

KNOWLEDGE MANAGEMENT AND ATTITUDE TOWARDS NUCLEAR ENERGY: THE RUSSIAN DIMENSION

A. Gagarinski

Russian Research Centre “Kurchatov Institute”, Russian Federation

E-mail address of main author: agagarin@kiae.ru

The paper presented by the author at the first IAEA Knowledge Management Conference (Saclay, France, 2004) described the main achievements of the Soviet Union and Russia in the field of generation and systematization of nuclear knowledge and of assuring human resources needed for using this knowledge.

The crises of the 80-90ies (Chernobyl accident, changed political system and collapse of the Soviet Union) stopped the country’s nuclear power development and were a severe blow for its system of nuclear knowledge management. The crisis decade, followed by the nuclear power industry stagnation, resulted in the knowledge management situation, which could well be described by the known maxim of Prince Hamlet – “the time is out of joint”.

In the opinion of nuclear specialists, the breach of the normal process of knowledge transfer – caused by transferring the nuclear power plants from under control of the semi-military nuclear complex with its high levels of discipline and nuclear knowledge to the unprepared civil “steam boiler” industry – was one of the most important causes of the Chernobyl accident.

In present conditions, which are now with confidence described in term of “nuclear renaissance”, it seems important to trace the influence of the attitude towards nuclear energy existing in the country and in its separately taken circles (governmental authorities, energy community and the public) on the management knowledge system (preserved and currently developing), as well as the role of nuclear professionals in forming this attitude in the rest of the public.

1. Governmental support

The governmental support of the nuclear education, launched since its very creation in the Soviet Union almost simultaneously with the start of the “Uranium Project”, has been preserved and currently continues to develop. The latest reforms in this area (transfer of nuclear educational institutions from the nuclear industry to the general higher education system of Russia) – which, however, haven’t received unanimous support among the nuclear specialists – are now developing towards the establishment of educational & methodical associations in the fields of nuclear physics and technology.

The first step in this direction – unanimously approved by the nuclear community – was the establishment of the consortium named “Russian Nuclear Innovation University”, as an important step towards developing an integral education and training system for the country’s nuclear personnel. The leading specialists will undoubtedly present the issue of nuclear education in detail at this meeting.

Less known, but of principal importance, is the “target” support rendered by the government to the talented young scientists (and their scientific curators), which, in conditions of obvious destructive processes in the Russian science of the 90ies, continued to preserve – and now to develop – the nuclear research and development potential. Governmental support programs for young Russian scientists, for leading scientific schools (President’s grants), and for unique Russian facilities, are now existing, growing and attracting young scientists with the

opportunities to work together with eminent nuclear scientists on world-class installations. The nuclear share in the total support of technical sciences reaches 20%.

It should be noted that the Federal Atomic Energy Agency (Rosatom) also provides grants to nuclear students and post-graduates. Many nuclear-related organizations (Kurchatov Institute, for instance) also allot special grants to their young workers.

Some educational institutions have their affiliated chairs at nuclear organizations. The above-mentioned Kurchatov Institute has 9 basic chairs in the country's leading educational institutes (including Moscow State University), as well as their respective chairs on its base. These educational institutions can thus use the most modern experimental equipment available in this country.

It is important to note that the higher nuclear education in Russia includes also the system of nuclear personnel re-training and professional skill improvement centers, which exists and develops since the end of the 60ies. Today such centers operate not only in Moscow and St.-Petersburg, but also in Siberia and at the Urals (leaving aside the skill improvement faculties in some educational institutes). It is characteristic that these organizations also became the public information centers in the nuclear area.

The list of direct governmental support of the knowledge management (for instance, financing of the respective technologies) and of attracting the young people to the nuclear industry (financing of scientific schools for young scientists) could certainly be continued – including, for example, such a dramatic decision as the delayed call to military service (in conditions of the Law on general military service) received by thousands of nuclear workers in the last several years.

It should be noted that the outflow of specialists from the Russian nuclear industry (in the absolute majority of cases rather to internal business structures than to foreign countries)

Nevertheless, the efficiency of measures taken to rejuvenate the nuclear science – especially in the short term – should not be overestimated. The age composition of the country's leading nuclear center – the Kurchatov Institute – is an illustrative example of the above (Fig. 1). According to certain assessments, the average age of nuclear scientific personnel is now past 60.

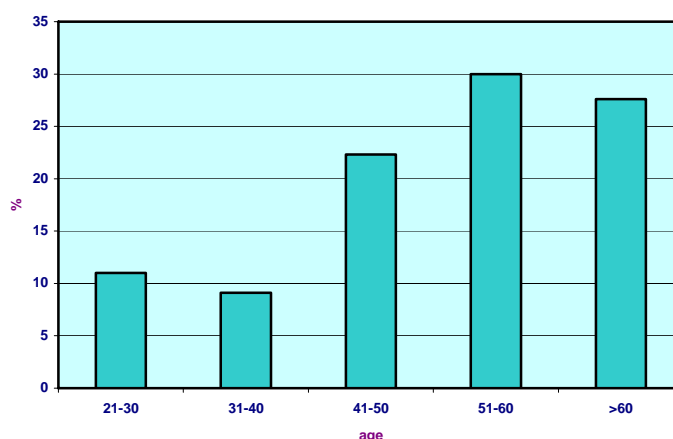


Fig. 1. Age of scientists (example of the Kurchatov Institute)

Attention should be paid to the visible dip in the range of 31-40, which is generally acknowledged as the age of peaking capability to generate non-standard technical solutions. This circumstance – which is, unfortunately, characteristic for the Russian nuclear science

(not alone, it seems) – is obviously ‘promising’ a negative trend of its scientific & technical potential.

In these conditions, the political and moral support of nuclear power industry by the government, in addition to the financial one, is of increasing importance. This, in Russia especially, has a strong impact on the social climate and, thus, on the personnel inflow, which determines the very possibility of nuclear development. Statistic data shows that, after the Russian President has declared the nuclear power to be one of the country’s most important tasks, and after the major program of budgetary investments in this economy sector has been adopted, the share of positive mass media publications on nuclear topics increased more than three-fold (from 20 to over 60%, Fig. 2).

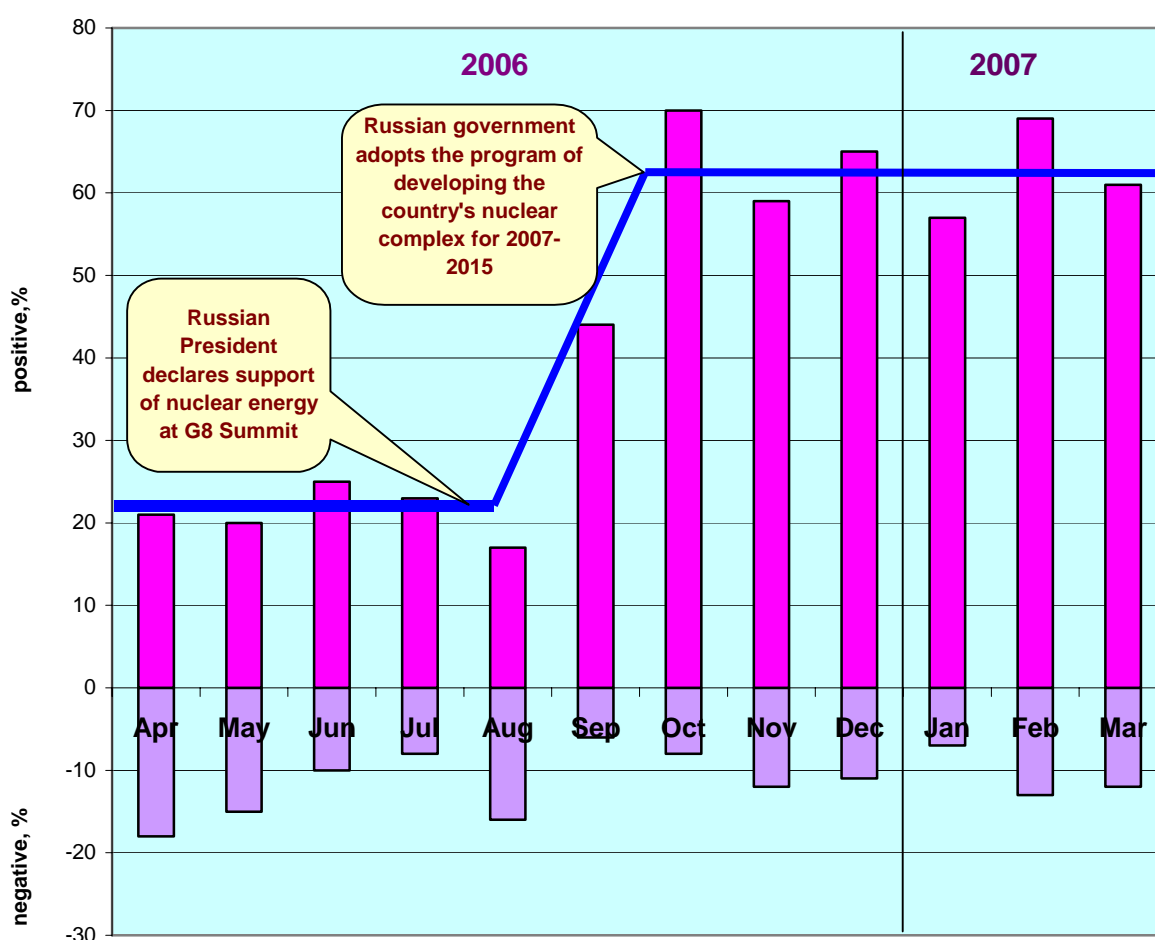


Fig. 2. Russian federal mass media about nuclear energy

It is obvious that, without a steady positive mass media image, it would be hard to expect to attract the young generation to the nuclear sector.

2. Nuclear knowledge management and the energy sector

For a long time, the weak point of nuclear professionals was to realize their place in the country’s power industry sector and to set corporate ties with their “shop colleagues”.

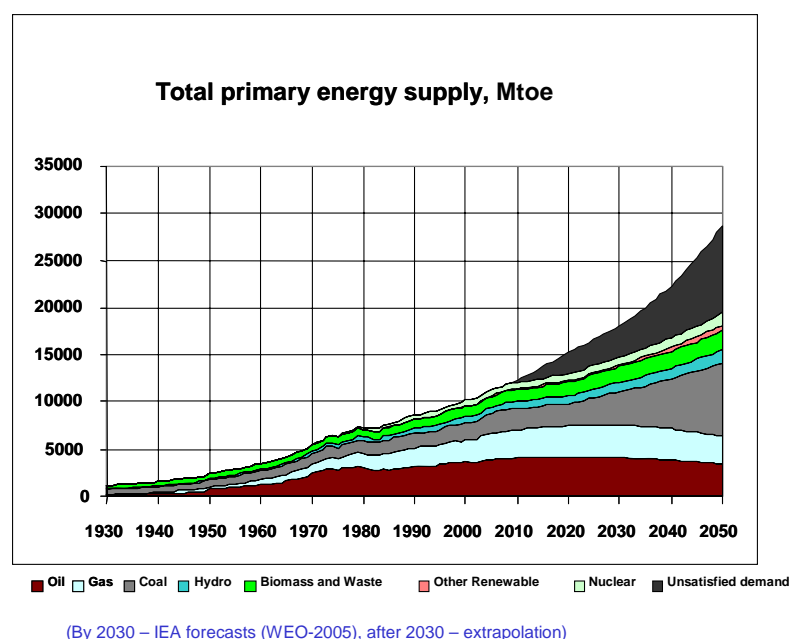
This is unacceptable in the current conditions, when, besides the yet-virtual synergy projects (nuclear energy for fossil fuel production and transportation, etc.), there is the need and the

possibility for Russia – already well understood in the fossil energy sector – to abandon its “gas addiction” and to use its export profits to invest the nuclear development and to save the fossil fuels instead of burning them in power plants.

The creation of a “pro-nuclear” climate in the traditional power industry directly promotes the personnel attraction, while preserving and developing the nuclear specialty in multiple energy educational institutions of the country.

A good example of coordinated activities of the energy specialists was shown by the preparation of documents for the G8 Summit in St.-Petersburg (July 2006), where the contribution of nuclear specialists has been weighty – especially as concerns the long-term energy strategy issues.

Russian power industry specialists have already appreciated the system energy research experience and mathematical apparatus developed by the nuclear professionals. The expected 30% deficit of primary energy by the mid-century (Fig. 3) discovered by the prognostic studies performed in the Kurchatov Institute and caused by the swift reduction of the consumption gap between the developed and the developing countries, creates an objective basis for the creative “interdisciplinary” cooperation of the energy specialists in jointly searching for “yet unknown source” to meet the future energy demand of the mankind.



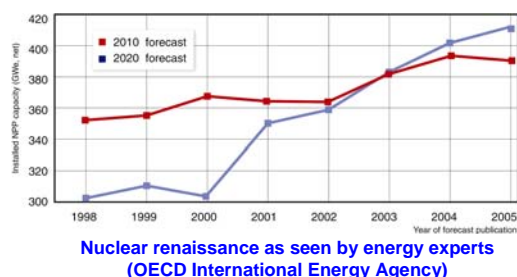
*Fig. 3. Primary Energy Supply
(30% deficit of primary energy resources by 2050)*

The published nuclear specialists’ vision (from the “physicist’s position”) of the status and prospects of the global and Russian energy development (Fig. 4) is meeting an increasing demand among the energy community, and is turning into a joint knowledge management base.



Russia in the World Energy of the XXI Century

E.P. Velikhov, A.Yu. Gagarinski, S.A. Subbotin, V.F. Tsibulski



Nuclear renaissance as seen by energy experts (OECD International Energy Agency)

	2005	2010		2020	
Potential export, bln m ³		Without nuclear	With nuclear	Without nuclear	With nuclear
	207	204	226	197	277

Russia's gas export potential depending on nuclear energy development strategy

Fig. 4. Nuclear professionals for the world and domestic energy

In particular, the nuclear professionals were invited to take part in the development of the Russian electric power deployment strategy by 2030, which faces an urgent issue of rapid increase of nuclear and coal electricity generation.

3. Nuclear knowledge management and the public

It is the public attitude towards nuclear energy that determines the status and prospects of the key nuclear development factor – i.e., involvement and training of the qualified personnel, which would come in time to absorb the experience of the rapidly depleting community of the “First Nuclear Era” specialists.

Here it should be clearly understood that the nuclear energy image existing in the “public memory” from its very beginning has not allowed it, for sixty years of existence, to become a traditional and habitual technology of the energy mix, assessed by the public on the basis of its objective performance. The specific feature of the Russian dimension concerning the atomic energy consists of the unsatisfactory social position a considerable part of population recognizes itself in – and this circumstance, as sociologists know well, intensifies the external influence on the public opinion and leads to its radicalization and to mythologization of actual problems.

Today, in the conditions of nuclear power industry propaganda launched on the governmental level, the focus of nuclear professionals’ attention should shift from the “existence theorem” (which was already proven) to the calm and positive dialogue with the public concerning the regional and local issues, which are regularly and with sufficient qualification raised by the environmentalists.

Nuclear specialists, anxious about the inevitable fast development of their industry, and, in the first turn, about its personnel training and about transferring the accumulated knowledge to the new generation, should learn not only to solve their internal problems, but also to interact with the external public. This need is already understood – with significant role played here by the

timely and definite position of the IAEA (as we know, nobody is a prophet in his own country).

The nuclear sector (first of all, Rosenergoatom Concern) is steadily pursuing the policy of “making bridges” with the public and of disseminating nuclear knowledge in the regions, where its enterprises are operating – such as, for instance, the seminars given by NPP specialists for the teachers of physics from the adjacent territories. The Russian nuclear power plant construction concern (Rosatomstroy) organizes close collaboration with higher nuclear educational institutions situated in all regions, where the concern’s projects are underway. One of the young generation conferences held at the Kursk NPP had a name characteristic in this connection – “Nuclear Power – A Zone of Innovative Development and Life Prospects”.

For example, many scientific organizations, at least in Russia, have already acquired the experience of using efficiently even moderate enough resources needed to preserve the “tacit” knowledge, by encouraging the leading specialists of the older generation to write books summarizing the experience of both achievements and losses on the way of nuclear energy.

By the way, the IAEA – which already possesses the budget sufficient for this purpose, the experience of financing the world experts, and, above all, the moral authority, could become the leader in ordering the books from the eminent First Nuclear Era scientists from various countries, which would be a unique contribution to nuclear knowledge management.

Without dwelling on the whole range of activities performed by the Federal Atomic Energy Agency and by the nuclear community in the field of nuclear knowledge management improvement (described in other presentations), I would like to note only the critical importance of the present moment, when the reform of the Russian nuclear power industry and the establishment of a vertically-integrated structure (a sort of a nuclear Gazprom) enter their practical phase. The new law adopted in this regard has not forgot the nuclear education, and thus some new prospects for the knowledge management could be reasonably expected.

In these activities, the nuclear specialists should miss no opportunities to send “positive messages” to the public. As an example, it should be noted that such an information occasion, as the 60th jubilee of the Soviet first – and the world’s oldest operating – nuclear reactor was made a topic for the national mass media and a unique demonstration of the Russian nuclear science and engineering potential.

4. Role of non-governmental organizations

Here we must stress the role of non-governmental organizations, such as a Nuclear Society, which in Russia has got not only an efficient and aggressive (in the positive meaning) Young Generation Department, but also a special nuclear education section, and even the children’s section.

The Young Generation Department and the sections of the Nuclear Society of Russia coordinate the activities of the youth associations, support and promote the innovative projects of young scientists, organize technical tours to nuclear plants for young people, and conduct many other activities. An international youth conference “Northern Lights” with compulsory participation of nuclear scientists and managers is regularly organized in St.-Petersburg with Rosatom’s support.

The Nuclear Society has performs great services of involving the nuclear industry’s veterans in continuous work with schoolchildren and young people, and of supporting the “association” of the nuclear education specialists.

The Russian “Children’s Nuclear Academy” received already about 600 applications this year. The President’s program of equipping all schools with computers and Internet contributed much to the fact that the competing projects and applications are now received from the whole

country, including rural areas. The children, other than those whose parents work in the nuclear industry, thus show the interest in the Academy.

It should be noted in conclusion that the issues of knowledge management and attracting and training of specialists do not have a narrow corporate character, and require from nuclear professionals the ability to skillfully interact with the public as a whole, as well as with its separate groups. Russia has an interesting experience here, and we are ready for an efficient international cooperation.

REFERENCES

- [1] A.YU. GAGARINSKI, N.E. Yakovlev, “Nuclear Knowledge Management: Russian Lessons”, In: Proceedings of International Conference on Knowledge Management – Strategies, Information Management and Human Resource Development; September 7-10, 2004, Saclay, France.
- [2] “THE History of Nuclear Power in Soviet Union and Russia”, edited by V.A. Sidorenko, issue 4, IzdAt, Moscow, 2002.
- [3] I.V. EFIMKOVA, N.N. Ponomarev-Stepnoi, “Integration in Nuclear Education”, Atompressa, No 34, August 2006.
- [4] N.N. PONOMAREV-STEPNOI, V.F. Tsibulski, “Nuclear Energy and Power Security”, Atomnaya Energiya, v. 101, issue 4, October 2006, pp. 247-254.
- [5] E.P. VELIKHOV, A.Yu. Gagarinski, S.A. Subbotin, V.F. Tsibulski, “Russia in the World Energy of the XXI Century”, IzdAt, Moscow, 2006.
- [6] RESOLUTION of the 16th Annual Conference of the Nuclear Society of Russia, “How to Assure the Nuclear Power Development in Russia”, Yadernoe Obshchestvo magazine, No 4-5, pp. 20-30.