

The background of the entire page is a photograph showing the silhouette of a tall, lattice-structured tower, likely a cooling tower or chimney, against a bright, hazy sunset sky. The sun is low on the horizon, creating a strong glow and lens flare effect. The tower is on the left side of the frame, and other industrial structures are faintly visible in the distance on the right.

# **ROSATOM RISKS**

**EXPOSING THE TROUBLED HISTORY OF  
RUSSIA'S STATE NUCLEAR CORPORATION**

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**2017 UPDATE**

**GREENPEACE**

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**This briefing is an update to the report *Rosatom Risks: Exposing the troubled history of Russia's state nuclear corporation*<sup>1</sup>, published by Greenpeace International in 2014. Since then, Rosatom's projects have progressed in spite of, and increasing the uncertainties, risks and protests outlined in the original report. Rosatom continues broadening its expansion and is trying to add new countries to its range of clients. As of March 2017, Rosatom has a portfolio of projects in 49 countries worth US\$133bn<sup>2</sup> (€126bn), which includes current projects and plans up to 2030. This briefing provides updated information on the current projects in the European Union and Turkey as well as some data on the company.**

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## ROSATOM'S FINANCIAL OUTLOOK

Rosatom nuclear business is widely claimed as successful. Nevertheless, the Russian taxpayer is subsidizing the corporation. Rosatom's published EBITDA (earnings before interest, taxes, depreciation and amortization) was RUR 211bn (€3.05bn)<sup>3</sup>.

Despite these earnings, according to Rosatom's official 2014 report<sup>4</sup> to the Russian government, it paid RUR 102bn (€1.48bn) in income taxes, while receiving RUR 151.5bn (€2.2bn) from the Russian federal budget. Put simply, it received approximately 33% more in government support than it contributed in taxes. A total of RUR 79.8bn (€1.16bn), from Rosatom's income from the federal budget, was spent on building new reactors and related expenses in Russia<sup>5</sup>. The rest of the federal funding went mostly to research and development programmes, including more than RUR 7,8bn (€113m) for the development of new reactor technologies<sup>6</sup>.

Similar federal support in the coming years could be problematic taking into account the growth in Russia's budget deficit<sup>7</sup> from RUR 300bn (€4.4bn) in 2014 to RUR 2 trillion (€31.5bn) in 2016<sup>8</sup>, this is expected to grow to RUR 2.74 trillion (€43.2bn) in 2017<sup>9</sup>. In an early March 2017 interview with Strana Rosatom, Rosatom's new director Alexey Likhachev announced that state support for Rosatom is going to end in 2020.<sup>10</sup>

Despite the fact that the vast majority of government spending in 2014 went to building new reactors and related expenses, according to Rosatom itself, only 37.8% of Russia's population supports active development of nuclear power generation. Another 37.7% think that the industry should remain at the current level.<sup>11</sup>

## AKKUYU, TURKEY

**Bilateral Agreement (2010):** Build-Own-Operate (BOO) – a bilateral agreement between the Russian Federation and Turkey.

**Corporate Structure:** Following this agreement, the Akkuyu NPP is owned by a joint stock company named Akkuyu NGS Electricity Generation Joint Stock Company under Turkish corporate law.

**Current shareholders<sup>12</sup>:**

- JSC Rusatom Energy International<sup>13</sup>
- Rosenergoatom OJSC<sup>14</sup>
- Atomstroyexport JSC<sup>15</sup>
- InterRAO UES<sup>16</sup>
- Atomenergoremont OJSC<sup>17</sup>

- Atomtekhenergo OJSC<sup>18</sup>

These Russian shareholder companies listed above - all subsidiaries of Rosatom - currently own 100% of the shares of Akkuyu NGS. According to the bilateral agreement between Russia and Turkey, Rosatom's shares cannot be lowered under 51%. In 2016, Akkuyu NGS made a statement to media that the company decided to sell part of its shares. A Turkish construction conglomerate, Cengiz İnşaat<sup>19</sup>, announced itself as a potential candidate. Cengiz İnşaat is already a subcontractor in the project for the construction of coastal structures. Cengiz İnşaat is a controversial company accused of unlawful practices in coal power and mining investments.<sup>20</sup> As of 1 March 2017 it has not obtained any shares, leaving Akkuyu NGS 100% owned by Rosatom and its subsidiaries.

Former CEO of French energy giant EDF and former chairman of the French defence group Thales, Henri Edouard Proglío was appointed in 2015 as Board Member until December 2017. He is also member of the board of Fennovoima, the Finnish Rosatom project.<sup>21</sup>

On 23 February 2017, one of the founders of president Erdoğan's AKP party, Cüneyd Zapsu, was appointed as Board Member (he is the only Turkish member at the company and he does not represent a shareholder)<sup>22</sup>

**MWe:** 4800 (consisting of 4 units)

**Reactor type:** VVER1200

**Time period foreseen for operation:** 60 years

#### **Latest Chronology and Incidents related to the Akkuyu Project**

1. Non-transparent procedures in the permitting process since 2014:
2. Greenpeace Turkey exposed ongoing construction work in the field without the relevant administrative permits (Environmental Impact Assessments (EIAs), licence etc.).<sup>23</sup> This issue resulted in strong social reactions against the project.
3. While the EIA process was still ongoing, the Turkish Minister of Environment and Urbanism, Idris Güllüce, approved the EIA report at the occasion of Vladimir Putin's visit to Turkey, stating: "What is the problem if we make a gesture to Putin by confirming the EIA Report."<sup>24</sup>
4. Akkuyu NGS established a partnership with Cengiz İnşaat Sanayi ve Ticaret A.Ş. to build hydro-technical structures for the power station.<sup>25</sup> Cengiz İnşaat is a controversial company accused of unlawful practices in coal power and mining investments.<sup>26</sup>
5. The International Atomic Energy Agency indicates in its report of November 2013 INIR mission (Integrated Nuclear Infrastructure Review) that Turkey does not fulfil earlier recommendations from the IAEA.<sup>27</sup> A list of 24 findings quoted from the report in the national news outlet Hürriyet highlights that there is still a lack of clarity about the roles and responsibilities of the different involved authorities including the Ministry of Energy and Natural Resources (MENR)'s Nuclear Energy Implementation Department (NEPID) and the nuclear regulator Turkish Atomic Energy Authority (TAEK), while indicating

- concerns about sufficient independence of the latter. There are doubts about whether the current capacity of Akkuyu NSG is sufficient to produce the necessary technical documentation, and whether there are sufficient capacity and skills within TAEK to assess this. It highlights the fact that there is a lack of clarity around the decommissioning and waste fund, and around nuclear liability provisions. It found a lack of strategy for radioactive waste management. So far and against common international practice, Turkey has not published the INIR mission findings.
6. Akkuyu NSG launched an advertisement campaign with a budget of TRY 5 million (€1.3 million). In the advertisement, happy children images are used with the slogan "A powerful Turkey and Akkuyu will be the solution to the energy dependence issue". The Chamber of Electricity Engineers applied to the High Council for Radio and Television to ban the advertisement. After wide and strong criticism, the campaign was withdrawn.<sup>28</sup>
  7. There are 13 lawsuits filed against the Akkuyu EIA report approval by individual citizens, NGOs, chambers and institutions.<sup>29</sup>
  8. In the context of one of these lawsuits, a field visit by the court was conducted in the Akkuyu project area on 5 December 2016. During this excursion, a representative of Rosatom explicitly stated that because Rosatom does not have experience in the construction of a nuclear power station on a coastal site, Rosatom created the plan in line with French legislation.<sup>30</sup>
  9. The bilateral agreement between Russia and Turkey<sup>31</sup>, as well as the EIA report<sup>32</sup> state that spent nuclear fuel may be transferred to Russia for reprocessing. During the above mentioned field visit in Akkuyu, a Rosatom representative stated that Russian legislation does not accept nuclear waste from third countries.<sup>33</sup> There is a clear lack of clarity about obligations around reprocessing, storage and final disposal of radioactive waste.
  10. The EIA report of Akkuyu does not address the issue of decommissioning of the power station.
  11. There is no accident modelling in the EIA of Akkuyu.
  12. The island of Beşparmak is one of the four regions where Mediterranean monk seals have their habitat. Monk seals are a highly endangered species with only 600 remaining worldwide, mainly in the Eastern Mediterranean. Beşparmak island and the monk seals habitat are located within the first emergency zone of the Akkuyu power station (less than 3 km). They are also impacted by the increased building and shipping activity during the construction period.<sup>34</sup> Turkey has ratified the Barcelona Convention and its Genoa Declaration, and an obligation to protect Mediterranean monk seals.<sup>35</sup>
  13. Nuclear liability: Turkey is a party to the Paris Convention and the Joint Protocol under the Paris Convention. However, there is no specific legislation for liability of nuclear power stations in place in line with these conventions and the current legislation limits liability for nuclear installations to SDR 15 million (€19 million EUR, TRY 75 million). Under Turkish Corporate Law, joint stock companies are only liable for their capital in case of any non-compliance. In case of a nuclear disaster, the company is only liable with its capital and the liability cannot exceed it.

## Official Expert Report – Recent Developments in the Lawsuits against the Akkuyu EIA approval

In the context of the 13 lawsuits filed against the Akkuyu EIA, an official expert committee, created by the court, has submitted its report reacting on the allegations. This report includes important false assessments<sup>36</sup>:

- The expert committee focuses on existing nuclear power stations in the world, but does not take into account lessons learned from nuclear catastrophes like Fukushima.
- Although the expert committee acknowledges that there is insufficient information on the influence of the cooling system and expected thermal discharge on endangered species, especially the monk seal, the committee does not hesitate to approve the project.
- The expert committee states that nuclear accident modelling is not needed in the EIA unlike practices in many other countries. The committee claims that nuclear accident modelling is the mandate of the Turkish Atomic Energy. For that reason, impacts of severe accidents and necessary emergency preparedness and response are not considered properly.
- Instead of a wide scenario-based comparison with viable alternatives, the expert committee only compares electricity prices from nuclear energy one to one with solar photo-voltaic energy on the basis of what Greenpeace Mediterranean assessed were unrealistic data.<sup>37</sup>

## PAKS II, HUNGARY

Hungary currently depends on imports for nearly 30% of its electricity consumption<sup>38</sup>. MAVIR, the Hungarian electricity system operator assumes<sup>39</sup> that 5.3 GW of new generating capacity will need to be built by 2026, and some 7 GW by 2031, to meet projected energy needs,. The plans to fill that gap between projected future consumption and the future generation capacities include constructing two new 1200 MW nuclear reactors at the Paks II nuclear power plant. The project is currently in the licensing phase, with the first reactor projected to go online in 2025.

In 2009, after two years of preparation, the Hungarian Parliament approved the Paks II construction plan. The Paks II plant will be an expansion of the Paks I nuclear power plant, located on the banks of the Danube in central Hungary, which currently houses four VVER 440 reactors, with 2000 MW combined capacity. They should all be operational by the mid-2030s. While the Hungarian government claims the new reactors are for maintaining nuclear capacities, commissioning those in 2025 and 2026 respectively would mean nuclear capacities will be more than doubled in reality for at least 6-7 years, as the old reactors are planned to go offline between 2032 and 2037.

Because the Paks I nuclear power plant already provides around 50% of Hungarian electricity production<sup>40</sup>, with the additional Paks II project, the total capacity of nuclear power would strain the Hungarian electricity grid. Even if we assume a quick increase in electricity consumption, the two NPPs would cover upwards to 80% of the electricity production of Hungary. As the Hungarian system is relatively small and its gross maximum load (around 6800 MW) is more than two-fold of the gross minimal load (around 3200 MW)<sup>41</sup>, the question remains why Hungary would need 4400 MW inflexible nuclear capacity? It is also clear, that the Paks II investment endangers other energy investments by crowding out capacity from other sources, especially from clean renewable energy sources.

The Hungarian state-owned energy group, MVM Ltd<sup>42</sup>, was responsible for preparing and launching the tender to choose a reactor supplier for the project in 2009. However, on 14 January 2014, the Hungarian government, despite promises for launching a tender, signed agreements with Russia to construct the two new units, followed by a financing agreement in March 2014.

The construction contract (EPC) was signed in December 2014, by the newly established MVM Paks II Ltd. Company and the Russian Nizhny Novgorod Engineering Company Atomenergoproekt (NIAEP)<sup>43</sup>. According to official plans, construction works will start in 2018.<sup>44</sup>

The MVM Paks II Ltd. Company was originally part of the MVM Group, but was separated by the Hungarian government in 2014 to fall directly under the Prime Minister's office as an independent entity. NIAEP used to be a part of the USSR Ministry of Nuclear Power<sup>45</sup>, and is currently an affiliated company of the state-owned Rosatom Group, and was renamed as ASE Joint Stock Engineering Company in December 2016.<sup>46</sup> Rosatom was initially a part of the USSR government nuclear program and then later the Russian federal nuclear ministries.

According to the intergovernmental agreements between Hungary and Russia that are public, and other published information, the two new 1200 MW (VVER-1200/V491) units will be constructed as a "turn-key solution"; NIAEP will be responsible for all aspects of construction (e.g. design, site surveys, construction management, equipment procurement). Contracts between the parties also set conditions of cooperation in maintenance, and operation. The Russian Federation, will lend a maximum of €10bn to Hungary via the Vnesheconombank<sup>47</sup>, the state Bank for Development and Foreign Economic Affairs (VEB), covering an estimated 80% of the cost of the project, while the remaining 20% will be covered by the Hungarian state (according to a report by Reuters<sup>48</sup>). This brings the overall anticipated bill for the project to €12.5bn, though it may be more because Rosatom projects have a track record of running behind schedule and over budget.<sup>49</sup>

There are already doubts as to whether Russia will be able to finance the project. The Russian economy has struggled with a huge loss of income due to falling oil prices and international sanctions.<sup>50</sup> The VEB also seemed unable to provide the necessary finance, as the bank is teetering on the verge of bankruptcy. It will need a

US\$20bn (€19bn) bailout<sup>51</sup> from the state budget to remain solvent. Even though Russia's oil industry seems to have survived the oil prices fall-down, it has to adapt to new circumstances and cut the oil production.<sup>52</sup> Uncertainties with Russian tax income from oil and gas revenues will continue to cast a shadow over the federal state's possibilities to support the nuclear sector.

Should Russia be able to finance the project, the terms of the intergovernmental loan agreement are clearly disadvantageous for Hungary. Repayment of the loan is marked to begin by March 2026 at the latest, independently from the status of construction. Should Hungary be 180 days late with an instalment, Russia has the right to claim the repayment of the loan in total. Moreover, because the loan is in Euros, all risks related to changes in the exchange rates are also born by Hungary.

The EPC contract is not public, so it is difficult to get clarity about the responsibilities of the contracting parties (Paks II Ltd. and NIAEP), as well as the effect of these responsibilities on the intergovernmental loan agreement.

The legality of the Paks II project financing has been investigated by the institutions of the European Union under state aid rules. In addition, infringement of the tender process was reviewed. This investigation was the result of a joint complaint filed in April 2014<sup>53</sup>, plus an additional letter<sup>54</sup> at the beginning of November 2015 by Energiaklub, a Hungarian NGO, and Greenpeace EU.<sup>55</sup> The start of the investigation was announced on November 23, 2015,<sup>56</sup> however the tender infringement investigation was closed in November 2016 with neither consequences nor justification for this decision.

On 6 March, the European Commission closed its investigation into the question of state aid for the Paks II project. It concluded that state aid was involved because the project would not generate sufficient profits within a market environment. It therefore imposed conditions on approval of this state aid to protect against market distortion. These conditions included that no profits may be used to increase the market position of the operator of Paks II, the operator has to be fully independent from other state owned market operators, and the electricity will have to be sold for 30% on the exchange and the rest has to be auctioned in a transparent way.

To further understand the financing mechanisms of the Paks II project, and whether the terms of the Hungarian-Russian contract constitute illegal state aid, Greenpeace Hungary commissioned an in-depth economic analysis<sup>57</sup> by the independent energy consultancy CANDOLE PARTNERS. The study demonstrates that a private investor would not commit funds in the PAKS II project given past trends and the projected evolution of the European and Hungarian electricity markets.

Indeed, after considering multiple scenarios, the study concludes that the Paks II nuclear power station will not be able to generate profits. On the contrary, it is likely that subsidies will be necessary to allow the operation of the plant.<sup>58</sup>

The study also shows that Paks II will hinder, and could even completely eliminate, all competition in the Hungarian wholesale electricity market. This would reinforce

and expand the State's near-monopoly of the electricity market and block private investments into renewables and energy efficiency.

The study concludes that if new generating capacity is needed, then the most efficient and cost-effective way to address this issue would be to apply the German model, which provides for tenders for renewables, to the Hungarian market. By choosing to build Paks II with a Russian loan, the Hungarian government has committed itself to an extremely expensive project that puts Hungarian taxpayers at a serious risk, would bind the country's electricity sector for decades to come, and keep Hungary beholden to Russia for the foreseeable future. By choosing this energy path, the Hungarian government has ignored both current and future energy trends as well as the benefits afforded by renewables, energy efficiency and a high degree of interconnection with surrounding countries.

## **FENNOVOIMA, FINLAND: DELAYS AND PROBLEMS IN SAFETY CULTURE**

Fennovoima is a Finnish-Russian nuclear power company, 34% owned by Rosatom. The company plans to build a VVER-1200 reactor at Pyhäjoki in North-Western Finland. The project was started in 2007 when the company Fennovoima was founded. Originally it was owned by the German energy giant E.ON. After the Fukushima disaster, E.ON decided to drop the project in 2012. Originally, Fennovoima was supposed to order the reactor from Toshiba or Areva but in December 2013 it signed a contract with Rosatom.<sup>59</sup>

The original decision in principle was granted under the understanding that the project would use either Toshiba's or Areva's reactor. For that reason, Fennovoima made some additions to its application in March 2014. The role of Rosatom in the project sparked concerns especially after Russia invaded Crimea in 2014. Therefore, the Finnish government decided that at least 60% of the shares of the company should be owned by Finnish or at least by EU based entities.

After a long discussion, the Finnish parliament eventually voted in favour of the Fennovoima project in December 2014. Fennovoima still needed to find more Finnish investors. Earlier, Fortum, a Finnish state owned company, had promised to buy a maximum of 15% stake in Fennovoima if it would get 75% shares in the Russian hydro-power company TGC-1.<sup>60</sup> However, the negotiations between Fortum and Russia did not go as planned and Fennovoima needed to submit its application for its construction license by the end of June in 2015. .

On Tuesday 30<sup>th</sup> of June, Fortum revealed that its negotiations for TGC-1 were still open and that it would not take part in Fennovoima.<sup>61</sup> In the afternoon, Fennovoima surprised everyone by stating it had found a new Croatian investor that would ensure 60% Finnish/EU ownership.<sup>62</sup> It took a few hours for journalists to find out that the Croatian firm, Migrit Solarna Energija, which owned only one small solar power plant,

was in fact a dummy company which could be traced back to Moscow and Rosatom.<sup>63</sup> After two weeks of investigation, the Finnish Ministry of Labour and Economics came to the same conclusion. The ministry stated that it could not establish with certainty that the company was “factually controlled” from inside Western Europe.<sup>64</sup>

This meant that the Finnish/EU ownership of Fennovoima dropped to 55%. However, Fennovoima received a new deadline of 5 of August 2015, to find more Finnish/EU owners for the project. Finnish minister Olli Rehn travelled to Moscow at the end of July to discuss Fennovoima with the deputy prime minister of Russia, Arkady Dvorkovich.<sup>65</sup> On the morning of the new deadline, Fortum came out and said that it would buy 6.6% stake in Fennovoima while another partly state own company, steel maker Outokumpu, increased its stake by 1.8 percent.<sup>66</sup> It is well known secret that Fortum was not pleased about taking part in Fennovoima.<sup>67</sup> Originally it applied for a decision in principle to construct its own reactor when Fennovoima applied, but Fortum did not receive it. Then Fortum tried to play with the Russian hydro-power company, however in the end all it got was 6.6% stake in a nuclear power company it did not want to take part in. Finnish construction company SRV also bought a 1,8% stake at Fennovoima. According to SRV it would in turn get the project leader contract from the main contractor of the construction site, Russian based Titan-2. After one and half years, this contract remains to be signed.

### **Arbitration court case against one of the owners**

Since the creation of Fennovoima, several of its original Finnish owners left the project. One of them is Kesko, a Finnish retailer group. Originally Kesko was supposed to own a 3% stake in Fennovoima. In March 2014 Kesko decided that it no longer wanted to take part in Fennovoima because of the uncertainties related to the economic viability of the project, contractual issues and schedule.<sup>68</sup> The parent company, representing Finnish owners in Fennovoima, Voimaosakeyhtiö SF, refused to respect Kesko's decision and challenged Kesko in arbitration court in December 2015.<sup>69</sup> Finally, in January 2017 the arbitration court decided in favour of Kesko.<sup>70</sup> This meant new challenges for Fennovoima. Previously 0.9% worth of shares were still unowned and the arbitration court decision meant that the percentage of Finnish ownership dropped close to 62%.

Either Fennovoima needs to find more owners from the market or the costs for other Finnish owners will rise. The problem is that no one wants to buy shares in Fennovoima. For example, Kuopion Energia, a company that owns 0.1% of Fennovoima has tried to sell its shares since 2013 but has failed to find a buyer.

### **Ongoing problem**

In order to get the construction license for the reactor, Fennovoima and Rosatom need to submit almost 50,000 pages of technical material to the Finnish Radiation and Nuclear Safety Authority STUK, which in turn gives its expert opinion to the Finnish government which eventually decides whether the application is approved or not<sup>71</sup>. Originally, the Finnish Ministry of Labour and Economics asked STUK to

conduct this study by the end of 2017 “if possible”. Now it is clear that it is not possible. Fennovoima has had several setbacks in submitting documentation to STUK. In September 2016, YLE news revealed that STUK was still waiting for documents it was supposed to have received six months earlier.<sup>72</sup> In November 2016, Helsingin Sanomat told that STUK received material from Fennovoima one year later than originally planned.<sup>73</sup> Jukka Laaksonen, the former head of STUK currently working for Rosatom, has claimed publicly that the reason behind the delays is a problem in communication between Fennovoima and Rosatom and the lack of experience of Fennovoima.<sup>74</sup> STUK in turn has said that the reason behind the delays in licensing process seems to be insufficient resources of Rosatom, more precisely of its subsidiary companies: RAOS Project, the main supplier of the reactor; Atomproekt, the main designer of the reactor; and OBK Gidropress, the main designer of the primary circuit. Janne Nevalainen from STUK told Nuclear Intelligence Weekly in February 2017 that: “We [STUK] have completed 15 inspections of the Fennovoima and the Rosatom organization, and we have concluded that, in our view, one of the reasons [for delays in documentation submission] is that they are lacking resources — engineering resources. Fennovoima has been behind on its own recruiting plans, but [it’s] mainly Rosatom’s Finnish subsidiary Raos Project Oy and Atomproekt. We see that they have positions open and there’s also quite a big workload for people”.<sup>75</sup>

According to STUK, Fennovoima will submit papers to STUK in 2018. Once all the papers are in, the authority needs at least six months to evaluate everything and write its safety assessment. This means that the approval of the Fennovoima construction license application may be delayed to 2019.

However, delays are not the only problem Fennovoima has faced. In August 2016 YLE news wrote that a STUK safety audit flagged several severe shortcomings in Fennovoima. According to the STUK audit report, some workers interviewed for the audit claimed to have been put under pressure, sidelined, or even “smoked out” for drawing attention to safety concerns or questionable practices. Employees interviewed for the audit also spoke of scheduling pressure that seemed to influence the actions of the management more than safety issues. The STUK report also “indicated that ‘some documents’ had been approved by changing signatures, if the original experts had not agreed to sign off on them.” Fennovoima rejected all the claims. The Fennovoima project director commented that “We do not concur that there has been pressuring or threats at the company. But we have attempted to improve communication and the allocation of responsibility”.<sup>76</sup>

Only a couple of weeks later, YLE News revealed that despite Fennovoima's rejection of the claims made in the STUK report, its parent company, Voimaosakeyhtiö SF (VSF), fired one of its executives because he expressed safety concerns to the Finnish Radiation and Nuclear Safety Authority. Voimaosakeyhtiö SF admitted this to YLE after initially denying it. STUK deputy director Tapani Virolainen commented that this “certainly violates the idea of safety culture”. He also said in the YLE interview that STUK has had similar discussions about Fennovoima with other employees and that: “There are a number of cases. The discussions that we have

had with employees of Fennovoima or its affiliated companies are of course confidential, though. We do not report to Fennovoima about them."<sup>77</sup>

Finnish Minister of Economic Affairs, Olli Rehn, met with STUK and commented that "big changes have to be made this autumn if the project's [Fennovoima] credibility is to be regained" a few days following the scandal<sup>78</sup> The Ministry asked in end of September 2016 an additional safety culture report from Fennovoima. In November 2016, STUK expressed its concern about the plans it had received from Fennovoima and Rosatom. The Ministry subsequently requested additional information on the schedule of the project from Fennovoima.<sup>79</sup>

At the end of January 2017, STUK published a summary of its safety audit reports made from September 2016 to the end of that year.<sup>80</sup> STUK expressed its concern about insufficient resources of Rosatom. A few weeks after publishing the report, it was told that STUK asked VTT, the Technical Research Centre of Finland, to write and audit report about safety culture in Fennovoima to deliver in the autumn of 2017.<sup>81</sup>

## **LENINGRAD 2, RUSSIA: CONSTRUCTION OF THE NUCLEAR POWER PLANT**

New reactors in Russia also face serious issues. In July 2010, the prosecutor's office of the city of Sosnovy Bor and the Russian nuclear regulator, Rostechnadzor, found that the Leningrad 2 construction site had serious problems with its working conditions. The issues included among others: non-compliance with fire safety standards; a lack of proper sewers; and a lack of running water. Rosatom failed to address these concerns. As a result, the prosecutor's office was forced to request a suspension of on-site work, which was granted by the courts<sup>82</sup> on 29 December 2010 but overturned on 11 January 2011.

That same month, a strong wind caused a 14-metre-high reinforcement structure to collapse<sup>83</sup> at the Unit 1 construction site. Fortunately, a foreman managed to evacuate workers before the structure fell on them.

Finland has a particular interest in the construction due to the commissioning of Russian reactors for the Fennovoima reactor project. Less than six months after the wall collapse at Leningrad 2, in June 2011, the Director General Jukka Laaksonen, of the Finnish nuclear regulator STUK, asserted to a delegation from Baltic Sea countries that the construction and design of these reactors was of the highest quality.

This assessment was soon proven false. Late May 2011, defects were discovered in the containment structure, prior to Laaksonen's comments. Although attempts were made to correct these serious flaws, on 17 July 2011, the 600-800-tonne reinforcement cage of the containment building fell on its concrete frame.<sup>84</sup> The incident did not result in any casualties because the workers had left the site for

lunch shortly before the collapse. The weight of the cage caused the concrete frame to crack and the entire structure had to be replaced, leading to significantly increased costs and a nearly year-long delay<sup>85</sup> in the project.

Following his grossly flawed quality and safety assessment of the Leningrad 2 construction, Laaksonen left his position at STUK. Soon after<sup>86</sup>, he became the Vice President of the Rosatom international sales unit Rusatom Overseas.

In July 2015, another construction accident happened at the site. During lifting of 70 tonne protective pipes, worth of RUR 300 million (€ 4.4 million), a sling snapped. The pipes fell from 20 meters height into a spent fuel pool. This accident caused a six-month delay<sup>87</sup> for the project.

Around same time, problematic working conditions at the site were again exposed. According to a construction worker who climbed a 110-meter crane in protest, he and his colleagues had not received any salary payments<sup>88</sup> in four months.

In the spring 2016, yet another scandal erupted at the Leningrad 2 site, with help from the Russian environmental NGO Green World. A whistle-blower working for the main construction contractor Titan 2 published a 49-page-long report describing serious problems at the site. According to the report<sup>89</sup> issues included falsifications of the documents regarding the heat treatment methods for primary circuit pipeline welds. Such behaviour indicates an unacceptably lax safety culture and oversight failure. The whistle-blower subsequently fled Russia out of concern for his safety. Rosatom and Titan-2 denied the allegations.<sup>90</sup>

## **NOVOVORONEZH II, RUSSIA: START-UP WITH TROUBLE**

On 5 August 2016, the first VVER 1200 reactor was brought on-line at the nuclear power plant Novovoronezh II. This start-up was followed by a scram on 10 November that went unreported for six days<sup>91</sup>. The reactor was reconnected to the grid on 27 January 2017<sup>92</sup> after repairs were carried out due to a short-cut in the generator area.

## **BELENE, BULGARIA**

Bulgaria has learned the hard way about the risks of doing nuclear business with Russia, both as a result of legal action and domestic leadership failures. In 2012, Bulgaria cancelled the Belene nuclear project for which Rosatom was the vendor. After the cancellation, Atomstroyexport – Rosatom's export branch – filed a case in the Paris Arbitration Court against Bulgaria. It demanded approximately €1bn in compensation for breach of contract<sup>93</sup> and material already prepared.

During the ensuing years, the Bulgarian Socialist Party (BSP) tried to restart<sup>94</sup> the project, but with little success. While in power, the BSP failed to submit a report by the British / Hong Kong bank HSBC as evidence in the arbitration case, which proved that the project far exceeded its initially contracted costs<sup>95</sup>. This may be due, in part, to the fact that this report was produced prior to the decision to cancel the project by its political opponents, the centre-right Citizens for European Development of Bulgaria, known under its Bulgarian acronym GERB.

In September 2016, the Court of Arbitration granted Rosatom €620 million in compensation for material already prepared. Rosatom then demanded that Bulgaria<sup>96</sup> pay this amount in total before the end of the year. Despite this, the BSP and the Bulgarian nuclear lobby continues to doggedly pursue the restart of the Belene construction project, now using the argument that the country already paid for equipment that otherwise would go wasted. Attempts to sell the two already manufactured pressure vessels and a heat exchanger to Iran and India were fruitless. Because construction costs still are too high to make sense for Bulgaria, restart of the project is extremely unlikely.

## CONCLUDING REMARKS

Since Greenpeace International published the report "Rosatom Risks" in October 2014, recent developments have only confirmed its general conclusions. The developments in Russia and Finland show that concerns about proper quality control and safety are justified. The machinations around project financing in Turkey and Hungary confirm the financial risks attached to developing nuclear power with Rosatom, and the steady interaction between global politics and the project development in these countries illustrate perfectly the risk of political dependency. Nuclear power development with Rosatom – and others – is not alone risky from a financial, safety, political and security perspective, but also because clean, safe and cheaper energy sources exist. Nuclear energy is an unnecessary risk at all times.

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