Report 2006

Status of Russia's decommission fund

Decommission

ВЫВОД ИЗ ЭКСПЛУАТАЦИИ СТАРЫХ ЭНЕРГОБЛОКОВ АЭС

Status of Russia's decommission fund

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Report 2006: Status of Russia's decommissioning fund

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About the project

This report is a result from the project "FROM CLOSED ROOM TO OPENNESS: INVOLVEMENT OF CIVIL SOCIETY IN THE FUTURE OF THE NUCLEAR REACTORS IN NORTH WEST RUSSIA". Partners in the project are GREEN WORLD from Sosnovy Bor, Leningrad oblast, GAIA ecological center from Apatity, Murmansk oblast and NORGES NATURVERNFORBUND (Friends of the Earth Norway), Norway.

The long-term goal of the project is to get an official plan of action for closure of the old units of the nuclear power plants (NPPs) in North West Russia. The plan should provide a safe, secure and environmentally reliable way to decommissioning, and set an acceptable time table for closure. In shorter term, the project shall contribute to a public debate on the future of the reactors, to participation of civil society in the process, and capacity building in environmental non-governmental organisations (NGOs).

Increased openness and public participation in the future of the old reactors are important. More open debate is both a goal in itself, and will be likely to influence decommissioning process in a positive way. It is vital to establish plans for when and how decommissioning shall take place. The lack of plans poses an obstacle to closure, and for establishment of alternative power capacity. Good plans will secure predictable conditions and reduce negative consequences for environment and social welfare.

Concerns about environmental impact, safety and security of nuclear power have relevance for the whole society. Therefore environmental NGOs, espescially those close to nuclear power plants, feel it is their duty to engage in nuclear issues. The NGOs of this project wanted to focus on public participation and open dialogue.

1. Introduction

This report focuses on financing of decommissioning, in order to provide a background for dialogue in this field. Safe and predictable decommissioning depends on financial resources. However, it has been questionable whether there existed sufficient funding for decommissioning. The report aims to tell the story of the Russian decommission reserve, the historical background and present situation. Even though we still feel that we do not know the total picture, we have collected far more knowledge then was available before. In addition the report provides background facts about Kola and Leningrad NPPs.

Passing Leningrad NPP on bicycles

You may find more background information and debate on our webpage www.decomatom.org.ru.

2. Power situation in North West Russia

After 1990 the power consumption in North West Russia has decreased approximately 30 %. This is mainly due to reduced consumption by the power demanding industry after the collapse of Soviet economy. At the same time the production capacity is more or less maintained, leading to a significant reserve capacity. High growth in power demand in Russia as a whole is expected, but has so far not been the case in North West Russia. This is because of the industry structure and reduced population in the Northern areas.

On the Kola Peninsula hydro power covers about 50 % of the power demand. Being the cheapest alternative, hydro power stations produce independent of demand. The remaining demand is covered by Kola nuclear power plant, which has a higher tariff and has needed to adjust its production to the reduced demand. Roughly 50 % of the nuclear power plant's capacity goes to cover consumption on the Kola peninsula, 25 % goes south to Karelia and 25 % is in reserve.

In St. Petersburg/ Leningrad oblast hydro power constitutes only a small part. The production is dominated by Leningrad nuclear power plant and combined heat and power plants (gas-fired) in St. Petersburg. The tariff of nuclear power are lower than gas power, meaning that it is the gas power production (as well as an oil fired power plant) that has reduced its production in step with the decrease in demand.

Not much of the production capacity in North West Russia is taken out of production, even though much of the capacity is old and exhausted. The authorities have chosen to consentrate their efforts on new market possibilitites to increase the power consumption. Three measures are considered possible:
1) Transfer to electrical boilers in buildings. More or less all buildings are connected to heat distribution network based on gas, oil or coal.
2) Establishment of new power demanding industry/ aluminium factories
3) Power export to the Nordic countries.

Today it is possible to close the first reactor without causing problems for the power balance. Environmental organisations are afraid that new power demand, based on cheap power from the temporary power surplus, later will make it more difficult to close the oldest reactors.

3. Nuclear power in Russia

Russia as a whole has 10 nuclear power stations, with together 34 nuclear reactors. Four of these are stopped, and in addition 6 more has reached 30 years of lifetime, but are still operating. Table 1 shows Russian NPPs, what type of reactor, their age and current status.

Russian experience with lifetime extensions of nuclear reactors is quite new. Only in 2001 the first unit of Novovoronezh NPP reached 30 years. Kola and Leningrad NPPs both have first generations reactors that have reached their designed lifetime of 30 years. Two reactors at Kola NPP and one at Leningrad NPP have been reconstructed, and operation permits has been given for the first five years.

There exist plans for several other reactors, some of which even has started construction. However, as it seems uncertain if they ever will be finished, we have chosen to leave them out of this table and report.

4. Status of old nuclear reactors in North West Russia

Kola NPP is situated on the coast of Lake Imandra in the southwest part of the Kola Peninsula, 15 km from the town Polarnye Zori. In a 100 km radius the cities Apatity, Kandalaksha, Kirovsk, and Monchegorsk are also located.

Kola NPP has four VVER 440 reactors, two of which are the first generation reactors. The VVER reactors are pressurised water reactors. The Kola NPP reactors lack a safety containment to prevent radioactive leakage in the case of accidents. The cooling systems are also considered unsafe. The two first reactors reached their 30 years of estimated lifetime in 2003 and 2004, and have been prepared for new 15 years of operation. Licences have been given for 5 years operation for both reactors.

prevent release of radioactive substances in the event of an accident.

The first reactor at LNPP was reconstructed not legally in 2003, without any environmental impact assessment. After the reconstruction it received licence for 5 years continued operation, and prepared for 15 new years, making the operating time totally 45 years. It is not likely that these 45 years will be exceeded, as the structure of the reactor walls is old. Reactor number 2 reached 30 years in the summer of 2005, and is currently waiting for preparations for continuing operation. The preparations are scheduled to last approximately one year.

Leningrad NPP (LNPP) is situated on the coast of the Gulf of Finland, in the closed nuclear zone of Sosnovy Bor 80 km west of St. Petersburg (6 millions residents).

LNPP has four RBMK-1000 reactors, two of which are the first generation reactors of the same type as Chernobyl reactors, only Leningrad NPP's reactors are older. RBMK abbreviation means Reaktor Bolshoj Moshchnostj Kanalnij (high capacity channel type reactor). The RBMK reactors are considered dangerous, because of danger of fire in the graphite moderator, and because they lack safety containment which can

Kola NPP

Table 1: Nuclear reactors in Russia

Nuclear unit	Type of reactor	Year	Current status
Kola 1	VVER 440-230 (1st generation)	1973	Operating. Lifetime exension given in 2003 for five years.
Kola 2	VVER 440-230 (1st generation)	1974	Operating. Lifetime extension given in 2004 for 5 years.
Kola 3	VVER 440-213	1982	Operating.
Kola 4	VVER 440-213	1984	Operating.
Leningrad 1	RBMK 1000 (1st generation)	1973	Operating. Lifetime extension given in 2004 for five years.
Leningrad 2	RBMK 1000 (1st generation)	1975	The unit is currently stopped, waiting for upgrading, to receive prolongation permits. It is supposed to receive prolongation permits for 15 years in 2006
Leningrad 3	RBMK 1000	1980	Operating.
Leningrad 4	RBMK 1000	1981	Operating.
Smolensk 1	RBMK 1000	1983	Operating.
Smolensk 2	RBMK1000	1985	Operating.
Smolensk 3	RBMK 1000	1990	Operating.
Kursk 1	RBMK 1000 (1st generation)	1976	Operating.
Kursk 2	RBMK 1000 (1st generation)	1979	Operating.
Kursk 3	RBMK 1000	1983	Operating.
Kursk 4	RBMK 1000	1985	Operating.
Novovoronezh 1	VVER 440-210 (1st generation)	1964	Stopped in August 1984
Novovoronezh 2	VVER 440-365 (1st generation)	1969	Stopped in the end of 1989.
Novovoronezh 3	VVER 440-179 (1st generation)	1971	Operating. Stopped in 2001. Restarted in 2002. Lifetime extension given in 2002 for five years.
Novovoronezh 4	VVER 440-179 (1st generation)	1972	Operating. Stopped in 2002. Restarted in 2003. Lifetime extension given in 2003 for five years.
Novovoronesh 5	VVER 1000 -187	1980	Operating untill 2010. In 2010 will be stopped for reconstraction. In 2011 restart is expected
Kalinin 1	VVER 1000	1984	Operating.
Kalinin 2	VVER 1000	1986	Operating.
Belojarsk 1	AMB-10 (early type RBMK)	1964	Stopped in January 1983.
Belojarsk 2	AMB-200 (early type RBMK)	1967	Stopped in January 1989.
Belojarsk 3	BN 600 (fast breeder reactor)	1980	Operating.
Balakovo 1	VVER 1000	1985	Operating.
Balakovo 2	VVER 1000	1987	Operating.
Balakovo 3	VVER 1000	1988	Operating.
Balakovo 4	VVER 1000	1993	Operating.
Bilibino 1	EGP 6	1974	Operating.
Bilibino 2	EGP 12	1974	Operating.
Bilibino 3	EGP 12	1975	Operating.
Bilibino 4	EGP 12	1976	Operating.
Rostov 1	VVER 1000	2001	Operating.

5. Accessible information and public participation

The Russian decommission fund has been subject to a lot of speculation. Formal information has been very limited, and it is necessary to know very precicely what to ask, in order to get correct answers. Relevant answers are only given if you manage to ask the correct questions to the correct person. This means that you more or less need to know the situation before you ask about the situation. The informal information available has been contradictory and inconclusive. Based on the available rumours it has been doubtful whether the fund actually existed or not.

To establish a correct understanding of the situation of the Russian decommission fund is a time consuming work. The matter is complicated, and not easy for common people to understand. Laws, regulations and decrees are written in a difficult language, which often has more than one possible meaning. It has been necessary to carefully study, the history of the relevant laws and regulations, as well as the current juridical situation.

However, whereas law and decrees gives an understanding of the theoretical situation, it is limited access to information about how things work in reality. During the work we have many times met experts who wondered why we were so concerned with the laws, when the real situation is more important. In our view, both the laws and the real situation are important, and only when these two aspects do not differ too much, we will have the basis for transparency of the nuclear sector in Russia.

To the above, we can add that in response to inquiries from environmental organizations, officials have made use of different concepts that do not correspond to existing legislation of the Russian Federation. For example, in a written response to the question of Greenpeace Russia "What amount has been budgeted for decommissioning of each reactor, including those that are operating and those that are being constructed?", Nicolay Sorokin, Assistant General Director of Rosenergoatom responded that "By the Act of the Government of the Russian Federation of 05.12.2004, No. 737, the Reserve has the status of a Savings Fund, in which money for carrying out the decommissioning program accumulates" [21]. Yet in Act No. 737 there is nothing said about a Fund, only a Reserve. This is a large difference, as the concepts of "Fund" and "Reserve" have different institutional components, as well as a different method of verification of how money is spent.

Different officials give different dates of events. From the letter of Sorokin above, it is stated that the "Reserve has been functioning since 1994." At the same time, according to official documents, the Reserve for decommissioning of old reactors only began to function in January 2002 [21].

Because of the contradictory nature of the information, the authors of this report have based their conclusions on published legislative acts and laws.

To complicate matters, several processes are developing in parallel: Changing in administrative structures, the process of liberalization of the power market, and changes in environmental legislation.

Also at present there is no established dialogue between non-governmental organizations and relevant official administrative institutions in Russia. Formerly, under former nuclear energy minister Alexander Rumjantsev, a Public Council of different NGOs met with the minister for the discussion of the actual problems. Also a member of our project group participated in this Council.

Rumjantsev later accused unidentified members of this council to be spyes that used the council to obtain information, and after this the council have not met. Formally the council is not closed, but Rumjancev wanted to change the members of the Council. New head of Rosatom invited to the new Public Council new members. But there are no any representatives of the NGOs from the "nuclear regions".

At the same time a Public Chamber (obschestvennaja palata), an apparatus under the government of the Russian Federation has been established, with the purpose to provide the interaction of government and public, as well as the influence of third sector on the governmental policies. However, the real nominations for this chamber are done by appointing people from administrative bodies, and the chamber thus serves as yet another organ that is controlled by the authoroties.

6. The first phases of decommissioning regulations: 1995-2001

In 1995, under president Boris Yeltsin, the Russian Federation law on use of nuclear energy was adopted. The law has been updated several times, last time in 2003.

In article 33 it is stated that order and measures for decommission should be foreseen in projects of nuclear energy units. Responsibility for establishment of a system for financing of decommission is assigned to the government of Russian Federation, and should be determined before putting units into operation [1].

Article 34 of the law determines that all functions of decommission shall be organized by operating utility responsible for operation, with participation of other relevant institutions. In most cases that would mean the power utility Rosenergoatom, which up until recently was reporting to Minatom as one of its departments.

Further on, article 34 stated that in order to achieve this, responsible organizations should have sufficient capacity as well as financial, material and other resources. The operating utility should in cooperation with other institutions responsible for use of nuclear energy, and within their respective budget allocations, create a fund for expences connected with decomissioning of nuclear installations, radiation sources and storage facilities, as well as for financing of scientific reasarch and technical experimental work connected to safety of the nuclear objects. This means, that according to the law from 1995, the financing of decommissioning of nuclear power plants would come from the federal budget, as well as budgets of other levels.

Thus, at this stage, Rosenergoatom was assigned the formation of the fund, but had not sole responsibility for allocation of funds. This is different from western countries, where the operating utilities (power companies), have responsibility to create sufficcient funding for decomisisoning.

With the realization of this law, decommissioning fund was established by decree № 1012 of July 2nd from Yeltsin in 1996. The decree stated that the government should establish a special fund for accumulation of means for financing decommissioning of nuclear units and scientific research investigations and design-industrial works [2].

> *"(...) in accordance with article 34 of the Federal Law "About the use of nuclear energy", to develop in the third quarter of 1996 n order for creation and operation of a special fund for financing of expenses connected with decommission of nuclear units, radiation sources and storages, and also for fiancing of scientific and experimental work in increasing of security of these objects"*
> **– decree No. 1012**

The fund was not actually established until April 1997 in governmental resolution № 367 [3]. This resolution adopted the statement about the establishment of a fund with several purposes, among other things decommissioning of nuclear units, waste storage, scientific investigations, etc. The sources of this fund were stated in article 4 of the resolution. There were six sources, four of which are earmarked sources from budgets of different levels, one from other institutions -official and private-, and the last one money allocated from the operating utility, as a not clearly defined share of the production costs (seberstoimost).

In article 6 of the resolution, it was stated that not later than 3 years before the end of a unit's operating period, it shall be developed a federal program of decommission. The situation must be inspected, and a special commission will determine suggestions for decommissioning of the unit and necessary measures for the increasing its safety. As we understand this, it was an opening for the following prolongation of reactor's life.

Article 7 states in addition to article 4, that when a new station is built, a part of the tarriff shall go to the decommission fund from the very first day. For those stations already operating, additional expenses can come from budget allocations.

Donation of official organizations and private citizens were also admitted as possible sources of this fund.

As far as we can tell, these funds estblished in 1997 have left no track, even though laws and regulations have stated that money should be set aside in a fund. If money has been accumulated, it is probably spent or eaten up by inflation.

7. Audit by the Accounts Chamber

The concern that money was not accumulated led to investigations from the Russian Accounts Chamber (schetnaja palata), which is the supreme body of state finance control of Russia [4]. In 2001 the Accounts Chamber adopted a resolution regarding the situation with financing of decommission [5] . The report was later published in the regular Bulletin of the Accounts Chamber.

As result of its auditing, the Accounts Chamber states in this report that a special fund for financing of expenses for decommission must be established, but that up until now Minatom has not created this fund and subsequently, no allocations so far had been made for decommissioning of NPPs. The Accounts Chamber suggested for Minatom to create this fund, implying a suggestion from the Chamber to Minatom that they should start to follow the existing law.

8. Current regulations

The new government by Michail Kasianov followed the advice of the Accounts Chamber. In resolution № 68 from January 30, 2002 the Russian government stated rules for the transferring of means for formation of a reserve for decommissioning of power plants [6]. A fund was not established, but there was determined that Rosenergoatom should transfer money to a reserve, and that the amount of money to this reserve (reserv) shall be 1.3 % of the gross income (vyruchki) got by the operating utility and nuclear stations, from realization of goods (products and services) connected with the use of nuclear energy. The volume of earmarked means for decommission purposes, 1.3 % from the gross income (vyrochki) was at last clearly defined.
The substitution of the clear word “fund” for the indistinct “reserve” might seem as a minor and unimportant change. However, we think this has lead to a weaker control of how the allocated money can be spent. And it is not possible clearly to understand where for example private persons can transfer their donations. If the expenses were accumulated in a fund, that everybody understand as separate institution with special authorities, the money would be more likely to be used for decommissioning purposes alone. A reserve can be used more freely by Rosenergoatom.

> *“Rosenergoatom shall transfer money to a reserve (...) shall be 1.3 % of the gross income (vyrochki) got by operating utility and nuclear stations from realization of goods (products and services) connected with the use of nuclear energy”.*
> **Resolution No. 68, January 12, 2002.**

In 2003 this resolution was changed, with an additional statement saying that the reserves for decommission has accumulating character [7].

In 2005 the resolution was changed again, this time to reflect administrative changes in the structure of Russian Federation’s administration [8]. For the decommissioning reserve itself these changes formally meant nothing.

In addition to money transferred from Rosenergoatom’s income to the reserve, decommissioning money could also come from budget sources. Such finances will be likely to come on request, not into the reserve, but for immidiate use. There could also be a possibility to use money from the stabilisation fund for decommissioning purposes.

Tariffs
What the power producer gets from selling its energy is decided by tariff, and differs between different producers. For nuclear power the tariff is currently approximately 50 kopek per kWh. Please not that what producers get for their energy is not the same as what consumers pay. The money collected from the selling tariff together makes the gross income (vyrochki), from which the 1, 3 % is going to the decommissioning reserve.

9. State department responsible for managing nuclear energy

In 2004 a reform of the governmental structure took place in Russia. In the presidential decree № 264 from February 2004 the existing government was set aside [9]. And another presidential decree, № 314 from March 2004, established a new and more effective system and structure of the governmental executing body [10].

The Ministry of nuclear industry (Minatom), that previouisly was the federal minsitry responsible for decision making process in the field of decommission and financing (among many other functions), was reformed into Federal Agency of Nuclear Energy (Rosatom). This institution is now responsible for the decommission process and for financing as well.

This is formally a big difference: Minatom was a part of the government, and Rosatom is under direct control of the government of the Russian Federation, i.e. holds a lower position in the structure of state power.

The presidental decree from March 2004 established one more institution - the Federal Service of Ecological, Technological and Nuclear Control, which holds the function of supervisor of safety of nuclear units and for licensing of their operation. This regulatory body is called Roztechnadzor. It is under the Government of Russian Federation. The previous nuclear regulatory body Gozatomnadzor (GAN) was under the President of the Russian Federation. This means that the roles have reduced. Theoretically Roztechnadzor shall put nuclear industry under control. The chief of Roztechnadzor, Andrey Malyshev, stated in an interview with Agency “RIA Novosti” and magazine “Rosenergoatom” that decommission is one of the aspects of this supervising agency that is under their control [11, 12].

10. Implementation of rules

Resolution No 68 of 2002 determined the procedure for extracting parts of the income of Rosenergoatom to the decommission reserve. In a letter to the environmental NGOs cooperating in the project “From closed rooms to openness”, Rosenergoatom informs that the amount of money in the reserve is 1 302.820.000 rubles or approximately 45.700.000 dollars, by 31.12.2004 [13].

The amount of money in the reserve leads us to believe that money has been collected from 2003 and onwards. The accumulation might have started earlier, if so this implies that some money must have been spent.

The letter from Rosenergoatom (REA) contains numbers for spending of the money. The letter says that according to “Program of 2004 for preparation and decommissioning of nuclear blocks of concern Rosenergoatom”, REA can spend about 258 million rubles (or about 9 million dollars) for activities in 2005. Also in this letter, according to the order of Federal tariff service (FTS), Rosenergoatom plans to collect and use in 2005 about 935 million rubles (or about 34 million dollars) for the mentioned program.

This difference between the FTS amount that is planned to collect and use, and the amount that can be used by REA, could be the accumulated finances in the reserve. Or the divergation might have its explanation in different years of planning.

The assumption that most of the money will be spent quickly is supported by information from the inspectorat Rostechnadzor. In a press conference 30th March 2005, in the press center of RIA-Novosti (Russian Information Agency), leader of Rostechnadzor Andrey Malyshev said that money is not accumulated in the decommission reserve, as all money is spent on already closed reactors. According to Malyshev all money is spent on four energy blocks that are in the process of decommissioning, reactor no 1 and 2 at Belayarskaya NPP and no 1 and 2 at Novovoronzhskaya NPP [11,12].

Another possible reason for spending the money

as it gets in, is Russia's rather high inflation of around 10 percent, which makes it problematic to keep money in a reserve for a long time without using it.

The information from Malyshev is not necessary contradictory to that of the letter from Rosenergoatom. What Rosenergoatom claims to be the currently amount of money in the reserve (by the end of 2004), is approximately the same amount of money that would be generated in one year. So if this sum is used each year, no money will be accumulated for the next years.

The official reasons for insufficent money is given in a letter from Federal Agency for Atomic Energy (former Minatom), in letter of October 13, 2005 (No. 04-5538) [14].
Three reasons are given:
1. Systematically non-payment for the nuclear electricity 1993-1999.
2. High inflation in 1990s.
3. Economic crisis in late 90s.

According to former general director of Rosenergoatom, Stanislav Antipov, Rosenergoatom has not enough financing measures for decommissioning. The deficit in 2004 was about 6 billion rubles, and the 2010 deficit could exceed 8.5 billion rubles [15]. As the number of reactors that needs decommissioning financing will increase during the years, we can imagine even greater deficit in the future.

The letter from Rosenergoatom to the NGOs refers to a Tariff Order from 30.11.04, issued by the Federal tariff service, as the basis of their work for formation of the reserve. However, in the letter from the federal tariff service, three different reserves are mentioned, but not the decomissioning reserve (Table 2).

The governmental resolution № 68 from 2002 mentioned, in addition to these three reserves, also a separate reserve for financing of expences for decomissioning of nuclear power plants. It has so far not been possible for the organisations to find out if the decomissioning reserve is located under the reserve for nuclear and radiation safety, or other reasons for why it is not mentioned separately.

Table 2: Tariff order from the Federal tariff service, 30.11.2004

Name of the reserve	Percent of transfer from income money
Reserve for nuclear, radiation, technical and fire safety	3,43 %
Reserve for phyzical protection and control of nuclear materials	0,64 %
Reserve for development of nuclear power plants	26,30 %

11. How much is needed?

Estimations on decommission costs are difficult. Experiences with decommissioning of commercial reactors are very limited, as no large reactors with normal operating lives (20-30 years) have been completely dismantled yet. Thus the costs are uncertain, and the figures depend heavily of who is presenting them. It is not agreement between nuclear industry and independent experts.

The cost of decommissioning depends on technical matters such as type, size and condition of the relevant facility, on political and strategic decisions about timing and end-state, that is, the decommission strategy adopted, and labor costs, costs of waste disposal and financial accounting protocols [16]. According to NEA, one of the most significant cost elements is management of the low level materials that arise from dismantling [16].

According to the response of Nicolay Sorokin, the Assistant General Director of Rosenergoatom, in a response to Greenpeace Russia, "A technical-economic calculation showed that the cost of decommissioning of one reactor is approximately 260-350 USD per kilowatt of installed power, depending on the type of reactor installation and the expense of storage and eventual removal of the used nuclear fuel, as well as treatment, removal and burial of radioactive wastes. Moreover, these

are not one-time costs, but costs that are spread over a period of 45 to 55 years [21].

Regarding strategy, the main types are immediate/early dismantling, deferred/postponed dismantling, and entombment [16]. Allthough the first strategy implies huge early expenses, postponing demands costly long-term surveillance and monitoring.

IAEA point out that "in every case the costs are site-spesific, and generalisations and approximations from other facilities are usually inappropriate to use as a basis to establish a funding base. The owner/licensee, the regulator and the public need to agree upon the detailed site-spesific estimates of cost" [17]. According to a study by NEA, average decommissioning costs is about 320 million USD for a 1000 MWe pressurised reactor, and 420 million USD for a 1000 MWe boiling water reactor [16, page 23]. An IAEA report states that decommission costs can vary between 250 million USD to 500 million USD, with assumed median value of 350 million USD [16].

The costs of decommission of the Ignalina NPP in Lithuania, with RBMK reactors of the same kind as Leningrad NPP, is expected to be 1 billion € by official documents [18]. But according to preliminary estimations done by Lithuanian economists, the total decommission costs exceeds 3 billion € [16]. This money are only for the first 50 years, and the amounts will be larger if wages in Lithuania increases to Western European standard.

According to a public EIA on the new Balakovo NPP done by Greenpeace, putting aside 1,3 % of cross income will not be enough to cover the decommissioning costs. Using the current tariff of 50 kopek, calcultions show that 1,3% makes 289 million rubles in 40 years of operation. This makes 18% of construction costs at 1,6 billion rubles. In Balakovo NPP strategy decommission costs are said to be 29-39% of construciton costs [19].

Even though income from a reactor goes to a decommissioning reserve and not decommissioning of the reactor itself, new reactors would need to take in more than their share, because old reactors started accumulating too late. Greenpeace suggests to increase the percentage from 1,3 to at least 2, in order to accumulate enough money for decommissioning [19].

It should be noted that decommission in Russia doesn't need to be equally expensive as estimated in Western Europe, US and Japan. First, prices of labour and materials are lower in Russia than in the other countries, decreasing the total price. Second, the area situation is much less pressured in Russia than Western Europe and Japan especially. This means that it might not be necessary to restore the plant site back to greenfield condition, at least not at once. Rosenergoatom is currently studying a brownfield strategy where old NPPs can be capsuled in concrete, after the spent fuel has been removed [20]. Depending on time frame and necessary security, this might be cheaper than a greenfield strategy. It is too early to tell whether Rosenergoatom wish to follow this strategy.

On the other hand, the lack of satisfactory storage facilities in Russia may increase the cost. Finding good solutions for the spend fuel and radioactive waste, as well as securing the reactor sites from theft or terrorists, is difficult and expensive. The time frame of radioactive waste is much longer than the time frame of the decommissioning program. Social and economical programs for previous nuclear areas will also be expensive.

Rough calculations show that it is possible to accumulate 910 million rubles each year from the fee of 1,3 percent on the gross income from nuclear power produciton. For calculation purposees we use a tariff of 50 kopek per kWh. Then we multiply the annual production of 140 TWh (equally 140 billion kWh) with 1,3% percent of the price, 0,65 kopek. 910 million rubles equal about 26 million Euros. Whether the current income is sufficient to cover decommissioning expenses, will depend on remaining operation period of existing reactors, possible new reactors, and decommissioning strategy chosen.

12. Conclusions

The decommission reserve is claimed to have accumulating character, but in practice it is not so. As the reserve was put in operation only at end of the first generation reactors planned operation period, it has not had time to build up a substantial capital. Money from the reserve is spent on already long time closed reactors, that do not generate allocations to decommissioning themselves. The payment is not linked to the actual reactor, but goes into a common reserve.

In North West Russia there are four reactors of first generation, while in the rest of Russia there are eight more, making a total number of twelve first generation reactors. Even though the operating time of some of these reactors have been prolongated, they will need to be decommissioned sooner or later. When this decomissioning process starts, the needs for means will increase substantially. However, at the same time the payments to the reserve will be reduced as the first generation reactors are taken out of opration and no longer contribute to the reserve.

One may speculate on Russian authorities intention in this situation. As we have seen in the last years, there are more or less open intention to prolong the operation time of the oldest reactors by up to 15 years. In this way they will continue to generate money for the decomissioning reserve for a longer period. The nature of the funds structure also implies that as the old reactors are closed, it will be necessary to open more and more new nuclear reactors in order to collect enough money for decommissioning of the old reactors. Prolongation can in short term seem to be a less cost demanding choice, and the structure of the decomissioning reserve, as it is working now, supports our assumptions on long term prolongation of first generation reactors.

The reserve is a start for decomissioning processes, it has established a structure and regulations for payments, which is good. Still, the problems with allocation of means for phase out of first generation reactors are not solved by this reserve.

It could be possible, although we doubt it, that there exist budget allocations for decommissioning that we have not yet found. Nevertheless, we consider it possible that budget money can be used for decommissioning in the future. Help from abroad might also be considered.

Secrets of the decommissioning reserve are still to be revealed. One of the additional remaining question is what the money in the reserve can be, and are being, used for, i.e. what is covered by the regulations. According to the governmental resolutions money can be used for support of decommission and scientific and experimental work connected with decommission. This could be interpreted to cover safety improvements on running nuclear reactors.

For supporting accumulating means for decommissioning of the old Russian NPPs it is necessary to have a tutorial counsil independed from Rosenergoatom, to provide control over the fund.

The process of accumulating and spending of means from this fund should be transparent for the society, and provide possibility for participation by civil society.

Finally, the allocated means from Rosenergoatom to this fund should be enough for providing safe and secure decommissioning processes of all NPP units operated by REA. In other words, nuclear energy should work by market conditions and compete with other electricity energy producers. State subsidizies of nuclear energy should be stopped.

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