NUCLEAR POWER CRISES AND PUBLIC OPINION: RUSSIAN EXPERIENCE

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ABSTRACT

This report presents the state of Russian nuclear power, which provides 13 per cent of the country's electricity production (up to 80 per cent in some large regions) and shows no recession trends, characteristic of the whole Russian economic complex.

The report discusses measures taken both for improvement of the safety of operating and future new-generation NPPs, and for improvement of public confidence in them.

Also considered are the problems related to both civil power and the military heritage, which are most actively discussed in mass media.

This report provides the prognosis for nuclear power and public opinion for the next 10-15 years.

INTRODUCTION

During the last decade nuclear power in the former Soviet Union has had the unique experience of overcoming three crises: the Chernobyl crisis of 1986, the collapse of the Soviet union in 1991, and the economic crisis in Russia, which still exists.

In the communist time of the Soviet Union, nuclear power was part of the system's facade (first NPP, first atomic icebreaker, etc.). The problem of nuclear power's public acceptance as a factor influencing the development of nuclear power technology, practically didn't exist in the USSR before 1986, when nuclear-related decisions were made at the «highest level», and nuclear power development strategy was formed by a monopolistic nuclear industry. At the same time, the public was assured of the complete security of nuclear power, because the only available information was disseminated on the occasion of positive, peaceful achievements.

Chernobyl and Perestroika have not only frozen the development of the country's nuclear program, but blamed nuclear power for almost all the problems of the people of the former-USSR (FSU). So, in a remarkably short historical period, public opinion in the Soviet Union, and later in Russia in connection with the use of nuclear energy, has made an abrupt turn from "unanimous approval" to almost total rejection of nuclear power, and then, to its' no doubt temporary, removal from a public attention focus. The experience of nuclear power operation and the development of the relationship between nuclear professionals and the public in a time of very rapid change should be of interest to the countries with smoother changes in public opinion.

The delay in construction of new nuclear facilities caused by construction of combined cycle gas turbine generating facilities in Russia's power industry, where more than 60 per cent of the country's fuel is natural gas (which is unique for the world), encourages analysts to look at short- and long-term possibilities of diversification of power sources, including the role of nuclear power in the country's economy.

There is practically no doubt, that nuclear power will be one of the principal energy technologies of the future. It has all the necessary requirements for that: adequate uranium resources, safety, ecological acceptability, economic efficiency.

In Russia, nuclear power is still more attractive, because, in addition to uranium resources, world-class mining and fuel cycle capabilities and highly qualified personnel, there are relevant technologies and projects to successfully implement a comprehensive closed fuel cycle program. However, in order to preserve the technical potential and scientific base to ensure the possibility of a «new start», which, as the experts agree, will begin in the second decade of the next century, the nuclear power option must survive through the «gas pause» in conditions of economic crisis, unfavourable investment climate for capital-intensive technologies and a wary public attitude, quite natural after the Chernobyl accident of 1986.

NUCLEAR POWER TODAY

Today Russia operates nuclear power plants with total installed capacity of 21,240 MW. Four stations include 13 water-water reactors (PWRs) with 10,450 MW total capacity, three stations include 11 units with channel-type graphite reactors (RBMK) of 10,220 MW total capacity, one station with a fast neutron reactor at Beloyarsk NPP—of 520 MW capacity, and four EGP units (48 MW total capacity) in the town of Bilibino on the Chukotka peninsula. During the 1987-1996 period, when commissioning of new units was slowed down, the share of NPP-produced electricity in Russia was 11-13 per cent per year. But the share of its consumption differs from region to region. For example, NPPs supply 33 per cent of St. Petersburg's electricity, 22 per cent of Moscow's, about 50 per cent of the North-West's, and 80 per cent of the Central Chernozem zone's. Russia is the fifth in the world in terms of total installed capacity of NPPs.

The dynamics of the main parameters of electricity production on Russian NPPs are given in Table 1. Available data show that nuclear power has survived through the crisis of 1986, which did not eliminate the nuclear program, although it brought the program to increase development of nuclear power to a halt. That program would have provided for 190 GW(e) of installed NPP capacity by the end of this century (i.e., five times the present-day level in the former-USSR countries). It is important to note, that no operating NPP units at the USSR territory have been decommissioned as a result of the Chernobyl accident.

Table 1 Nuclear Power in Russia.

Year	1991	1992	1993	1994	1995	1996
Number of units	28	28	29	29	29	29
Installed capacity, GW	20.242	20.242	21.242	21.242	21.242	21.242
Electricity production						
B kWh	120.0	119.6	119.2	97.8	99.3	108.8
Share of electricity						
production, %	11.5	12.1	12.7	11.4	11.8	13.0
Load factor, %	67.2	67.3	64.9	52.6	53.4	58.3

The political crisis of the collapse of the USSR has led to difficulties in the nuclear power sector for example in Ukraine, because economic ties were severed. However, the crisis hasn't eliminated nuclear programs in any of the FSU countries, and has even encouraged nuclear development in Armenia, Belarus and Kazakhstan.

Having survived with great losses the crisis of 1986, and, with less damage the *political* crisis of the collapse of the USSR, nuclear power has quite obvious technical achievements during the long *economic* crisis. They are: «first-turn» measures of safety improvement, made on all FSU nuclear reactors,

decommissioning of several old units and the retrofitting of several first-generation RBMK units. Projects for advanced reactors for the new generation have proceeded up to the level of licensing and site choice. Certainly, evaluation of these measures from the point of view of their sufficiency and achieved safety level is a subject for discussion both among specialists and on public, state and international levels.

The most significant measurement of the reliability and safety of nuclear power plants is the number of incidents at various INES scale levels and the frequency of automatic actuation of emergency protection systems. They show a stable trend of decreasing (Table 2). These parameters of Russian NPPs assuredly place Russia among the leading nuclear countries of the world.

Table 2 Trends of Operational Events of Russian NPPs

Year	1992	1993	1994	1995	1996
Total number of events	197	159	128	101	83
Events rated at level 1 and above by INES	32	29	9	4	2
Automatic actuation of emergency protection (per unit)	1.4	0.9	0.4	0.6	0.4

However, the unfavourable economic climate in which nuclear power is functioning, is due to the fact that the joint stock company “RAO EES of Russia", the monopoly consumer has not made its payments to nuclear power plants. In 1996 the debt of the monopoly consumer—joint-stock company «RAO EES of Russia»—to nuclear power plants and «Rosenergoatom» was 7.9 trillion roubles (1.4 billion USD).

Nevertheless, even in these conditions nuclear power demonstrates its economic efficiency. The cost of NPP electricity in 1996 has made an average of 70 roubles (1.2 cent) per kilowatt-hour, which is 30 per cent cheaper, than for the best RAO EES plants, with fuel component of 13 roubles (0.2 cent) per kWh, or five times cheaper, than for the best heating plants.

SHORT-TERM PERSPECTIVES

The power strategy of Russia, officially adopted in 1995, provides for the necessary level of nuclear power development in 2010 to make 125 billion kWh (or 22 GW installed capacity), with the maximum level of 160 billion kWh (or 28 GW installed capacity). A certain reconsideration of these guidelines should take place in December 1997, when the Russian Government will review the country’s Program of Nuclear Power Development for 1998-2005 and for a perspective to 2010, worked out according to the President’s order. Quite a moderate program, proposed to the Government, nevertheless provides for an increase of nuclear capacity to 28-29 GW by 2010, and is based on objective preconditions:

- units which are practically finished and require relatively small investments for start-up;
- prepared NPP sites;
- projects of new-generation nuclear power units (VVER-1000, VVER-640, BN-800), developed to the final licensing stage and permission for construction;
- proven possibilities to continue operation of existing units for another 5-10 years after the end of their design life.

Nevertheless, the possibility of realizing this quite moderate program instead of the «zero» scenario, with decommissioning of units which have reached the end of their design life (in that case the Russian NPPs’ installed capacity would make 17.5 GW by 2010), should be considered as vague.

It is necessary to note, that the loss of nuclear capacity will take place in most «sensitive» regions (North-West, Centre), where the nuclear share in energy supply is large enough (30-50 per cent).

The main reason for uncertainty lies not in public rejection, as in the beginning of the 1990s, but in investment problems (according to the program—about 7 billion «new» roubles or 1.2 billion USD per year). When capital investments disappeared from the federal budget in 1992, and unfavourable long-term credit conditions, the only real (and obviously insufficient) financial source for nuclear power was from the NPPs' own sources or incomes, which it receives, moreover, after long delays and even then only partly.

Uncertainty during the next transition period in nuclear power creates an objective threat to its perspectives beyond a period of 10-15 years, when this method of producing energy in Russia may guarantee the security of the country's power supply in conditions of inevitable price increase for other energy resources. It is expected, that, possibly, by 2030 the increase of the nuclear share will be 20-30 per cent in the whole country, and up to 25-40 per cent in its European part.

PUBLIC OPINION

It may be stated with confidence, that the short-term prognosis for nuclear power development in the country will be determined purely by economic factors, with a calm enough public attitude. The generally accepted way to confirm that is through public opinion polls, not very numerous but nevertheless sometimes conducted in Russia. Usually a strong majority of the respondents do not oppose the existence of NPPs (60-65 per cent), and 25-30 per cent of those questioned agree to new NPP construction, which doesn't make much difference if compared to similar data in many West European countries.

The results of a comparatively recent and very representative public opinion poll in Belarus, which is similar to Russia in terms of public thinking, are of certain interest. In this republic, which was most affected by the contamination from Chernobyl, 41% of respondents support the construction of the first national NPP (with 39 per cent against it).

Analyzing the public opinion trends, especially in swiftly changing Russian conditions, it is important to distinguish the levels on which the problem of nuclear energy's public acceptability is considered.

On the *political level* the period of the struggle against nuclear power, which began in the early 1990s, allowing the electorate voices to easily win , may be considered practically over. On the contrary, the nuclear power arguments more and more often become an instrument for solving political problems. Russia's rapprochement to the «leading countries' club»—G7 at the 1996 nuclear safety summit, demonstration of policy independence, eastern direction of nuclear export (Iran, India), improvement of Russia-US relations on the base of weapon-grade plutonium conversion—far from exhausts the list of examples. The recent parliamentary hearings on nuclear power, the above-mentioned President's initiative and actions of the Government quite objectively demonstrate the trend toward an increase in understanding of the role of nuclear power in Russia's economy at the decision-making level.

Public opinion at the *national level*, does not necessarily coincide with the political elite's position, but nevertheless preserves the Soviet-time heritage—trust in the printed and, especially, «the TV screen» word. Under conditions of market-oriented mass media that means a regular supply to the public of any negative information (including anti-nuclear), where the problems of a past military heritage and of peaceful uses of the atom are freely mixed.

Chernobyl still ranks first among these problems, though the elapsed time and the obvious decrease in the «Chernobyl syndrome» have already let the appearance of some publications, with critical analysis of the after-accident situation, be used for political purposes.

Let us briefly list other unsolved or slowly solved problems, which give an objective base for Russia's nuclear power complex critics:

- stagnation in radwaste and spent nuclear fuel management programs, absence of mastered technology for the ultimate disposal of radwaste;
- utilization of decommissioned nuclear submarines;
- territories contaminated as a result of the initial stage of nuclear activities at military complexes;
- unreadiness to utilize weapons-grade plutonium;
- insufficient control of nuclear materials, etc.

On the whole, according to multiple data of the same mass media, an average Russian is still afraid of radiation more than of AIDS and drugs, but incomparably less, than of criminals and economic reforms of the Government. Major national-level anti-nuclear campaigns in the near future seem practically improbable.

The gravity centre of struggle against nuclear objects, as well as against other industrial facilities (oil terminals, high-speed highways, etc.) has obviously moved to the *regional* or *local level*. Here several cases have already demonstrated the efficiency of the way chosen by small but very active groups of «green» movements—organization of local referenda in order to oppose nuclear objects' construction. An example of such an anti-nuclear success is a 1996 referendum concerning the NPP construction in the Kostroma region (87 per cent against). Anti-nuclear movements are also a relative success in their long struggle (about 100, 000 signatures are already collected for the regional referendum) to stop the construction of the second line of Krasnoyarsk nuclear fuel reprocessing plant RT-2, which is one of the key facilities in the Russian nuclear power strategy, and which also gives a perspective for Russian high technology related to spent nuclear fuel reprocessing to get to the world market in order to utilize part of the plant's capacity for the needs of the world community.

It should be noted, that an example of Russian «Greenpeace» analogue and some similar groups, that Russian nuclear specialists are facing a new phenomenon of anti-nuclear activities being financed from abroad. This «Imported» component was obviously present in the conflict around the completion of the Rostov NPP construction, on which the regional parliament should adopt a final decision, which, in its turn, may become an important stage in overcoming the "not in my back yard" (NIMBY) complex in Russian regions.

It seems, that the specialists' objectives are to attract public attention to the problems of large power facilities (not necessarily nuclear) on a national level. Only common discussion on federal, regional and local levels is able to ensure objectivity in solving the problems of industry infrastructure, that are necessary for Russia's sustainable development.

A change of public opinion priorities and the increase in attention towards environmental problems are as predictable as Russia's and its nearest neighbours' recovering from the state of economic crisis. In this situation, nuclear power objectively occupies the "extreme" position, because it is a new technology. It exists only for a period of two human generations of life, so the myth that it may still be eliminated could not possibly be destroyed until people live with nuclear power for at least 20 more years. That's why nuclear power is condemned to the role of a "scapegoat" for a certain historical period, which in fact doesn't prevent it from an optimistic look towards its future.