their privileged situation unchanged. The average salary for employees in the closed nuclear towns may be higher than the average in the regions around them, but conditions vary considerably. In the first years after the collapse of the Soviet Union many employees lost their jobs. The inhabitants of the nuclear mono-towns often have better education facilities, health care and other services compared to the people in the regions around them. Both income and social infrastructure in the nuclear mono-towns are closely tied to the nuclear industry, as they are paid for from the budget of the nuclear power plants, fuel production plants and waste handling facilities. These factors make the nuclear mono-towns extremely vulnerable, and the resistance against change from employees and inhabitants and their politicians is very strong as a result.

## Nuclear export a major Russian policy and economic objective

Partly as a response to these problems, but also in response to other strategic needs, the Russian government has a strategy to establish a new role for the closed nuclear towns. Key elements in this strategy is to increase export of electricity from its nuclear reactors to Europe, as well as to export Rosatom`s nuclear reactors for electricity production to other countries. Rosatom also supplies the nuclear fuel to Russian-built reactors abroad, and Rosatom receives some of the spent nuclear fuel for reprocessing in Russia. An article from the World Nuclear Association sums up the Russian nuclear strategy: **Exports of nuclear goods and services are a major Russian policy and economic objective.***

* http://www.world-nuclear.org/info/Country-Profiles/Countries-O-S/Russia--Nuclear-Power/ Read 20 April 2015

## Table 2. Nuclear mono-towns for fuel cycle operations and nuclear weapons production facilities

| Close Nucleartown (Region) | Main business | Name of Enterprise | Population (thousands ) | Rosatom payments/year to social infrastructure, $ mln. (+ % incrising in 4 - 5 years) | Percentage of nuclear facility worker's salary to average salary in region |
|---|---|---|---|---|---|
| Sarov; Kremlev; Arzamas-16, 60, 75; Moskva-300 (Nizhny Novgorod) | The development of nuclear weapons | All-Russian Scientific Research Institute for Technical Physics (VNIITF)) | 88,6 | 39.5 (+ 162%) | 250 |
| Zarechny; Penza-19 (Penza) | Production of nuclear weapons components | Production Association «Start» | 62 | 26.3 (+ 187%) | 160 |
| Snezhinsk; Chelyabinsk-70 (Chelyabinsk) | Nuclear Munitions Development & Testing and Defense Power Facilities | All-Russian Scientific Research Institute for Technical Physics (VNIITF) | 50,6 | 83.9 (+ 172%) | 250 |
| Tryokhgorny; Zlatoust-36 (Chelyabinsk) | Devices and systems for nuclear power plants and nuclear weapons control | Federal State Unitary Enterprise «Instrument-Making Plant» | 34,5 | 33.6 (+185%) | 180 |
| Lesnoy; Sverdlovsk 45 (Sverdlovsk) | Recycling and assembly of nuclear weapons, the production of stable isotopes | Combine «Electrochim-pribor» (Plant 418), Nuclear Warhead Plant | 65 | 52.2 (+ 32%) | 180 |
| Novouralsk; Sverdlovsk-44 (Sverdlovsk) | Uranium enrichment, separation of uranium isotopes & development of centrifuge technology | Ural Electro Chemical Plant | 98 | 170 (+ 111%) | 180 |
| Ozersk; Chelyabinsk-65, 40 (Chelyabinsk) | Storage, reprocessing of spent nuclear fuel, isotopes production & manufacture of instruments | Mayak Production Association | 99 | 90 (+ 138%) | 180 |
| Seversk; Beryozki; Tomsk-7 (Tomsk) | Creation of nuclear weapons components | Siberian Chemical Combine | 114 | 81.1 (+ 9%) | 180 |
| Zheleznogorsk; Krasnoyarsk-26 (Krasnoyarsk) | Production of weapons-grade plutonium | Mining & Chemical Combine | 93,7 | 56 (+ 45%) | 160 |
| Zelenogorsk; Krasnoyarsk-45 (Krasnoyarsk) | Production of weapons-grade plutonium | PA Electrochemical Plant | 69 | 91.6 (+ 49%) | 220 |
| Total: 10 close nuclear towns | | | 774,4 | $ 724.2 mln./ year | everage for all nuclear rowns: 194 |

# Increased demand for nuclear fuel helps closed nuclear towns

The Russian government hopes to achieve several goals at one time with this strategy. An increasing number of Russian built nuclear electricity reactors, also in other countries, will increase the need for nuclear fuel. The nuclear fuel production in the closed nuclear towns will therefore increase. The expectation is that income from the nuclear fuel production and also from the handling of spent fuel will help to maintain the Russian civilian and military nuclear industry in the closed towns in the east of Russia.

Without an increase in income from nuclear fuel production and handling of the spent nuclear fuel, the maintenance of the nuclear infrastructure in the closed nuclear towns in the east will be more difficult. This problem will increase, as the present financial crisis means that there is less money available in the federal budget for investments in the nuclear infrastructure.

A manifestation of the financial crisis was seen in October 2015, when it was announced that six of the closed towns would be open from January 1st 2016. The opening process was initiated by the Ministry of Economical Development, with the goal to reduce the financial pressure on the Russian state budget. Both citizens and local authorities have reacted negatively on the opening, fearing among other things increased level of crime and reduced budgets.

**Three of these towns house Rosatom enterprises:**

- Sverdlovsk, (former Tomsk-7), where the Siberian chemical factory is located, producing hexafluoride uranium.
- Novouralsk (former Sverdlovsk 44), where the world's biggest factory for enrichment of uranium is located.
- Zelenogorsk (former Krasnoyarsk 45), where an electrochemical factory also producing enriched uranium is located.

# Russian oil revenue finance nuclear export

Some argue that Russia is using revenues from oil and gas to finance its export of nuclear technology. The argument is that since prices for oil and gas varies over time, the income from the oil and gas sector is also very variable and insecure. The insecurity of the income from this export is a problem for the government. It is difficult to know what you can spend on schools, infrastructure and so on next year, if you do not know what your income will be. If you use oil and gas revenue on nuclear power plants for export of electricity, or for investment in nuclear power plants abroad, then you may get a more secure income from this investment, with less variations from year to year compared to oil and gas revenue.

The best way to secure a more stable income is if Russia is able to sell nuclear power plants with a Build Own Operate - BOO-agreements to other countries. Then, the price for the nuclear electricity paid by the host country will be fixed, and not variable. By building, owning and operating nuclear power plants in other countries, Rosatom and Russia secures a permanent customer and a stable income for their services and their nuclear fuel, at least as long as the plant is operating. In the long term, in the Russian thinking, this is more secure and a better alternative than the insecurity of a variable income from export of oil and gas.*

# Electricity generation for export

In the Kaliningrad enclave, Rosatom started the building of two new reactors in 2010 intended for export of electricity. However, none of the intended customers in other countries have been interested. Lithuania has explicitly refused to buy electricity from the Baltiiskaya Nuclear Power Plant (BNPP) because of the competition with its own plan to build a new nuclear power station at Visaginas. Germany, Poland and the other Baltic states have also refused to buy electricity from the new reactors.**,*** The future of the two reactors is therefore uncertain.

* http://atomicinsights.com/russia-using-oil-wealth-finance-nuclear-exports/ Read 20 April 2015
** http://en.wikipedia.org/wiki/Kaliningrad_Nuclear_Power_Plant Read 20 April 2015
*** http://www.osw.waw.pl/en/publikacje/analyses/2013-06-12/russia-freezes-construction-nuclear-power-plant-kaliningrad Read 20 April 2015

It has been argued that the main reason for Rosatom and Russia to start the building of BNPP was to stop Lithuania from building a new nuclear plant at Visaginas, and /or stopping the integration of the Baltic States into the European grid*. In other words, it is difficult to say if economic or geopolitical motives were the most important for starting the construction.

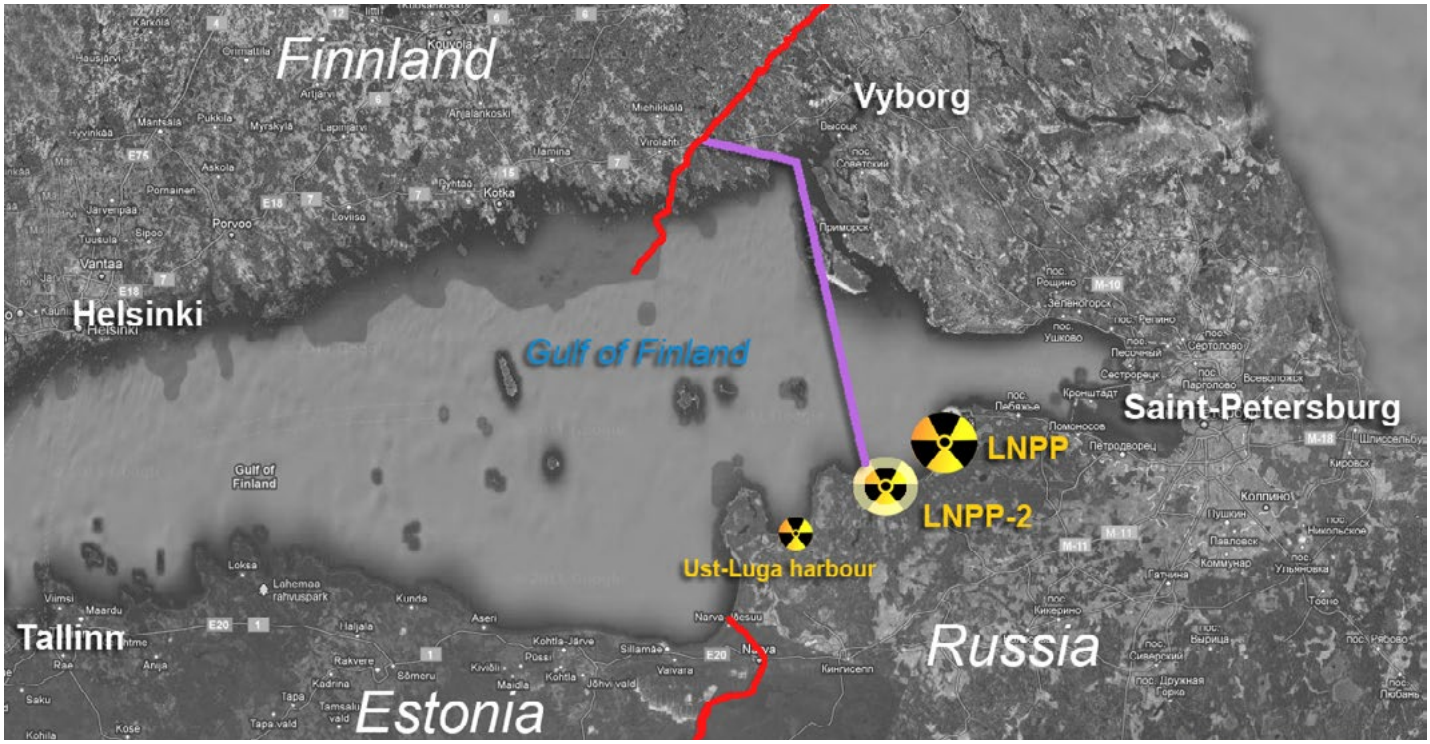
## New underwater electricity cable will increase the risk of accidents

The Russian company JSC Edinaya Energeticheskaya Sistema (Unified Energy System of Russia), in cooperation with the State Corporation on Nuclear Energy (Rosatom), is laying an underwater 1000 MW power cable from the new Leningrad nuclear reactor -2 (LNPP-2, under construction) on the south shore of the Gulf of Finland, to a point south of thetown of Vyborg on the north shore. A public hearing of the environmental impact assessment (EIA) of the cable project was held in Sosnovyj Bor in December 2011.

On one hand the cable, according to the EIA, will increase the transfer capacity of electricity from Russia to Finland. On the other hand, the operation of the LNPP-2 (4×VVER 1200 reactors) has the chance to increase the risk of an accident for old LNPP (4×RBMK-1000 reactors), according to independent expert analysis. It will decrease the stability of the electricity transfer to Finland in winter time, as steam from the cooling towers for the new reactors may cause icing of the high voltage grid transmission and possibly destroy it. The licenses of Rostekhnadzor (Russian regulator of nuclear safety) will provide the opportunity for the common operation of both old and new nuclear reactors at the Leningrad power plant from 2018 to 2026.

Increased electricity export from Russia will lead to environmental dumping, due to lower safety and environmental standards in Russia. It will also decrease environmental safety in the Baltic part of Russia as operation time of old and unsafe nuclear reactors will be prolonged**.

The cable will have a capacity of 1000 MW, and is capable of transporting electricity directly from 1 of 4 units of VVER-1200 nuclear reactors of the New.




The planned underwater cable for the export of nuclear electricity from the Leningrad nuclear power plant in Finland.

* http://bellona.org/news/nuclear-issues/2014-04-baltic-visaginas-will-two-nuclear-neighbor-competitor-plants-get-built Read 20 April 2015

** For more information, please consult the web page www.decomatom.org.ru

Leningrad NPP-2. The cable will bypass the limitations in the transmission lines around St Petersburg, and allow a more direct access to the international electricity market via Finland. In the last 10 years Russian-Finnish transfer of electricity has been about 10-11 TWh/year. This is about the equivalent of the electricity production of the 2 oldest Chernobyl type reactors of Leningrad NPP. These reactors have received a license for the prolonged operation after reaching their 30 years design limit. This political decision was not legal, as it was made without required public participation and environmental impact assessment (EIA).

## Nuclear export as a foreign policy tool

Another goal of the Russian government is to use the Russian energy supply and energy technology as tools for influencing the politics of their neighboring countries. Russia has used its export of natural gas as a means of exerting pressure on their neighbors in the past, as in Ukraine. It also plans to use Russian nuclear reactors as a similar method of political influence*. Rosatom has among other things concluded an agreement with the Ministry of Foreign Affairs in order to strengthen promotion of the services of Rosatom abroad**. In 2015, Rosatom claims it is currently in talks on the construction of at least 30 units for nuclear power plants abroad. It has ongoing cooperation on nuclear power plant construction in China, India, Turkey, Belarus and Vietnam is at various stages, accounting for a total of 11 reactors. Preparations are also underway for the construction of Bangladesh's first nuclear power plant***.

## BOO Build, Operate, Own

A BBO-agreement with a host country means that Rosatom Builds, Owns and Operates (BOO) the nuclear power plant in question. This makes the host country very dependent on the Russian state owned company that is running their nuclear power plant. So far only a nuclear power plant in Turkey is sold with a BBO-agreement. But reactors have been sold with an agreement of supplying nuclear fuel from Rosatom, and some with an agreement that Rosatom will receive the spent nuclear fuel.

Kirill Komarov, First Deputy CEO of the state nuclear corporation Rosatom, told a Brussels audience in 2015 that his company could guarantee a fixed price for electricity of $50/Mwh from the new nuclear plants it builds, if the client chooses the firm's services for their lifecycle, other words BBO****. According to EU policies, however, fuel supply should be diversified. The EU will not allow Rosatom to build NPPs in the EU with no options for fuel supply. This is just one of several barriers from the EU to the Russian nuclear export ambitions (see below).

## Comparison between Rosatom offer and cost of new reactor with western technology

Nuclear construction projects in Europe at the moment are Olkiluoto in Finland and Flamanville in France. Both are economic disasters. If you take the capital costs when completed and the interest during construction into account, the cost for the electricity generated will reach 100 € /MWh. The procurement process in the UK for the planned Hinkley Point nuclear power plant reached a similar level of the total price of electricity. However, that included a long-term contract with inflation-adjustment and several risk reducing commitments from the governments side.

Euratom Director-General Stamatios Tsalas said at the same meeting that according to the Euratom treaty, which is binding for member states, it is Euratom who should buy the nuclear fuel and then give it to the utilities. But in reality, a simplified procedure has been used where the utilities look at what producers offer. When they make their contracts, they send them to the agency for approval.

"Without our signature contracts are not applicable according to EU law," he said.

The lack of reciprocity in the opening of markets is also a barrier. Russia has 18 Russian-made nuclear reactors on its soil, while Western firms are excluded from building nuclear plants on Russian soil. As long as the Russian market for nuclear reactors is not open for non-Russian companies, and especially EU companies,

* http://www.geopolitika.lt/index.php/print.php?artc=4813 Read 20 April 2015
** http://www.world-nuclear-news.org/C-Rosatom-strengthens-cooperation-with-Russian-foreign-ministry-03061502.html
*** http://sputniknews.com/world/20150710/1024447768.html
****http://www.euractiv.com/sections/energy/rosatom-woos-eu-guaranteed-low-electricity-price-313884?utm

the EU is not willing to give Rosatom full access to the EU market*. The same goes for export of electricity. Without a generally open market for electricity which allows EU companies to sell electricity to Russia, EU will not grant open access for Rosatom or other Russian companies to export to Europe. The present Finnish electricity exchange with Russia is based on an agreement from before Finland joined the EU. It is therefore not covered by the EU policy, which is aimed at possible new contracts. The plan to build a new nuclear reactor at Pyhäjoki by the Bothnian Gulf is testing the EU policy, especially regarding the supply of nuclear fuel. Rosatom is not going to supply the nuclear fuel for the Pyhäjoki because of the EU (and Finnish) resistance against becoming too dependent on Russia.

## EU policies possible barrier to Russian nuclear expansion in Europe

Several different EU policies may directly and indirectly be blocking the way for Russian sale of electricity to the EU. One policy is the construction of a ring of high voltage transmission lines around the Baltic Sea and de-coupling of Estonia, Latvia and Lithuania from the Russian grid. This will reduce the present sale of electricity from Russia to the Baltic States, and also reduce the dependence and vulnerability of the Baltic States on Russian electricity export. If the transmission capacity from the Nordic countries is increased as a result of the Baltic ring, cheap hydro- and nuclear electricity from these countries may win market shares by being cheaper than existing generating capacity in the Baltic States** , and maybe also the Baltiiskaya NPP.

Another EU policy is the EU inner market for electricity and the demand for transparent cost and production conditions of the imported electricity. This means that the imported electricity must be produced under the same conditions as from nuclear reactors in the EU countries. The nuclear electricity from Russian nuclear reactors is not considered to be produced under the same safety regulations as from remaining EU-reactors. The nuclear fuel cycle for Russian nuclear reactor is especially problematic, and this is connected with the closed nuclear towns in the east of Russia. How big a role the environmental and health aspects of the Russian nuclear fuel cycle plays in the present EU policy is an open question. It ought to play a dominating role, in the light of the serious environmental and health problems the nuclear fuel cycle in Russia is causing.

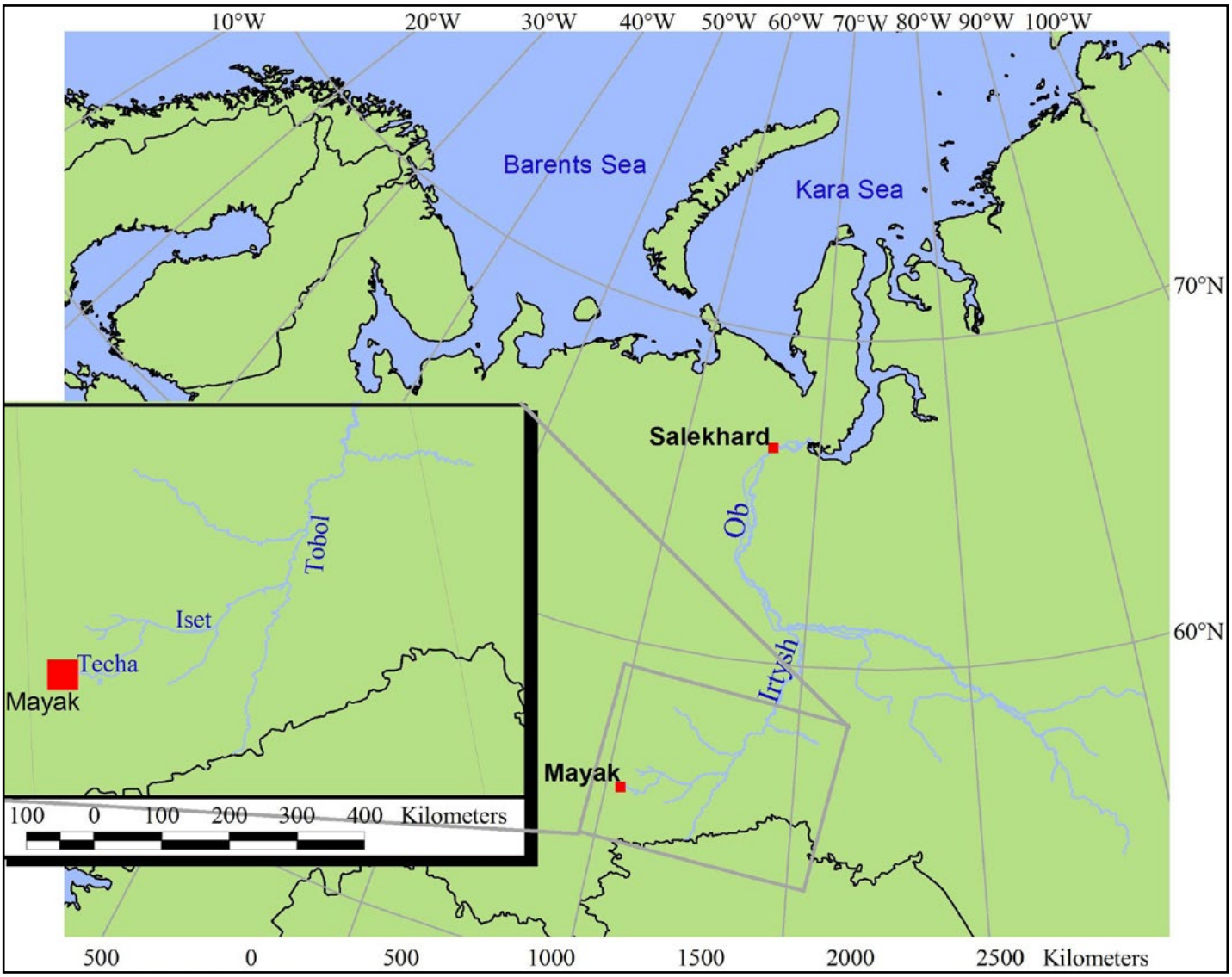
Naturvernforbundet and its Russian partners is therefore of the opinion that if Russians electricity is to be exported to the EU, its nuclear reactors should be subject to the same safety regulations as the nuclear reactors in the EU. At present, it is not. Several initiatives have been taken in order to promote an international discussion about this issue as well as common rules for the handling of nuclear waste. The start of a discussion among the states bordering the Baltic Sea in the first priority, but it is also important to involve the EU and other governments with an interest in promoting nuclear safety and the removal of health hazards from nuclear technologies.

## Unsafe storage and processing of spent nuclear fuel

The closed nuclear towns in the east of Russia have huge amounts of radioactive material stored under very unsafe conditions. The stored nuclear material is partly spent nuclear fuel from nuclear reactors located in western Russia. This is reprocessed, together with plutonium from nuclear missiles, into new nuclear fuel for reactors. The reprocessing causes huge amount of radioactive waste. Most of it is contaminated only at a low or medium level of radioactivity. Some of it is highly radioactive and most dangerous to the health and safety of the population in the area around the plants located in the closed nuclear towns. On several occasions there have been accidents that has spread radioactive material over great areas, and caused widespread radioactive contamination. The best known accidents have been around the nuclear installations in the closedtown of Mayak, see map below.

* http://www.euractiv.com/sections/energy/rosatom-woos-eu-guaranteed-low-electricity-price-313884?utm_source=EurActiv+Newsletter&utm_campaign=cc4d3da0b5-newsletter_weekly_updat%20e&utm_medium=email&utm_term=0_bab5f0ea4e-cc4d3da0b5-245683805

** http://www.energypost.eu/russian-nuclear-power-plant-kaliningrad-help-baltic-states-integrate-eu-power-grid/ Read 20 April 2015




Mayak reprocessing plant and contamination of the Ob river and Kara Sea

The map is from an article, based on a study made by the NRPA – Norwegian Radiation Protection Agency, in 2009*. The article refers to the results from the study of the effect of radioactive contamination on the health of local residents in an area affected by radioactive contamination. The Techa River has been contaminated from three large accidents between 1949 and 1967, which spread radioactive waste from the Mayak nuclear installations over an area of more than 15.000 to 20.000 km².

The population along the Techa river, which is near the Mayak closed nucleartown, has an increased mortality from cancer, probably caused by increased levels of radioactivity. The Techa River is in turn connected with the great Siberian river of Ob, which is discharging into the Kara Sea, a part of the Arctic Ocean. If the contamination is not stopped, it may spread via the Ob into the Arctic Ocean and the fishing grounds in the Barents Sea north of Norway and the Kola Peninsula in Russia.

Another example is the huge store of spent nuclear fuel in the closed nucleartown of Sosnovyj Bor at the south shore of the Bay of Finland. This nuclear mono-city is home to the largest concentration of both civilian and military reactors in the world. Leningrad nuclear power plant, which is located here, has a temporary wet storage facility which has accumulated more than 40 000 units of spent nuclear fuel (SNF) rods, while it was designed for only 20 000 rods of spent fuel. This means that in the course of more than 42 years of the Leningrad NPP operation, a quantity of nuclear waste equivalent to more than 50 Chernobyl accidents has been accumulated in temporary storages on the Baltic shore.

* Overview of Dose Assessment Developments and the Health of Riverside Residents Close to the "Mayak" PA Facilities, Russia. Article by William J.F. Standring,* Mark Dowdall, and Per Strand
Published in Int J Res Public Health. 2009 Jan; 6(1): 174-199. Published online 2009 Jan 9 10.3390/ijerph6010174

The storage is located just a few hundred meters from the Bay of Finland, and a leak in the storage containment may release so much radioactive material that the whole Baltic Sea may be affected. This would in case put the health and lives of millions of people around the Baltic Sea in danger. The present policy of the Russian authorities is to transport the content of the storage to Siberia. This reduces the risk to the population around the Baltic Sea, but represents an increased risk for people living along the railway lines where the spent nuclear fuel is transported. Also, the storage and treatment of the spent nuclear fuel at its destination points in Mayak and further east is not satisfactory.

# Conclusions

Even if it is a process towards opening of some of the closed towns, the main part of the closed towns in the east of Russia remains. They will be partially kept alive by the electricity consumers in other countries, if Rosatom succeeds in their export strategy. The buying of electricity from Russia, or buying nuclear reactors, or let Rosatom build, own and operate reactors on their territory, will make the country contribute to the upkeep of the environmental hazardous nuclear infrastructure of Russia. Both the production and reprocessing of nuclear fuel in Russian are tightly intertwined with the military use of uranium. It is not possible to separate the civilian and the military side of the nuclear industry in Russia. When foreign countries buy electricity or reactors from Russia, they contribute to the continuation of the civilian-military nuclear industry in Russia, with its grave consequences for the Russian population in the regions around the closed nuclear towns. In the longer run, the nuclear industry located in the closed nuclear towns may also represent a very clear danger for health and safety for other countries.

# Examples of closed nuclear towns in Russia today

## Sosnovyi Bor

Located outside St. Petersburg at the southern shore of the Gulf of Finland. The town was established around Leningrad Nuclear power plant in 1958. Sosnovyj Bor contains several nuclear facilities, such as waste storage for low radioactive waste, storage of spent nuclear fuel and research nuclear submarine reactors, and the Aleksandrov Research Technological Institute. Sosnovyj Bor has 67 000 inhabitants, of which most works at the nuclear facilities. Thetown has about 500 large, medium and small businesses, of which the majority is connected with the nuclear activities. Sosnovyj Bor municipal authorities have engaged a business incubator for promotion of alternative business.

Sosnovy Bor. Source: http://www.skyscrapercity.com/showthread.php?p=103474680

## Poliarnye Zori

Located in Murmansk county at the Kola Peninsula, Poljarnye Zori was built from1968 around Kola Nuclear power plant. It has 15.000 inhabitants. Thetown has no business incubator. Efforts are being made to diversify the economy in Poljarnye Zori, and lessen the dependence on the NPP as the sole employer and source of income for the inhabitants as well as the municipality. The development of skiing facilities at the slopes of a nearby mountain is among these initiatives, aimed at attracting skiing tourists as well as increasing the quality of life in the Poljarnye Zori for its inhabitants*.

Poliarnye zori. Source: http://hellorussia.org/gorod_polyarnye_zori_polar_dawns_city.html

## Zheleznogorsk

Zheleznogorsk is located in Krasjnojarsk region, in the very middle of Russia. Thetown was founded in 1950, and the core activity was plutonium production. Zheleznogorsk with its 100 000 inhabitants has been able to develop, and host today the company that has developed the Russiand alternative to GPS, Information Satellite Systems company (I.S.S.), which employs 8000 persons. There are also plans to establish a nuclear waste storage inside the closed area. Environmentalists strongly oppose the plan, as it will be difficult to monitor the environmental consequences of the storage.

Zheleznogorsk. Source: http://www.mimi-gallery.com/jeleznogorsk-krasnoyarskiy-kray-dk?p=1

* Nord-News 21 February 2013

## Ozyorsk

Ozyorsk is located in Chelyabinsk county in the Ural mountains. It was and remains a closed town because of its proximity to the Mayak plant, one of the sources of Soviet plutonium during the Cold War, and now a Russian facility for processing nuclear waste and recycling nuclear material from decommissioned nuclear weapons. The plant itself covers an area of approximately 90 km² and employs about 15,000 people. Environmentalists are highly concerned with the transport of fuel across Russia to Mayak, and also with the overfilled storage that have documented leakages to the surroundings.

Ozersk. source: http://ok.ru/ozerskfoto

## Sarov

In 1946, the All-Union Scientific Research Institute of Experimental Physics, which was a nuclear weapons design facility that would become known in the West under the acronym VNIIEF, was built, and Sarov became a closedtown. VNIIEF has now become the Russian Federal nuclear center, which employs 1/5 of the population of around 92 000. Thetown is also a research center, and home of Russia's largest supercomputer. It is still one of the most guarded closed towns, and employees with security clearance travelling abroad can go only to Belarus, Kazakhstan (and Ukraine).

Sarov. Source: http://www.photosight.ru/photos/5856807/

WITHDRAWAL OF OLD NUCLEAR POWER PLANTS

International non-governmental organizations network

www.decomatom.org

**Decommission is an international NGO network, established in 2003 http://decomatom.org Our mission is promotion of safe, socially and ecologically acceptable decomissioning of NPP's reactors which has reached their design limit. It is necessary to take into account the world's best experiences on decommissioning, and secure openness and participation of all interested stakeholders on the basis of democratic principles.**

FOR THE NATURE

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KOLA ENVIRONMENTAL CENTER

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DECOMMISSION

WITHDRAWAL OF OLD NUCLEAR POWER PLANTS

International Network of Non-Governmental Organizations