

# **RUSSIAN FEDERATION**

## **COUNTRY REPORT**

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### **1. Current State of Nuclear Industry in the Russian Federation**

History of Soviet, and then Russian nuclear technologies began in 1940-th, when the foundation of nuclear science was laid down. Fundamentals of nuclear physics, radiochemistry and radiation material science were created at this time. Development of nuclear industry allowed producing nuclear materials and equipment for military and civil purposes.

First nuclear power plant was built in Obninsk in 1954; first nuclear generating unit VVER-210 of commercial scale was commissioned at Novovoronezh nuclear power plant in 1964.

31 nuclear reactors at 10 nuclear power plants are in operation in the Russian Federation now. Besides that, there are 454 storage facilities for nuclear materials, 16475 sources of ionizing radiation, 1508 storage facilities for radioactive materials and radioactive wastes in national economy.

Nuclear technologies are widely used in various fields of national economy, including applications in medicine, industry, transport, geology.

The total installed capacity of Russian nuclear power plants is 23.242 GWe (gross). The total nuclear electricity generation in 2007 was 160 bln kWh, share of nuclear electricity in the overall electricity generation in Russian Federation is 16%.

Concern Rosenergoatom is the only one operating organization in Russia now; it incorporates all Russian nuclear power plants.

#### **Nuclear Power Units in Operation:**

NPP name, Unit No	Reactor type	Power, MWe	
		net	gross
Balakovo-1	VVER	950	1000
Balakovo-2	VVER	950	1000
Balakovo-3	VVER	950	1000
Balakovo-4	VVER	950	1000
Beloyarsk-3	BN	560	600
Bilibino-1	EGP-6	11	12
Bilibino-2	EGP-6	11	12
Bilibino-3	EGP-6	11	12
Bilibino-4	EGP-6	11	12

Kalinin-1	VVER	950	1000
Kalinin-2	VVER	950	1000
Kalinin-3	VVER	950	1000
Kola-1	VVER	411	440
Kola-2	VVER	411	440
Kola-3	VVER	411	440
Kola-4	VVER	411	440
Kursk-1	RBMK	925	1000
Kursk-2	RBMK	925	1000
Kursk-3	RBMK	925	1000
Kursk-4	RBMK	925	1000
Leningrad-1	RBMK	925	1000
Leningrad-2	RBMK	925	1000
Leningrad-3	RBMK	925	1000
Leningrad-4	RBMK	925	1000
Novovoronezh-3	VVER	385	417
Novovoronezh-4	VVER	385	417
Novovoronezh-5	VVER	950	1000
Rostov-1	VVER	950	1000
Smolensk-1	RBMK	925	1000
Smolensk-2	RBMK	925	1000
Smolensk-3	RBMK	925	1000

VVER – pressurized water reactor

RBMK - light water graphite reactor

EGP - graphite-moderated boiling water reactor

BN – fast neutron reactor

## 2. Prospects of Nuclear Power Development

Rising electricity consumption demands new generating capacity. In order to ensure nuclear power development, the Federal targeted program "Development of Atomic Power Industry Complex of Russia for the Period of 2007-2010 and up to 2015" was adopted.

The major objectives of this Program are:

- To provide accelerated development of the nuclear power industry complex;
- To ensure geopolitical interests and energy safety of the Russian Federation through commissioning of new standardized nuclear reactors.

First stage of the Program is being implemented during the period from 2007 to 2010. At this stage modernization of existing nuclear units is planned to extend their lifetime. Completion of construction of nuclear power plants at advanced construction stage at existing sites (Rostov NPP Unit 2, Kalinin NPP Unit 4, Beloyarsk NPP Unit 4) as well as the construction of new nuclear plants (Novovoronezh NPP-2, Leningrad NPP-2, Kursk NPP-2) is foreseen in the Program.

11 nuclear power units already received licenses for lifetime extension.

On April 2007 a state decree on the restructuring of the nuclear power industry was signed. The aims of restructuring:

- To restructure the atomic power industry complex;
- To preserve and develop scientific-industrial potential;
- To strengthen competitiveness of the Russian Federation in the world market of peaceful nuclear products and services.

Within the framework of restructuring an Open Joint-Stock Company (OJSC) "Atomic Power Industry Complex" with 100% shares being in the federal ownership was created.

In February 2008 the Government of the Russian Federation adopted the General Scheme of electricity generating facilities location for the period until 2020.

This General Scheme is based on the forecast of growing electricity demand in Russia by 2015 up to the level of 1426 bln kWh (basic version) with a possibility of electricity demand of 1600 bln kWh (maximum version). The basic version of nuclear power reactors construction program will allow to commission 32,3 mln kW by 2020.

The additional nuclear power plants development program is provided to cover growing electricity demand at maximum energy consumption level. Nuclear power plans are going to use new-type serial power units with reactors of VVER-1000 type with electric capacity of 1150 MW. Besides these power units the possibility for construction of nuclear power units with the unit capacity of 300 MW as well as of floating nuclear power plants with a capacity of 70 MW is planned by 2020. The power capacity increase due to modernization providing capacity increase of 1.5 million kW is planned by 2015.

The general scheme includes the construction of following nuclear power plants:

- Kola NPP-2,
- Leningrad NPP-2

- Novovoronezh NPP-2,
- Nizhny Novgorod NPP,
- Tver NPP,
- Central NPP (Yaroslavl region or Kostroma region),
- South Urals NPP (140 km to the west from Chelyabinsk),
- Seversk NPP (within 25 km from Seversk in Tomsk region),
- Primorskaya NPP (Primorye Territory),
- Severodvinsk floating NPP (Severodvinsk in Archangelsk region ),
- Pevok floating NPP (Chukotsky autonomous region).

The construction of the unit 5 of Kursk NPP will take place in case of assignment of some additional finance for its construction and for building power transmission lines. The general scheme also notices that the type of Kola-2 power units will be specified. WBER-300 is preliminary chosen. Location of Tver, South Urals, Central and Seversk NPPs will be specified during the development of their construction feasibility study.

By 2015 ten new power units will have been commissioned, and another ten units will be being constructed. The present nuclear generating capacity could increase about 2.3 times by 2020.

### **3. Radioactive Waste Management**

In Russia the law on radioactive waste management has been drafted and is planned to be introduced to the State Duma in June 2008. At the present time financing of radioactive waste management program is within the Federal targeted program "Nuclear and radiation safety". 29.7 billion rubles will be spent on the issues of radioactive waste management.

The radioactive waste management strategy includes construction and reconstruction of:

- Storage facilities for some 120 thousand cubic meters and of RW treatment complexes at nuclear fuel cycle enterprises;
- Storage facilities and complexes for RW treatment at nuclear power plants;
- Storage facilities at the "Radon" facilities for RW management coming from national economy for 140 thousand cubic meters.

Besides that decommissioning of 140 facilities, bringing 80 facilities to secure state, decontamination of territories, buildings and constructions with the total area of 1658 thousand square meters is planned by 2015.

Execution of project and research work on construction of interregional intermediate level waste disposal facilities as well as feasibility study and construction of pilot high level waste disposal facilities is planned.

At realization of the RW management strategy the appearance of the national operator in Rosatom structure is planned by 2010, and by 2015 it is planned to design a surface disposal system, and to design a deep geological repository for final RW disposal by 2035.

#### **4. Public Opinion**

There are various public opinion polls regarding nuclear energy and radioactive waste management in Russia. The results of these polls differ depending on the information gathering methods and on the polling organization.

One of such polls "Nuclear energy in Russia" was held on February 11-12 2006 in 100 residencies in 44 regions by the Fund "Public opinion" and published on the 16th of February 2006 on the site [english.fom.ru](http://bd.english.fom.ru) in the section: <http://bd.english.fom.ru/report/map/ed060723>:

Respondents were asked to discuss the pros and cons for Russia of developing nuclear power. Outlining negative aspects of this issue, respondents mentioned:

- the bad ecological situation (16% of answers),
- the general danger for people's health and lives (11%),
- the high probability of disasters and catastrophes (11%),
- the escape of radioactivity and the high daily doses of radiation (6%).

Considering positive aspects of nuclear power for Russia, respondents mentioned:

- the possibility of producing more electric power (17%)
- the low cost of nuclear energy (7%)
- the earnings from power revenues and the general stimulating effect on the country's economy (7%)
- the heating and lighting of houses and flats (6%)
- saving natural resources (3%).

Many people see atomic energy development in our country as all-sufficient evidence of the high level of Russian science and technology (6% of answers).

Respondents have conflicting opinions on the balance between the usefulness and harm of nuclear energy development; 39% think it is useful rather than harmful for Russia, while 25% hold the opposite view.

The majority of Russians are inclined to think that when in good working condition, nuclear power-reactors are relatively safe. Moreover, 29% of those polled share the opinion that when atomic power stations work without problems, they are absolutely harmless to the environment.

Another poll made by Levada-Center shows, that 41% of Russians do not see alternative to nuclear power as an energy source if in future all Russian deposits of oil and gas will be exhausted. Only 5% of respondents propose to refuse from nuclear power use for peaceful purposes, the majority (72%) is for its development or keeping at the current level.

#### **5. Development of Competences**

The development of nuclear industry is only possible if based on the modern forms of organization, management and labor remuneration. In 2006 some 313 thousand people were working at nuclear industry enterprises. Top level managers form 0,4%, intermediate level managers form 6,0%, specialists – 31,6%, workers – 62% of the total amount of employees.

General trends:

- Annual personnel outflow. The total number has been decreasing 5% a year for 5 years, for enterprises of fuel complex – 3,5% a year. The personnel outflow can be explained by the decrease of economically active population throughout Russia and by higher salaries and better social conditions at enterprises of Russian fuel energy complex.
- Aging of personnel, especially managers of various levels and scientific staff. Share of working retired people varies from 15 to 30%.
- Decrease of young employees of the age under 30 years. Total amount of young employees is about 54500 persons, or 34% from the total amount of employees. It decreased on 5% during last 5 years.
- Inertial way of personnel development leads to decrease in amount of employees with higher education.
- Decrease of employees with scientific degrees.
- Average age of workers is about 45 years.

System of training and education institutions in nuclear industry comprise of

- 4 universities and technical institutes;
- 3 specialized secondary educational institutions;
- 4 institutes for professional education;
- Training centers;
- Training points at nuclear power plants.

About 10000 students receive education in the higher and specialized secondary educational institutions annually, about 100 students graduate from each institution annually. The nuclear industry's educational system covers the demand of enterprises of Rosatom State Corporation only on 8%.

The demand of State Corporation in qualified staff will be 7000 – 8000 persons of more than 140 professions annually, among them:

- 2800 persons with higher professional education;
- 2000 persons with specialized secondary education;
- 2200 persons with elementary professional education.

Total expenses for education and training will be about 600 million rubles (about 25 million dollars).

It is proposed to establish nuclear educational cluster, which will allow enhancing the education and training, updating system of continuous education, using scientific and methodical base and financing more effectively, integrating science, education and industrial production.

## **5. WIN Activities**

There are about 400 female members of the Russian Nuclear Society (RNS), 35 of them are members of the North-West branch of Russian Nuclear Society. They represent a variety of nuclear and infrastructure facilities from several regions of Russia. The WIN movement in our country is not so active, as in other countries. As a rule, women usually do not organize special events on behalf of WIN, but participate in organization of numerous events hold by RNS.

One of the events, organized mainly by WIN and YGN members, is International Summer School "Boreal Nights". In 2007 it was 4<sup>th</sup> Summer School, the name of this School was "Nuclear and Communication: learning keys of listening and dialogue".

Russian and French Nuclear Societies organize this school together since 2002. Usually this event takes part during 20 or 14 days – half on the territory of the Russian Federation, half on the territory of France.

During this summer school students and young professionals from nuclear facilities are given training on the following main topics:

- nuclear technology and power development;
- environmental protection and sustainable development;
- safety culture;
- public information and public communication;
- cooperation with mass media.

Lectures and presentation are given by university professors, leading experts and journalists. It became a good tradition to participate in public debates or meetings with civil society members, non-governmental organizations and local administration representatives. Visits to nuclear and industrial facilities of both countries are arranged during the training.