

**GREENPEACE**

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# **FRENCH NUCLEAR WASTE: A ONE-WAY TICKET TO SIBERIA**

The French nuclear industry  
is sending its cumbersome stocks  
of spent uranium to Russia



UN 332

## Summary

At each stage of its production, nuclear electricity generates tons of waste and material that is difficult to reuse and as a result accumulates throughout France. These ever-increasing quantities of useless radioactive substances are a problem for the French nuclear industry and tarnish its message regarding the alleged environmental virtues of nuclear power. To rid themselves of some of this cumbersome waste, French companies EDF and Orano have chosen to resume the sale of spent uranium to Russia – a business interrupted over 10 years ago.

While investigating in the port of Le Havre, Greenpeace France discovered that several dozen tons of uranium obtained by reprocessing spent fuel were loaded on board the ship *Mikhail Lomonosov* bound for St. Petersburg on 20 January and 12 February 2021.

Orano (formerly Areva), which specializes in the production and processing of nuclear fuel, has acknowledged that it was behind these shipments. The company revealed<sup>1</sup> that it signed a contract for the sale of more than 1,000 tonnes of reprocessed uranium to the Russian state-owned nuclear company Rosatom, which is supposed to reuse the uranium in its nuclear reactors after processing at the Seversk (Tomsk 7) plant in the heart of Siberia. Russia already has enormous amounts of this material at its disposal, so it is likely that French reprocessed uranium will simply be stored at Seversk for an unlimited period. According to a confidential source of Greenpeace France, Orano is thought to be preparing another shipment of spent uranium from France to Russia between October and December 2021.

These shipments are not about to stop: in May 2018, Rosatom subsidiary Tenex announced a deal with EDF to process French reprocessed uranium, also at Tomsk 7<sup>2</sup>. Once processed, with the production of tons of waste that will remain in Siberia, this uranium should return to France to fuel the Cruas-Meyssac nuclear power plant. Unlike Orano, EDF has not, to date, restarted shipments of reprocessed uranium to Russia.

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<sup>1</sup> This information was given by an Orano official to Greenpeace France in an e-mail dated February 24, 2021. The complete e-mail is available on page 6 of this briefing.

<sup>2</sup> "Rosatom subsidiary signs contract with EDF," Le Figaro, May 25, 2018 [in French], <https://www.lefigaro.fr/flash-eco/2018/05/25/97002-20180525FILWWW00206-une-filiale-de-rosatom-signe-un-contrat-avec-edf.php>



In 2010, when it stopped exporting reprocessed uranium to Russia, Areva (now Orano) acknowledged that it had stopped for economic and environmental reasons<sup>3</sup>. The process used at the time in Tomsk to transform the uranium was extremely polluting, with chemical and radioactive residue injected directly into the subsoil of the site in liquid form. Greenpeace France has no guarantee that this process is cleaner today.

Greenpeace France calls for a permanent halt to exports of French reprocessed uranium to Russia, a practice which make no environmental, social or economic sense. Most of the material remains in Russia and is not reused, making it nuclear waste export, a practice that is subject to strict conditions in the EU legislation<sup>4</sup>, including the safety and proper management of the destination facility. Currently classified by French law as a recoverable "material," reprocessed uranium should be classified as "waste"<sup>5</sup>, as is the case in most of the world's nuclearized countries. Measures must be implemented for its indefinite storage inside France. Furthermore, because it produces hazardous waste for which there is no treatment or recycling solution, nuclear energy production should be definitively excluded from the European taxonomy, an inventory of green investments.

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<sup>3</sup> High Committee for Transparency and Information on Nuclear Safety (HCTISN), [Presentation of the French "Fuel Cycle" in 2018](#), p.14 [in French]

<sup>4</sup> In particular, Article 4 of Council Directive 70/2011/EURATOM.

<sup>5</sup> In September 2019 Greenpeace France published ["At what price? The hidden costs of nuclear waste"](#) [in French] a comprehensive report on the actual use and reuse prospects of nuclear "materials", demonstrating the need to reclassify them as "waste".

## With reprocessed uranium accumulating, the French nuclear industry is obliged to cultivate the myth of "recycling"

To conceal the fact that it constantly produces tons of waste, some of which will remain radioactive for tens of thousands of years, the French nuclear industry maintains the myth of a fuel "cycle" in which uranium can and is recycled. This strategic choice of using [complex, costly, and polluting industrial processes](#) to transform spent uranium remains ineffective: the stock of French radioactive waste continues to grow. The system in place for reprocessed uranium is a blatant example of the recycling illusion in the nuclear industry.

Nuclear fuel passes through a reactor to produce electricity and comes out "spent" or "irradiated", heavily loaded with radioactive material. It is then cooled in a pool near the reactor for two to three years before being sent to the La Hague plant and cooled again in a pool for five to seven years in order to be "reprocessed".

Reprocessing consists of separating three materials: plutonium (1 to 2%), reprocessed uranium (95 to 96%), and final waste (3 to 4%), classified as high-level long-lived, which is vitrified and could be buried at Bure.

When it was developed in 1965, the sole purpose of [reprocessing](#) was to extract plutonium for the manufacturing of nuclear bombs. Today, some of this plutonium is used to produce MOX fuel, which can be used in 22 French nuclear reactors.

As for reprocessed uranium, it can theoretically be used to refuel certain reactors. It must first be converted and then re-enriched. The only plant in the world that converts reprocessed uranium is located in Siberia, in the city of Tomsk 7 (renamed Seversk). The fact that the French nuclear industry has never invested in the construction of such a facility on French soil indicates a lack of interest in a tedious and unprofitable industrial process. From 1972 to 2010, several thousand tonnes of reprocessed uranium were exported to Russia for conversion and re-enrichment. Sent back to France as "enriched" reprocessed uranium, less than 600 tonnes were used in the four reactors of the Cruas-Meysses power plant between 1994 and 2013<sup>6</sup>.

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<sup>6</sup> High Committee for Transparency and Information on Nuclear Safety (HCTISN), [Presentation of the French "Fuel Cycle" in 2018](#) Annex 6: Perspectives on the development of RU, page 88 [in French].

Today, 33,000 tonnes of reprocessed uranium are accumulating in hangars at Pierrelatte<sup>7</sup>. Expansion of the hangars is underway, as this stock increases by nearly 1,000 tonnes per year<sup>8</sup>. Renewed enrichment in Russia would not allow this stockpile to be reabsorbed, since the Cruas-Meysse plant alone is not capable of consuming all this "recycled" fuel. The solution for reprocessed uranium currently favored by Orano is therefore a one-way trip to Russia, as revealed by the recent investigations of Greenpeace France. For its part, EDF continues to dangle the possibility of recycling in France by mentioning plans to adapt other power plants to the use of enriched reprocessed uranium by 2027<sup>9</sup>.

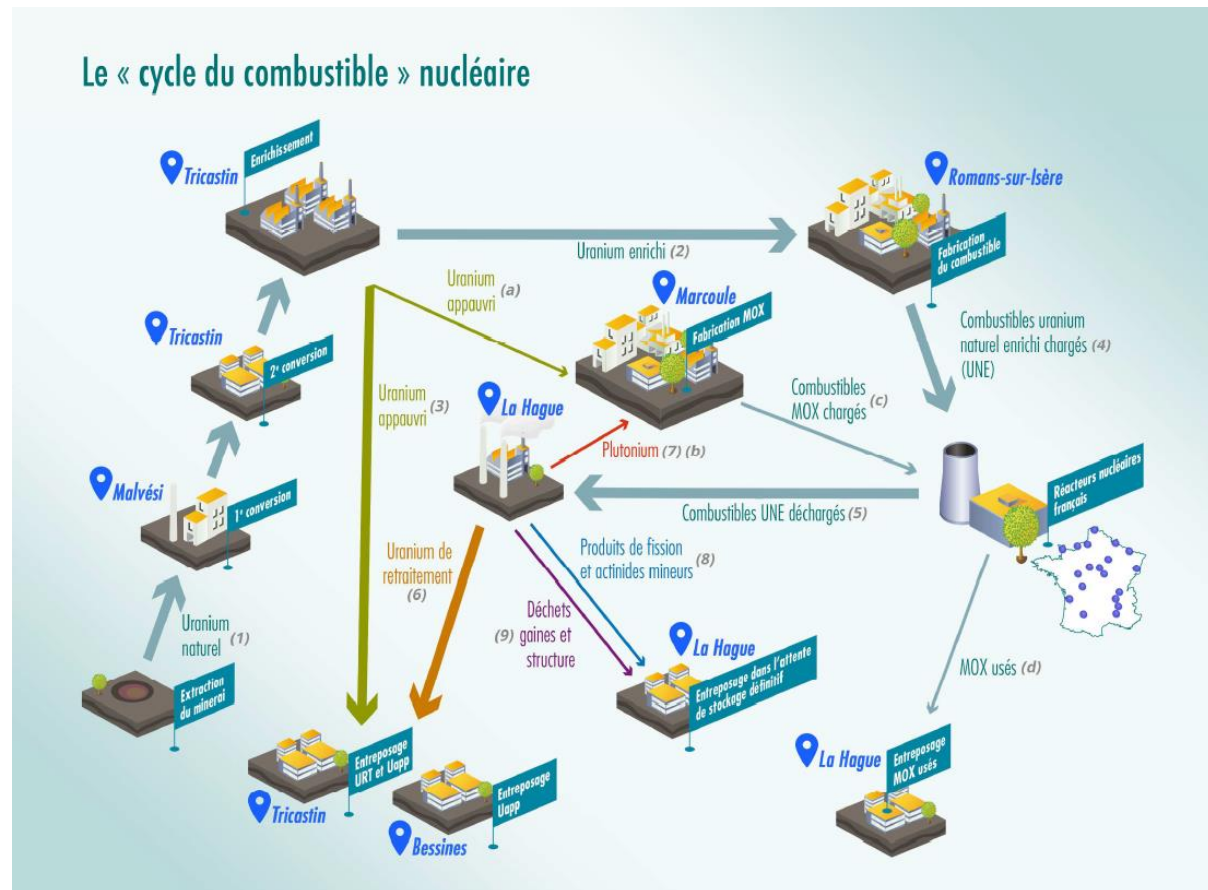
The French nuclear industry is one of very few to persist in reprocessing uranium to maintain the illusion of a fuel "cycle" and "green" nuclear power. Most nuclearized countries opt for direct dry storage of spent uranium rather than reprocessing to reduce costs, risks, transportation and waste.

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<sup>7</sup> French National Agency for Radioactive Waste Management (Andra), [National Inventory of Radioactive Materials and Waste 2021](#) page 13.

<sup>8</sup> The [National Inventory of Radioactive Materials and Waste 2021](#) reveals a change of +1,100 metric tonnes of uranium from the reprocessing of spent fuel between 2018 and 2019. A similar trend was observed in its previous inventories.

<sup>9</sup> Statement from EDF in response to Article 6 of the Decree of 23 February 2017 "Medium-term strategy to reduce the growth of reprocessing uranium stocks" [in French].



Graphic from the report "Presentation of the French "Fuel Cycle" " from the High Committee for Transparency and Information on Nuclear Safety

## Orano's re-heated solution: sell its reprocessed uranium to Russia

In 1984, after the sinking of the cargo ship *Mont-Louis* off the coast of Zeebrugge (Belgium), Greenpeace discovered that this ship was carrying containers of reprocessed uranium and revealed that the French nuclear industry had been exporting nuclear waste to Russia since 1972. Greenpeace took a stand against this traffic and intervened several times until it obtained the [halt of exports in 2010](#).

In May 2018, Tenex, a subsidiary of Rosatom, announced a deal with EDF to resume exports of French reprocessed uranium to Tomsk.

Greenpeace France then investigated the shipping company previously tasked with transporting reprocessed uranium, its authorized ships, as well as the port of Le Havre, from where the ships left between 1972 and 2010.

Greenpeace France discovered that a ship named the *Mikhail Lomonosov* was scheduled to take on board a shipment of uranium in February 2021. On site, on February 12, 2021, a team observed the arrival of a train from Pierrelatte and the loading of the cargo onto the *Mikhail Lomonosov*, which left in the direction of Saint Petersburg. Greenpeace France was able to conclude from the labels and signs on the 11 shipping containers on the ship that the material transported corresponded to reprocessed uranium. Further investigation identified a similar shipment on January 20, 2021.

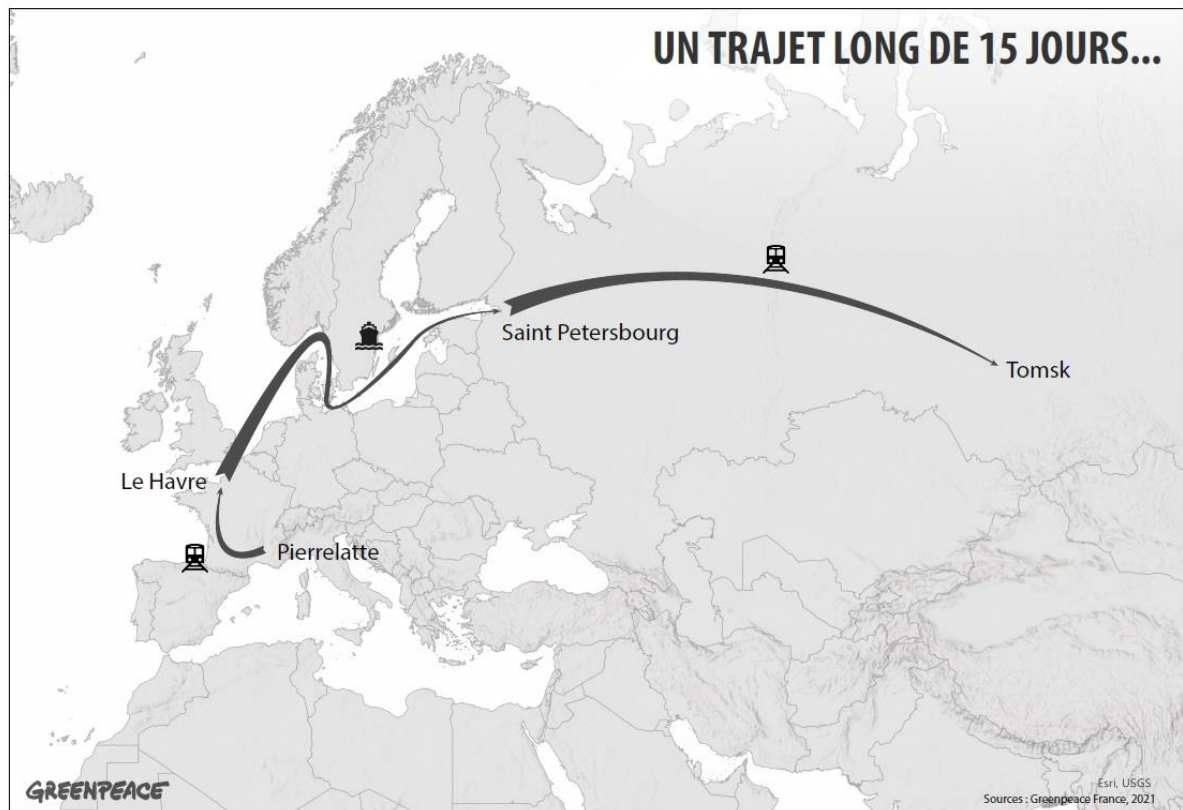
Contacted by Greenpeace France about this maritime shipment, EDF and Orano responded quickly. EDF has indicated that it was in no way connected to the event, while Orano has acknowledged, in e-mail correspondence dated February 24, 2021, that it was responsible for this shipment.

*"In late 2020, Orano sold just over 1,000 tonnes of RU to Rosatom, to be sent to Russia for conversion and re-enrichment to make nuclear fuel for Russian reactors.*

*Of course Orano, owner of this recoverable material but not a reactor operator itself, approached Rosatom, which has recognized experience in the use of fuel containing RU in its fleet of reactors. The RU material will be used to produce fuel assemblies, in the same facilities used for RU of Russian origin or RU from foreign sources such as EDF.*

*The shipment of RU to Russia is taking place in several shipments, the first of which was completed in early 2021. The second is underway."*

According to other confidential sources, the next shipment of reprocessed uranium to Russia will take place in the last quarter of 2021.





## Exports that are unjustified, both economically and environmentally

Russia does not need Orano's reprocessed uranium to fuel its nuclear reactors. The company has a huge stock of this material, for which it has no use. This reprocessed uranium, irradiating and polluting, would simply be stored at Seversk for an unlimited period, in a form that does not ensure against contamination. Siberia is once again being used as a garbage dump for the French nuclear industry.

No economic reason exists for Rosatom to pay for reprocessed uranium, which has zero market value according to EDF's accounts. For Greenpeace France, the existence of "return" contracts, which would make the operation profitable for Rosatom, seems the most plausible hypothesis. Orano sells its reprocessed uranium cheaply to the Russian company to be rid of it. In exchange, the French nuclear industry buys "new" uranium at a high price for Rosatom.

Customs records studied by Greenpeace show numerous inconsistencies in the flow of different types of uranium between France and Russia. In 2018, for example, France imported a large quantity of depleted uranium<sup>10</sup> from Russia, even though 330,000 tonnes of this uranium are already piled at Pierrelatte and Bessines and this stockpile grows by 6,600 tonnes per year.

At Tomsk 7 –now Seversk – French reprocessed uranium could create environmental problems, whether it is simply stored or converted and re-enriched, as EDF plans. The extent of the environmental impact is difficult to measure: Seversk, under the jurisdiction of Rosatom, is one of Russia's 45 "closed" cities, to which access is only possible with a special exemption.

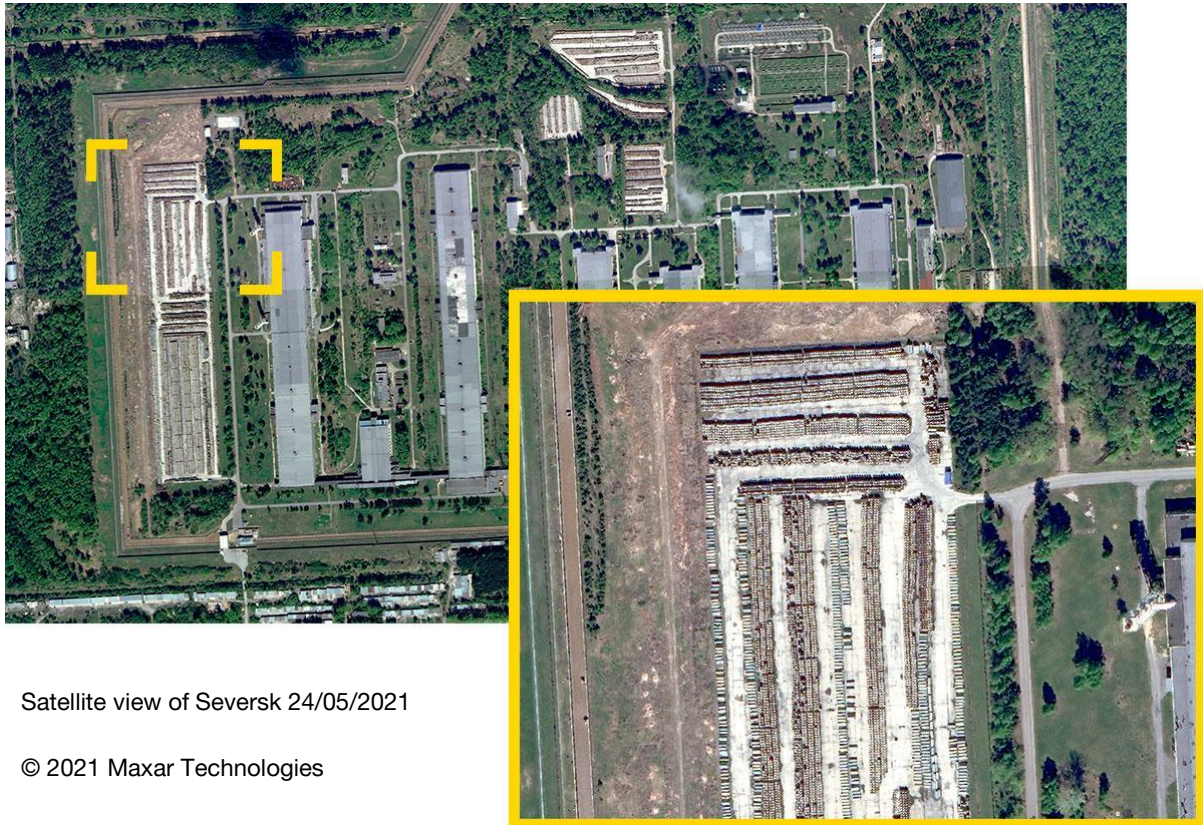
Satellite images have shown that the drums of reprocessed uranium are stored out in the open, without any protective measures to slow their degradation. The Seversk conversion and re-enrichment plant has been singled out in the past for "unsatisfactory effluent treatment," according to EDF<sup>11</sup>. The chemical and radioactive residues of conversion and re-enrichment were injected directly into the subsoil of the site in liquid form. Greenpeace has no guarantee today that this process has been improved.

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<sup>10</sup> Depleted uranium is created when natural uranium is enriched: some of the natural uranium becomes nuclear fuel, and some becomes depleted uranium.

<sup>11</sup> Denis Lépée, Director of the Nuclear Fuel Division at EDF, to the newspaper [Les Echos](#) September 10, 2018: "We recycled reprocessed uranium from 1994 to 2013, before stopping due to an unsatisfactory effluent treatment process."

In view of the almost non-existent prospects for reprocessing in Russia, the transport of French reprocessed uranium is purely and simply the export of nuclear waste, a practice that is subject to strict conditions in the EU legislation<sup>12</sup>, including the safety and proper management of the destination facility.



Satellite view of Seversk 24/05/2021

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<sup>12</sup> In particular, Article 4 of Council Directive 70/2011/EURATOM.

## Our demands

- The French government, as the majority shareholder in Orano and EDF, must oblige these two companies to stop shipping or stop plans to ship reprocessed uranium to Russia.
- The French Ministry of Ecological Transition must reclassify reprocessed uranium as waste, so that its dry storage can be costed and implemented.
- Nuclear supervisory authorities must investigate, in full transparency, the nuclear-related flows between France and foreign countries.
- The European Union must reject the inclusion of the nuclear industry in the green taxonomy – it does not respect the principle of safety or, in particular, the transition to a circular economy.

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Greenpeace France  
13 rue d'Enghien 75010 Paris France  
[greenpeace.fr](https://greenpeace.fr)