Today we have a unique window of opportunity. Global *nuclear renaissance*, unique legacy of *Minsredmash*, huge human resources potential and strong government support – all this paves the way to the establishment of the largest company in the world that would become a leader in nuclear energy development.

The International Uranium Enrichment Center will not solve all of the existing nonproliferation problems, but could offer a new basis for solutions to current crises in this sphere and prevent the appearance of potential new threats by offering *newcomers* to the field of nuclear energy a alternative to national uranium enrichment capabilities. In particular, one of the elements of a *package* solution to the crisis surrounding Iran's enrichment program could be the participation of this state in the international center.

Resolution of the Gulf countries to develop their nuclear industry is obvious. Going nuclear is explained by growing demand in the region for electric power and long-term perspective of oil and gas shortage. Additionally, there is a need for fresh water to develop agriculture. Plans to diversify economic growth and refine the oil locally require an alternative energy source. A totally different motivation lies in technological competition with Iran.

It is incredible how we could make substantial restructuring in such an effective and proper way. Much was done on the spot and from the scratch, but people who were seeking changes could turn their enthusiasm into immense work. Many things failed, which is a normal situation in the process of dramatic reforms. At the top level it all seemed very logical, but eventually the pace of transformation depends on the appropriate circumstances and motivation and the degree of involvement of people and enterprises.

At this point, there is no doubt that there are major significant prerequisites that will allow Japan and Russia to establish a strategic partnership in the area of nuclear energy in the near future. Both Japan and Russia have assumed strategic positions in Kazakhstan; thus, the interests of both countries have merged so closely that to let bilateral cooperation weaken is simply impossible.

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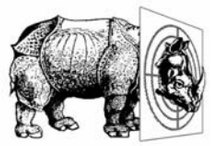

Nothing is built on stone; all is built on sand, but we must build as if the sand were stone.

Jorge Luis Borges

Atomic. Once a year the *Security Index* journal breaks its tradition of covering a huge variety of global security issues and focuses on a certain topic. This topic should be significant for the world and for Russia. This topic should be thought-provoking from academic point of view and controversial from the point of practical policy. This year we concentrate on atomic energy.

Nuclear renaissance has been much spoken about in the last two-three years and this term becomes a commonplace. However, some time ago it sounded like oxymoron – the world had just survived severe psychological shock from accidents in Chernobyl and Three Mile Island and psychology dominated economy.

Nowadays *nuclear renaissance* is in the headlines, it is mentioned in each and every manuscript. The current issue of *Security Index* follows this cliché, but has a substantial difference – we try to present the widest possible geographical scope of views. Russian politicians are interviewed along with their colleagues from Kuwait and the United States, Kazakh diplomats add to the analysis of Japanese experts. I did my best to cover in this issue the broadest range of problems related to atomic energy in the 21st century, but also deliberately engaged the authors from different nations – there should be no impression that nuclear energy development is only promoted by a small group of partisan countries.

Nuclear energy sector today consists of 439 operational nuclear power plants (NPPs) and another 35 are under construction. It accounts for 78 percent of all electricity consumed in France, 45 percent in South Korea, 31 percent in Germany, 30 percent in Japan, 19 percent in the United States, 16 percent in Russia... and only three percent in India, and two percent in China. What a patchwork of markets, developed and developing, zealous to encourage nuclear energy development and increase its share in the national energy balance!

However, we have no right to ignore the fact that over 1.5 billion people in the world have no access to electricity at all. In Africa average energy consumption per capita does not exceed 50 kWh per annum, i.e. about 6 W per hour – less than you have used today on your reading lamp or I have used today to charge the battery of my laptop and to write this article. Compare this with the energy consumption in the OECD (Organization for Economic Cooperation and Development) countries – 8,600 kWh per year, i.e. 170 times more than in Africa!

How can such *energy divide* exist in the 21st century? Will *nuclear renaissance* help to bridge this gap?

My answer is affirmative. I am sure that atomic energy is one of the keys to the progress of mankind, to overcoming inequality.

It is important, nonetheless, that those privileged nations that keep the hi-tech keys to global energy deadlocks do not feel the pressure of politics and, hence, do not deprive the developing world of opportunities that the energy progress brings.

Global. This is a big question. Nuclear energy development will spread with different pace in various regions of the world in the coming decades. The Asian vector is more or less evident – China expects real boom of NPP construction and it is discussed in the article by Nikita **Perfilyev** and Yevgeny **Petelin**. Latin America is next. The nations of the Middle East, Gulf and North Africa demonstrate growing interest in nuclear energy development, but will these intentions be supported by further practical steps? Roman **Ustinov** tries to answer this question in his article on the nuclear plans of the Gulf states. It is curious to see how Europe will behave. Angelica **Matveeva** takes a hard nut to crack – Germany. She believes that the present-day antinuclear policy of Germany is ridiculous, but she does not rule out potential German *Drang nach Vorleben* – back to the construction of NPPs.

Naturally, for me it is important to know what this *nuclear renaissance* may bring to Russia. And I asked Sergey Kiriyenko, who heads *Rosatom*, to tell our readers about Russia's perspective. He reminded me of the recent estimates by *Atomic Energy of Canada Ltd*. about the number of nuclear reactors to be built to replace the thermal power plants, so that global warming may not exceed two degrees in the 21st century. It turned out that at minimum mankind should have 4,000 reactors with the capacity of 1,000 MW each. This means that every year the world should construct more than 40 such reactors. «In comparison to this figure, our plans look much more modest and less fantastic. Moreover, it may seem that they even lag behind the potential demand of global nuclear energy in the future,» says Kiriyenko.

Russia should account for 20 percent of the global nuclear export. We should and will continue to work with existing partners – China, India, Iran, and Bulgaria. But we should not miss the window of opportunities opened not only by the export of traditional power plants but also of floating reactors. Potential geographical scope here is dizzying – from Vietnam to Egypt, from Jordan to Ecuador, from Indonesia to Cape Verde. But one should remember that competition is also tough.

Interdependence is another key word of the issue. *Nuclear renaissance* is not a prerogative of an individual state or a region. The process gains momentum all over the world – from East Asia to Latin America. The countries become mutually dependent and interconnected in joint projects – already implemented, existing on paper, or just invented. We devote much of our journal space to these matters. Dr. Adnan **Shihab-Eldin** speculates on the joint nuclear initiative of the Gulf states and admits that the authors of the project keep in mind their northern neighbor – Iran. Taisuke **Abiru** analyzes from Tokyo the current deals and promising partnerships within the business triangle of Japan, Russia, and Kazakhstan. Amb. Nikolay **Spassky**, deputy director general of the *Rosatom* state corporation, made a lot to ensure the signature of the 123 Agreement with the United States in May 2008 and now shares his vision of the prospects of bilateral cooperation.

Sustainable cooperation should be based on large-scale ambitious international projects for the future. There are not so many of them yet. The most visible one is the International Uranium Enrichment Center (IUEC) in Angarsk, which is making its first steps. My colleague from the PIR Center, Anton **Khlopkov**, notes the flaws in the IUEC activities, but also emphasizes its advantages and capabilities.

Security is another important word in our lexicon. In fact, the Russian term *bezopasnost* means both *safety* and *security*. Chernobyl gave a serious blow to the image and prospects of nuclear energy sector. However, today's technologies let us speak about qualitatively new levels of safety of nuclear reactors in the new century.

Safety of nuclear energy is intertwined with the peaceful uses and security of nuclear arsenals. «Nuclear energy can dramatically change the terms of existence of the human race. If it follows peaceful and only peaceful way, it may meet the increasing demand for energy. If it is used as a weapon, it may lead to the irrevocable result – global nuclear catastrophe that would mean the end of the modern civilization,» writes Amb. Roland **Timerbaev**, one of the founding

fathers of the NPT. The treaty still helps to keep the balance between nuclear energy development and willingness to abolish nuclear weapons.

Yes! We say «yes» to nuclear renaissance with this issue. According to Academician Nikolay **Ponomarev-Stepnoi**, «the *nuclear renaissance* is not a whim of transnational corporations planning to gain new profits, it is an imperative of our era determined by the desire to ease tensions on the energy market and, hence, to ensure energy security.»

According to his estimates, by mid-century the total capacity of nuclear facilities should increase five times, in order to solve this problem. And this means that the list of countries using nuclear technologies will be expanded and will contain those nations that do not have particular experience or specialized rules of nuclear safety and security maintenance. The IAEA believes that the number of such countries may vary from 8 to 11 by 2020, and amount up to 23 by 2030.

Zero. To finish the alphabet, I would also mention «*zero*», since the topic of *nuclear zero* becomes more and more popular. Nikolay **Sokov** speculates on the prospects and impediments for the nuclear-weapon-free zone in Central Asia. However, the disarmament affairs are only slightly touched upon in the current issue, as we plan to discuss them in detail next year, when we intend to organize heated debate on this topic among the internationally renowned experts.

In the 21st century the most challenging tasks face diplomats and politicians, not energy experts or businessmen. As if replying to the thoughts of Nikolay Ponomarev-Stepnoi, Amb. Timerbaev points out, «There is a need to develop meaningful and comprehensive strategy aimed at achieving exclusively peaceful nuclear energy uses under tight control. We are doomed to coexist with peaceful nuclear energy – without it, increasing energy demands of human race cannot be met.»

We have traveled in this issue from A to Z – from peaceful atomic energy to nuclear weapons abolition to complete zero. And we come to the conclusion that *peaceful coexistence* with nuclear energy is quite possible and even necessary. What about the views of our readers? Well, we are not going to close the nuclear debate and will return to it in our coming issues.

Vladimir Orlov

Note

Editors of the Security Index *journal would like to express their gratitude to the* Nuclear Threat Initiative, Inc. (NTI), *as without support of this foundation provided to PIR Center's project on multilateral approaches towards the nuclear fuel cycle, publication of this issue would not have been possible.*

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Sergey Kiriyenko

«ONE IS EITHER THE FIRST OR IS OUT OF THE MARKET»

***Vladimir Orlov, editor-in-chief of the* Security Index *journal, interviews Sergey Kiriyenko, Director General of the* Rosatom *state corporation*.**[1]

SECURITY INDEX: Soviet nuclear complex, most of which remained on the Russian territory after the collapse of the U.S.S.R, found itself in a difficult situation in the 1990s. It lost the coherence, its development stopped, the Chernobyl syndrome had its negative impact and global trends indicated low interest in the nuclear component of energy balance. You had to bring together all elements of the industry and initiate a profound reform. How is this process going? *Quo vadis*?

KIRIYENKO: One of the basic conditions for effectiveness of nuclear industry is the promotion of structural reforms, in order to set up the unified system of control and management. According to the law, the *Rosatom* state corporation is an economic entity and the government control body at the same time. All this distinguishes it from other companies – in fact, such practice was formed historically during the early years of the Soviet *Atomic Project* and proved its efficiency.

Such structure established thanks to the strong support of the Russian President enables us to concentrate all resources and necessary means without losing a single precious moment of time. If we hadn't started the reforms today, it would have made little sense to launch them in 5–10 years. We would miss the window of opportunity created by global *nuclear renaissance* and would lose the capacity to transfer knowledge and experience from one generation in nuclear sector to another. We are at the edge right now – in a number of spheres, which saw little investments, fewer serious contracts, such competence and experience nearly vanished. We have five-seven years to organize such knowledge transfer to a new generation entering the nuclear complex. If we had spared this time, Russian nuclear schools would have disappeared along with a number of valuable technologies.

SECURITY INDEX: May it happen that state funding would become another type of artificial support and lead to the establishment of a non-competitive enterprise?

KIRIYENKO: There is a government decision in principle to liberalize the heat and electricity markets starting from January 1, 2011. It is clear that primary reactors are built at the expense of the state budget, but then the industry will have to earn enough to finance its development, i.e. new construction sites. If market prices are set for gas and electricity, we get such opportunity. So far the Russian gas costs $260 abroad and $45 at home. So nuclear energy sector cannot compete with the gasified power plants. When the price balance is achieved, we can easily become business rivals of power plants based on gas, coal, and oil. If electricity prices are dictated by the market, nuclear power plants can gain enough to continue the funding of large-scale construction projects. Hence, the money that we receive from the state today is not the assistance to the weak, but a temporary support due to the lack of equal rules of the game in the energy sector. The government says – I cannot provide the sector with equal

terms, for some time you will have to be discriminated with respect to traditional energy sources, – and thus, it provides the means for the industry, at least, to make a start.

SECURITY INDEX: Russia is not the only country that intends to benefit from *nuclear renaissance*. Most of the nations with strong nuclear sectors set forth new proposals, intensify their policy at the service market – I mean reactor construction, fuel supplies, etc. What is the Russian place on the global market of nuclear services? What are the strong points of Russia in comparison with other players? How would you identify the areas of partnership and rivalry?

KIRIYENKO: Today we have a unique window of opportunity. Global *nuclear renaissance*, unique legacy of *Minsredmash*, huge human resources potential and strong government support – all this paves the way to the establishment of the largest company in the world that would become a leader in nuclear energy development.

Entering the world market with its tough competition, we should realize the logic of interaction and integration. Global nuclear energy sector is not only based on rivalry, it is a system of the most beneficial and most reasonable partnerships. After all, the *renaissance* occurred earlier than expected and is much more large-scale in nature than even bravest optimists dreamed of.

Atomic Energy of Canada Ltd. has recently published its calculations about the number of nuclear reactors to be built to replace the thermal power plants, so that global warming may not exceed two degrees in the 21st century. It turned out that at minimum we should have 4,000 reactors with the capacity of 1,000 MW each. This means that every year the world should construct more than 40 such reactors. In comparison to this figure, our plans look much more modest and less fantastic. Moreover, it may seem that they even lag behind the potential demand of global nuclear energy in the future.

Nowadays one can hardly find a key global nuclear corporation or country that is ready for such extensive *renaissance* of nuclear energy. Therefore, there are two strategic options. One is to build up all the elements that the country currently lacks. It will take time, while the *renaissance* demands all and now. This is why most of the global actors follow the second option – they complement each other in goods and services through appropriate integration. Large alliances are formed and despite all difficulties of such merger, they involve in their orbit more and more small satellites, since it is clear to everyone that knowledge and technologies are insufficient and should be expanded. *Rosatom* will most probably follow this way. In the next few years Russian nuclear industry will have to take a sharp strategic decision – to define which weak points should be compensated through the establishment of alliances, through integration. For that purpose, we need a clear and honest analysis of our capabilities. And there can be no arrogant faith in success – «we are the best in everything». Such approach is good for patriotic sentiments, but the reality is not always that simple.

We should learn, above all, to work with our partners inside the country, to open up for integration with the Russian economic champions in other sectors. One of the specific features of nuclear sector development was its closed character, and when we focused on military aspects only this could be justified – this was the only way to implement the government tasks. Today we should not resort to the other extreme, since economic rivalry is sometimes tougher than arms race and we should think about protecting our interests. On the other hand, without partnership with the best global corporations, global leaders in each direction of activities, we will not be able to ensure our own competitiveness. Natural economy, stubborn self-production is the wrong path to competitiveness in principle.

It is important that the format of nuclear sector development was clearly defined inside the country. At present, this is one of our strong points, as unlike our competitors, we have guaranteed state contracts with guaranteed funding until 2020. We plan to build 26 reactors and the construction sites have been chosen. None of our rivals have such large-scale program that ensures our progress, our good starting conditions. There are federal programs of nuclear power plants construction, nuclear and radiation safety and development of energy technologies for the new generation of reactors.

In accordance with the general scheme of deployment of generating facilities in Russia, we build two and then three power plants per year with the intention to reach the pace of four reac-

tors per annum. It would be easier to move from two to four blocks later, but now we have a much more complex task – to shift from one reactor in five years to two reactors annually. If we overcome this qualitative threshold, we will be able to make operational as many facilities as required.

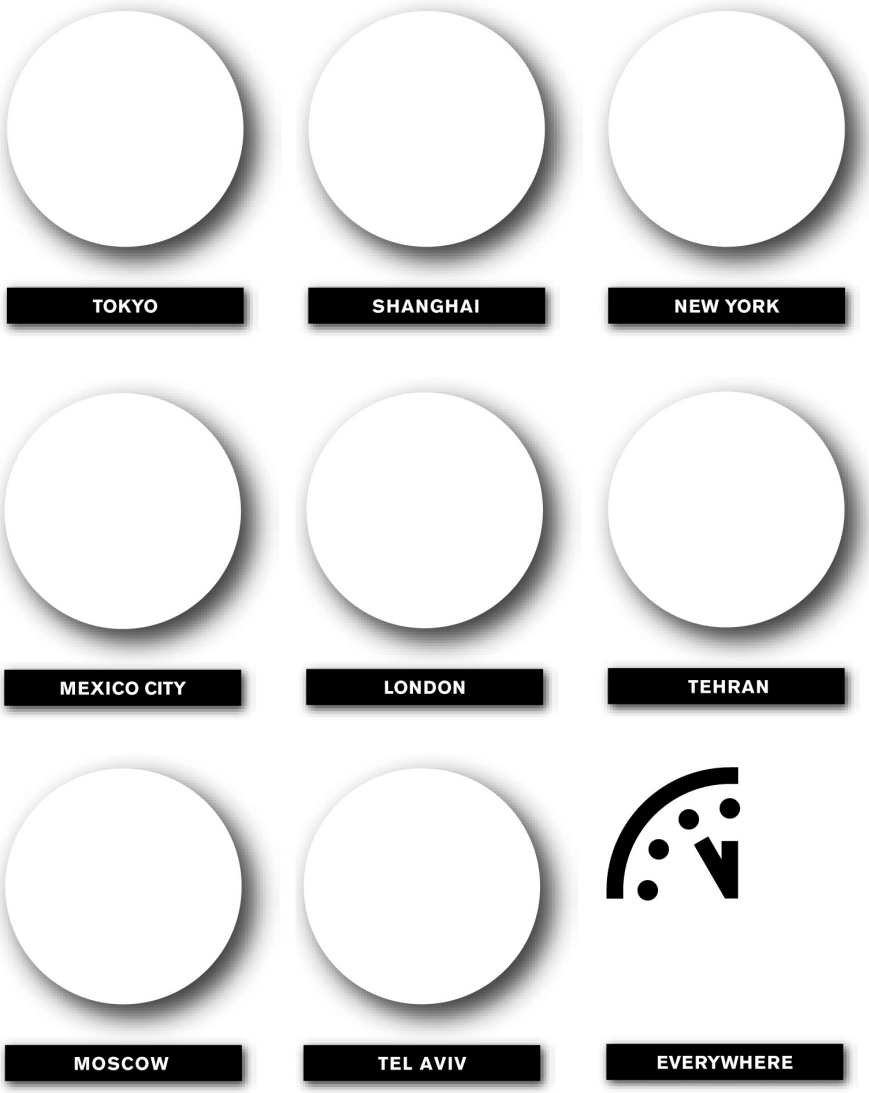
Under the current level of competition, it is impossible to be the second. One is either the first or is out of the market. So in each sphere that we tackle, we should have the ambitious goal of becoming the best.

SECURITY INDEX: And last but not the least question. Beside attracting external resources, is there any set of measures to raise the efficiency of using the already available ones? What is the impact of this process on the development of your company and its employees?

KIRIYENKO: It is necessary to treat the management issues seriously. People in Russia are not used to cost management, but in the new market conditions it is a principal issue. For instance, until recently we could afford not to ask ourselves about the real cost of nuclear fuel production and its efficiency in comparison to our business rivals. Nowadays, we can no longer keep silent on the issue. If we compare *TVEL*'s plants with the facilities of our competitors that have similar capacity, it would become obvious that they occupy 100 times less space and employ 10 times fewer staff. So the alternative is evident – our employees may continue to get 10 times lower wages, or we start substantial restructuring. And if they continue to earn 10 times less, our nuclear sector will lose its best specialists tomorrow. This is not the matter of politics; this is the matter of normal competitiveness. In other Russian industries – banking, oil production – salaries rapidly reach the global level and even exceed it sometimes. So, a young professional will have a choice. And if we do not provide him with adequate salary at the level of world standards, we will never be able to recruit the best specialists.

Note

[1] The interview took place on April 23, 2008.



Adnan Shihab-Eldin

«NUCLEAR POWER IS A GLOBAL OPTION»

Security Index ***Assistant Editor-in-Chief Nikita Perfilyev interviews former Acting Secretary General of the Organization of Petroleum Exporting Countries Dr. Adnan Shihab-Eldin, who is currently involved in the development of the nuclear power program by the Gulf Cooperation Council.***[1]

SECURITY INDEX: In December 2006, Abdul Rahman Al-Attiyah, Secretary General of the Gulf Cooperation Council (GCC), announced the intention of the six GCC states to establish a joint nuclear research program. What is the real rationale behind such decision?

SHIHAB-ELDIN: The purpose of that program is to make use of peaceful application of nuclear energy including generation of electricity and desalination. So the decision was to explore through a pre-feasibility study the development of a joint program, a regional program for the introduction of nuclear power.

As for the rationale behind such decision, the fundamental economics of nuclear power in recent years has become very obvious. As energy prices, including those of oil, began to increase 45 years ago, it became increasingly more attractive to those who could afford the initial capital investment to consider using nuclear power instead of gas or oil for the production of electricity. The IAEA and other organizations as well as consultants have pointed out that at $60 or so for barrel of oil, nuclear power, even new nuclear power plants, look very attractive. And today we have a hundred-dollar plus for price of a barrel of oil. So, that's the fundamental rationale for considering nuclear power option.

The timing of the decision may have to do with regional development. For example, the development of nuclear power in Iran as well as concerns over the direction of the Iranian nuclear program, in the sense of some concerns that it's not only peaceful. Here the rationale for GCC would be to point out that it is possible to use nuclear power 100 percent for peaceful purposes as an example. And to point out that you don't need to go to the enrichment process, you do not need to develop indigenous full nuclear fuel cycle that raises questions in order to have a peaceful nuclear power program. You can carry out a program – as it is the intention of the GCC - with the full support of the international community, with full transparency including full inspection and safeguards of the IAEA as an example for other countries in the region, who are also interested in using nuclear power.

The timing may also have to do with other non-fundamental economic considerations. Not many people know that in the 1970s, when the prices for oil went up, some oil producing countries like Kuwait, for example, did consider the nuclear power option. In fact, in 1978 Kuwait explored the opportunity to build a small 50-megawatt nuclear power plant for electricity and desalination. And it received three offers from West Germany, the United States and France, but after collapse of oil prices in 1980, and following the Three Mile Island nuclear accident, the project was basically cancelled.

SECURITY INDEX: But when we look at the oil-rich Gulf countries it does not seem that they should suffer because of high oil prices, instead they should benefit from such state of affairs. They don't have to spend money on buying oil and gas.

SHIHAB-ELDIN: It's not the question of high prices; of course, it's the question of economics. Is it better to use 1 barrel of oil at $100 or even at $50 to generate electricity or is it better to sell it for transportation use to other countries, like China and India that are really hungry for oil not for electricity? Basically these countries have no other alternatives. They can't use nuclear energy for transportation directly – so they need oil. And economics as such is that you can sell your oil at $50 or $100, build the nuclear power plant and still save money!

SECURITY INDEX: It could be said that the intentions to establish a joint nuclear program are unprecedented: there have been no examples when several countries with little or even no experience in the field of nuclear energy would launch such a program from the scratch. How effective is the decision in favor of the joint program?

SHIHAB-ELDIN: We don't know of any region where there was a joint nuclear program, perhaps with the exception of the program between Slovenia and Croatia, which was not designed as a regional program; it was a program in the former Yugoslavia. And then when the breakup of Yugoslavia took place, an agreement had to be worked out to share the electricity output between the two countries. In this sense the GCC planned program is the only program involving more than one country. Although similar attempts are being considered between Poland and the Baltic states. From this perspective, the GCC program is unprecedented. It does raise a number of challenges for GCC countries, because they do not have the infrastructure. This could certainly be a problem, but at the same time it could be an advantage, because when you start from the scratch and you are looking for a regional program it gives you an opportunity to harmonize all aspects including administrative, infrastructure, human resources, and research from the very beginning and to employ national capacity-building to the advantage of all parties.

On the other hand, of course, there is a challenge if each country is not willing to wait until the regional program is fully planned and timely implemented. Some countries may be impatient and want to possess a nuclear plant ahead of others because of budget issues, because they cannot wait for the regional program to be slowly implemented. Any time something multilateral is undertaken it takes a little bit more time because the decisionmaking process has to be a consensus.

But I think that it is an advantage that a regional program can take more time. And it may explain why such countries as the United Arab Emirates (U.A.E) continue to be in favor of planning a regional program though they have announced that they would also at the same time carry on with planning their own national program. I don't think that the final decision is needed today because planning for both the national programs and the regional program does take a long time. You cannot build your nuclear program overnight.

SECURITY INDEX: Whether it is the joint program or national one, GCC countries will have to overcome serious challenges before they will be able to build a first NPP. Because of little experience in this field, they lack organizational resources, legal framework, trained personnel etc. What other challenges these countries face and how will they tackle them?

SHIHAB-ELDIN: These and other challenges emerge, but they have to be resolved before the decision to start construction. The IAEA, for example, has issued guidelines to countries that are planning to introduce nuclear power. They mention three phases, covering 19 tasks stretching over 10 to 15 years before the first nuclear power plant is operational in a country that has no previous experience in this field. Now the studies and research are under way and the GCC countries do not have to make the final decision immediately.

If you speak about regional approaches there are two choices. One option would be to agree that nuclear power and the entire infrastructure: human, legal, safety, security will be the responsibility of one country and then everyone else will share the benefits. The second scenario is to distribute the responsibilities. The distributed approach requires considerable legal framework, distribution of the facilities, sharing of not just financial responsibilities, and sharing of benefits, not just power. It is not very clear which of these approaches will be finally agreed upon between the GCC countries.

SECURITY INDEX: How will the Gulf Cooperation Council control and distribute energy in good faith? The structure itself is quite weak and it may happen that after joint investment, one of the states may *privatize* nuclear facilities.

SHIHAB-ELDIN: If you choose the first approach, it is easy. One country like the U.A.E, which has already been thinking about about national program, can conclude an agreement with other countries to go ahead and build a nuclear power plant. And then other countries will share costs and benefits. Or it could be Saudi Arabia, for example.

The other option is more difficult and would probably involve distributed facility sharing. Especially if the countries want not only benefit from nuclear power but they also want to take advantage of technology and additional indirect benefits emerging from implementation of that technology within each country. It is not clear which approach would be the best but I think in this case you have three or four years of preliminary studies that will give you time to arrive to decision. Of course, the GCC countries have done a preliminary feasibility study with the IAEA. And now they are proceeding with detailed studies with the IAEA and other consultants. I think it will take another couple of years before the decision is taken.

If you develop a regional program it will have to be under agreements which are legally binding. I think nuclear plant is not going to be private although it might be built using some private money. Nuclear power involves a lot of government responsibilities in planning, safety, security, legal issues and even operation support of these stations. So I don't see that nuclear power in the GCC countries will be a private initiative; these will be initiatives run in first place by the states.

SECURITY INDEX: Even in the countries with well-developed nuclear infrastructure and long history of nuclear energy production it takes up to five years to build a nuclear plant. In case of GCC countries, in your opinion, how long will it take to put a first NPP into operation?

SHIHAB-ELDIN: As I said before, the IAEA has outlined three phases. The first phase is preliminary studies to take the decision. The GCC countries are in that phase right now. Preliminary feasibility studies, detailed feasibility studies, attempts to harmonize legal framework, etc.... And only then if they make a decision and reach an agreement, they begin to build the infrastructure, human resources, institutional framework with some kind of a regulatory organization, safety regulations. Some of these already exist in some countries, but others need to be developed. Even if you carry out a national plan like the U.A.E, even if you use all possibilities to speed up the process, if you outsource to the maximum possible to a nuclear country like France or the United States, I would not envisage a nuclear power plant in the GCC countries operational before 10 years at earliest.

SECURITY INDEX: 10 years is a long term. A lot can happen within this timeframe. How strong is the decision to explore the possibility to use nuclear energy? Could it follow the same patterns as in the 1970s when the collapse of oil prices resulted in the failure of feasibility studies?

SHIHAB-ELDIN: I don't see that happening. There are some similarities with the 1970s but there is also some major difference. It is clear now that oil prices mattered when they were at $58 or even $20 per barrel. Prices had soared in the 1970s to $40 but cost of marginal oil was much lower, below $20, below the breakeven point of nuclear then. Now it is different. Oil prices may go down to $50 or $60 the cost of marginal oil, but not to $8 or $20 because we have a strong demand growth driving force from China and India. It may slow down for a year or two but these are countries with a huge population and they are catching up in economic development. On the supply side, clearly all resources are still plenty but the cost of additional supply from outside the OPEC is high, more than $50 or $60 for marginal oil. I don't believe that oil resources will run out in 20 or 30 years. Bit it makes a lot of sense to start planning right now, especially if it takes 10 to 15 years to launch nuclear power generation.

Of course, any major incident in a nuclear power may slow down the planning for nuclear power, but I don't think it will completely derail it. Nuclear power is not just an option for the GCC countries, it's a global option. It has become an imperative. It is very compelling when China, India and other developing countries as well as some wealthy countries attempt to reduce their emissions, they must consider nuclear power option.

SECURITY INDEX: Such nuclear veterans as the United States, France, and Russia have already stated their support for the GCC countries and are ready to assist with technology, training, construction etc., because it means essential revenues. What countries are more likely to win potential contracts?

SHIHAB-ELDIN: It is clear that France has a special leading position. It is number one industrial nuclear country that has extensively used nuclear power domestically and its industry has been growing compared, for example, to the United States where nuclear program has shrunk and almost disappeared. They have only a core program remaining from the nuclear industry of the 1970s, so you can hardly find young specialists in the United States to run the program in the United States, let alone to export. Although now the U.S.A is changing position rapidly and even announces the Global Nuclear Energy Partnership Program precisely for those countries that have interest in this issue. And the U.S.A still has a lot to offer.

But still France has a leading position because its nuclear industry is more active on continuous basis. The French leadership under the new president has been promoting French nuclear industry as a part of its foreign policy. That is why you saw the agreement between France and the U.A.E. By the way, that agreement does not involve signing a contract to build a nuclear plant yet. But it is a memorandum of understanding to do feasibility studies for nuclear power option.

The U.S.A obviously has a special relationship with the Gulf countries and I would say that Washington has a good chance. But the U.S. approaches tend to be slow and this can put it down to the second or even third position. Other possibilities could be the United Kingdom, may be Russia, and Japan.

The GCC countries have limited human resources. They will have to build some core infrastructure. They will have to rely to the maximum degree on outsiders. I think it will depend on how to strike the balance between the minimum core infrastructure that will have to be established by the countries themselves and how far foreign countries will be able to go in providing the assistance and services.

SECURITY INDEX: And last but not least. Today you have an NPP and generate electricity, but tomorrow you can use the same technology to develop a nuclear weapon. How to guarantee that it will not happen in a potentially unstable and conflict-prone region?

SHIHAB-ELDIN: As I said before, it is clear that we have 10 to 15 years before the nuclear power program is implemented. The GCC countries want to use nuclear power for peaceful purposes. We are willing to follow all international full safeguards. We are a signatory of the NPT. We came to the Agency (IAEA) for an advice not just only on technology but also on safety and security.

The GCC countries stated that they do not need to build reprocessing if this can be offered from outside in a reliable way. We want to build a nuclear power program and get the assurances from the international community and the IAEA that we will be able to get fuel supply and dispose our wastes in a safe way.

And that is why the king of Saudi Arabia has come up with an idea that it would be wise to build an international center for nuclear fuel in a neutral country under the supervision of the IAEA. If this proposal is realized it may give assurances not only to the GCC countries but to the countries like Iran and other countries in the Middle East that they can proceed with their nuclear power program without having need to develop their own indigenous nuclear fuel technology, which is sensitive because you can divert enrichment or reprocessing. The GCC countries are saying that they don't need these technologies provided that there are international assurances.

We want to demonstrate a possibility of full cooperation without giving up your rights under the NPT. And this is the key: how do you proceed without conceding your right. And it is possible as long as international community is willing to take a challenge to provide assurances for fuel supplies and for nuclear waste services once the nuclear power program is finished.

Note

[1] The interview was taken on the phone on April 17, 2008.

Nikolay Spassky

«WE HAVE COMMON INTEREST IN SAFE AND SECURE NUCLEAR ENERGY DEVELOPMENT»[1]

Editor-in-Chief of the* Security Index *journal Vladimir Orlov interviews Deputy Director General of the* Rosatom *state corporation Nikolay Spassky.

SECURITY INDEX: On May 6, 2008 Russia and the United States signed the 123 Agreement. It should provide the framework for the Russia-U.S. cooperation in nuclear energy uses. What will the tangible results for Russia be?

SPASSKY: The answer to this question can be found in the U.S.-Russia Strategic Framework Declaration signed on April 6, 2008 in Sochi. The approval of the 123 Agreement (on cooperation in peaceful nuclear energy uses) will eliminate the abnormal situation in our affairs. So far our cooperation in this area went on without sound legal basis. So any issue required a separate agreement, and this was not convenient at all. Now this anachronism will be overcome.

Of course, we do not expect any revolutionary breakthrough from this document, but it will facilitate our interaction. Russian and U.S. corporations will be able to set up joint ventures and transfer to each other fissile materials, appropriate technologies and equipment, including nuclear reactors. Many lanes of cooperation mentioned in the last-year presidential statement will be filled with substance.

SECURITY INDEX: How would you assess the prospects of the U.S.-Russian relations in the sphere of nuclear energy and disarmament? In your opinion, in the foreseeable future will Russia and the United States be competitors or partners on the international market of nuclear energy goods and services?

SPASSKY: Russia and the United States are the two largest nuclear weapon states in the world. But their grandeur does not depend only on the size of nuclear arsenal, but also on the scale of civilian nuclear uses. Under such circumstances, any relationship inevitably contains the elements of partnership and rivalry at the same time. Besides, Russia-U.S. bilateral relationship also faces ups and downs in its development. However, despite the differences with the United States, we have one common interest in safe and secure nuclear energy development, in preventing the collapse of the nuclear nonproliferation regime, in neutralizing the nuclear terrorism dangers. This common interest is taken into account by Russian and U.S. corporations, including private ones that deal with this sphere. Let's not forget that the nuclear project by its history remains largely an international affair.

SECURITY INDEX: President Bush launched the Global Nuclear Energy Partnership (GNEP) in 2006. Russia was named as a partner. How does the U.S.-Russian cooperation in this area develop? How does this initiative comply with the Russian proposal on the establishment of international nuclear fuel cycle centers?

SPASSKY: When in the beginning of this millennium we noticed the trend towards nuclear energy sector growth (in other words, *nuclear renaissance*), the IAEA and the leading nuclear weapon states commenced the discussion on this matter. We focused on the fundamental

issue – how to combine the growth of nuclear energy sector, including on geographical scale, with the maintenance of nuclear nonproliferation regime. A number of initiatives were set forth and they all follow the same direction. The most comprehensive and specific one is the proposal by Vladimir Putin to establish the global infrastructure of international nuclear fuel cycle centers (Global Nuclear Power Infrastructure, or GNPI).

President Bush's initiative followed the same pattern. At first, it was a set of relatively general ideas, but later on it transformed into the GNEP framework. We had certain doubts about this concept and its viability. It indicated a significant emphasis on unilateral steps and the desire to replace the existing international mechanisms in this area. Nonetheless, our joint efforts helped to correct these shortcomings of the partnership, to a large extent. Common position of Russia and the United States appeared in the joint communiqué approved at the Kennebunkport summit on July 3, 2007.

On the basis of this platform we build our practical cooperation on GNEP. So far it is the matter of expert discussions, which are held in a constructive manner. The United States on its part has declared its support to the Russian initiative – the establishment of the International Uranium Enrichment Center (IUEC) in Angarsk.

SECURITY INDEX: At what stage of implementation is the Russian proposal on creating a nuclear fuel bank under the IAEA safeguards and under the auspices of the IUEC in Angarsk? What will the functions of *Rosatom* be in this project?

SPASSKY: It is known that the IUEC has been established and exists as a joint stock company incorporated in accordance with the Russian laws. Now its participants are two companies – Russian *Techsnabexport (TENEX*) and Kazakh *Kazatomprom*. Another party to the project is Armenia – the respective intergovernmental agreement was signed in February 2008 during the visit of the then Prime Minister Victor Zubkov to the country. We assume that the center may have the so called guaranteed stock of enriched uranium product (EUP) – the decision complies with the IAEA position, since the agency has been elaborating the idea of fuel banks for several years now. We proceed from the assumption that ideally this stock will never be used, but the very fact of its existence at the IUEC will build the trust in the center's capabilities.

The IAEA will have to play a dual function. First, it will ensure the safeguards for the fuel bank. Second, the material will be delivered from the bank upon the order of the IAEA (on commercial terms, not to forget). The stock itself until the moment of delivery will naturally be in Russian ownership.

We are now conducting intense consultations with the IAEA, in the course of which it is planned to work out a fully-fledged large-scale agreement between Russia and the agency. The document should regulate all practical issues related to the establishment of the fuel bank.

SECURITY INDEX: On September 26, 2007, the U.S. Court of International Trade ordered to lift the antidumping duties from the Russian low-enriched uranium supplies (LEU). Does it mean that Russia may deliver uranium to the United States beyond the HEU-LEU deal? How would you assess the prospects of extension of the program?

SPASSKY: If it was that simple, the issue of Russian uranium supplies to the American market would be resolved long time ago. The U.S. Court of International Trade obliged the Department of Commerce to revise its decision on levying antidumping duties on the Russian uranium products. However, such court decision has no automatic force. It is connected with the similar verdict related to the suits by a French company – *Eurodif*, which has not yet come into effect.

Under these circumstances, it would be risky to make the Russian presence on the U.S. enriched uranium market (in fact, the largest in the world) dependent on the outcome of the trials. Besides, even though we hope for the favorable result, court proceedings may take another few years.

Therefore, starting from mid-2006 we have undertaken a parallel course – I mean tough negotiations with the U.S. Department of Commerce. The talks ended with several mutually benefi-

cial solutions, which met the interests of Russian manufacturers. On February 1, 2008, Director General of *Rosatom* Sergey Kiriyenko (at that time he headed the Federal Atomic Energy Agency) and U.S. Secretary of Commerce Carlos Gutierrez signed an amendment to the Agreement Suspending the Antidumping Investigation on Uranium from the Russian Federation. Thanks to this amendment, beginning from 2011 and on, we will be able to supply the U.S. market with the entire spectrum of uranium products, including enrichment services, within the mutually agreed amount. And another crucial thing – the amendment states that our supplies will not be subject to the decisions of the U.S. courts related to the *Eurodif* affair.

As far as the HEU-LEU program is concerned, we have repeatedly reiterated at different levels that we are not going to extend it after 2013.

Note

[1] The interview took place on May 8, 2008.

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Daniel Russell

«RUSSIA AND THE UNITED STATES HAVE UNIQUE CAPABILITIES AND RESPONSIBILITIES IN THE NUCLEAR FIELD»

Editor of the* Security Index *(intl. edition) Dmitry Polikanov interviews U.S. Charge d'Affaires in Moscow Daniel A. Russell on the prospects of the 123 Agreement between Russia and the United States.

SECURITY INDEX: Russia and the United States have recently concluded the 123 Agreement, which establishes Russia-U.S. cooperation in nuclear energy uses. In your opinion, what will the tangible results for Russia be?

RUSSELL: The Agreement offers significant benefits to both countries. It makes it clear that we have moved from the old era of nuclear rivalry to nuclear partnership. It establishes a framework for cooperation in developing nuclear energy for peaceful purposes and for enhancing our joint leadership in preventing nuclear proliferation. The Agreement allows U.S. and Russian companies to partner in nuclear joint ventures and to develop new civilian nuclear technologies. In the commercial area the extent of the cooperation will depend on the companies involved, but the 123 Agreement opens the door to a new dimension of cooperation.

SECURITY INDEX: How does the Agreement benefit the United States?

RUSSELL: Beyond the benefits to both countries cited above, the Agreement would permit U.S. industry to sell civilian nuclear commodities to Russian entities, including such items as nuclear materials, reactor components and reactors; the same benefit applies equally to Russian industry and its ability to sell civilian nuclear components to U.S. entities. The Agreement will also strengthen U.S.-Russian nonproliferation cooperation, which is very much in the interest of both of our countries.

SECURITY INDEX: Do you think the document will be ratified? There seems to be a strong opposition in the Congress. What are the key concerns of the opponents of the agreement?

RUSSELL: We are not in a position to prejudge the outcome in Congress. The Agreement is currently before the Congress for review. U.S. law provides for a Congressional review period of 90 days of continuous session. Upon completion of the review, the Agreement may be brought into force by an exchange of diplomatic notes, unless both houses of Congress enact legislation to disapprove it.

A main issue of concern in Congress regarding the 123 Agreement involves Russia's relations with Iran. We share Congress' goal of preventing the transfer of weapons of mass destruction, missile technology and related goods, services and technology to Iran. Russia has joined the United States and other Western governments in efforts to find a peaceful solution to Iran's nuclear ambitions, including supporting three Chapter VII sanctions under UN Security Council resolutions.

We believe the 123 Agreement should stand on its own merits. A U.S.-Russia civil nuclear agreement advances our shared global commercial and nonproliferation interests. The United

States has 22 such agreements in force now. It is time to move to that level of cooperation with Russia.

SECURITY INDEX: How do you assess prospects for U.S.-Russian cooperation in nuclear energy and disarmament?

RUSSELL: The 123 Agreement will allow greater U.S.-Russia government-to-government cooperation in developing Global Nuclear Energy Partnership (GNEP) technologies and progressing to the next phase in support of the International Uranium Enrichment Center. This cooperation would include development of advanced fast burner reactors, the fuel for which would likely be developed in the United States and transferred to Russia for test irradiation. Such technologies would help ensure that the expansion of nuclear power worldwide takes place safely, consistent with nonproliferation goals.

SECURITY INDEX: One of the major stumbling blocks in the area of nonproliferation is the Iranian issue. On the one hand, Russia and the United States share common view on the prevention of nuclear weapons development. On the other hand, Moscow is ready to develop further Iran's peaceful nuclear program and is against any restrictions or tough measures. What is the point of compromise?

RUSSELL: Russia and the United States have unique capabilities, and unique responsibilities, in the nuclear field. A challenge for U.S.-Russian nuclear cooperation is how to best develop peaceful nuclear technology and make it available to developing countries in a way which guards against proliferation of weapons by states or terrorists.

President Bush authorized signature of the 123 Agreement based on a recommendation by senior U.S. officials that the level and scope of Russia's cooperation with the United States on the Iran nuclear issue justify taking the remaining steps to conclude the U.S.-Russia Agreement.

With respect to Bushehr, President Bush acknowledged last December that «if the Iranians accept that uranium for a civil nuclear power plant then there is no need for them to enrich.» Russia's supply of nuclear fuel to Bushehr thus demonstrates that Iran does not need to possess the complete nuclear fuel cycle – with its proliferation risks – to take advantage of the peaceful uses of nuclear energy.

SECURITY INDEX: In your opinion, will Russia and the United States be competitors or partners on the international market of nuclear energy goods and services?

RUSSELL: The nuclear sector is a growing one. There is room for both Russian and American participation. The 123 Agreement provides the framework for cooperation and so should enhance U.S.-Russian partnership in the sector. Indeed, we see the potential for our cooperation to help yield a new generation of reactors that can operate more cleanly, efficiently and safely. At the same time there some key competitive markets as well. Among them are reactor design and construction, fuel assembly production and nuclear safety.

SECURITY INDEX: President Bush launched the Global Nuclear Energy Partnership (GNEP) in 2006 and named Russia as a partner. How does the U.S.-Russian cooperation in this area develop? How does this initiative comply with the Russian proposal to establish international nuclear fuel cycle centers?

RUSSELL: U.S.-Russian cooperation on GNEP is progressing well. Russia is in fact one of the founding partners and jointly developed the partnership's Statement of Principles along with the United States and other nations, such as France, China, and Japan, that understand the importance of uniting to promote a common vision for the safe, clean, and peaceful expansion of nuclear power worldwide.

The U.S. and Russia are cooperating on the peaceful use of nuclear energy, supporting both GNEP and the Russian proposal to establish the International Uranium Enrichment Center in Angarsk. The 2006 U.S.-Russian bilateral action plan on civilian nuclear energy cooperation established the current cooperation, which focuses on advanced reactors, nonproliferation and safeguards, and international fuel cycle centers. GNEP and the Angarsk center are com-

plementary initiatives and underscore our nations' common vision on the peaceful use of atomic energy while strengthening nuclear nonproliferation.

SECURITY INDEX: On September 26, 2007, the U.S. Court of International Trade ordered the antidumping duties lifted from Russian low-enriched uranium supplies (LEU). Does this mean Russia may deliver uranium to the United States beyond the HEU-LEU deal? How would you assess the prospects of extension of the program?

RUSSELL: On February 1, U.S. Commerce Secretary Gutierrez and *Rosatom* Director Kiriyenko signed an amendment to the U.S.-Russian Uranium Anti-Dumping Suspension Agreement. This amendment will allow limited exports of Russian uranium products to the United States through normal commercial channels beginning in 2011, in addition to the uranium supplied under the HEU-LEU Agreement. From 2014 through 2020, Russia will be able to export to the United States approximately 20 percent of the US market for enriched uranium. The amendment promotes a stable uranium market in the United States and allows Russia direct commercial access to the market.

The HEU-LEU Agreement is a critical piece of US-Russian nuclear nonproliferation cooperation. Under this agreement to date, over 325 metric tons of HEU (equivalent to approximately 13,000 nuclear weapons) have been converted into LEU and exported to the United States. The current Agreement expires in 2013 and it is our understanding that Russia is not interested in extending the program beyond that date.

The U.S. Court of International Trade ruled last year that LEU produced abroad and imported into the United States was exempt from the antidumping law, if imported pursuant to a Separative Work Unit contract. The U.S. Government filed a petition for a writ of certiorari with the Supreme Court, which has agreed to hear the case during its next term, which begins in October. Because the original Suspension Agreement permits unlimited imports of the LEU downblended from HEU under the HEU-LEU Agreement, the Suspension Agreement and HEU-LEU agreements are interrelated and implementation of both is important to ensure a stable U.S. uranium market.

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Anton Khlopkov[1]

THE ANGARSK PROJECT: ENRICHMENT VS. PROLIFERATION[2]

There has been a lot of discussion of late about a *nuclear energy renaissance* and the beginning of a «new era» of nuclear development.[3] Though the use of the term «renaissance» is disputable, it is clear that many parts of the world are beginning to turn towards nuclear energy. According to the World Nuclear Association, there are 439 nuclear reactors in operation today while another 319 have been planned or proposed.[4]

Under the circumstances, preventing the spread of sensitive technologies and knowledge associated with the military use of nuclear energy is taking on particular importance for the global community. For countries developing nuclear energy, questions of ensuring industry inputs are particularly critical: uranium, uranium enrichment, and qualified personnel. States beginning to develop the peaceful atom are most concerned with the uninterrupted supply of fuel cycle services, including uranium enrichment services.

In the 1970s, when nuclear energy was being actively developed, there were extraordinary plans for uranium enrichment to become a new, large-scale industry. In the United States alone, there were plans to build 16 new enrichment plans with a combined capacity of about 140 million SWU by the year 2000.[5] In addition, there were expectations that in the 1980–1990s, besides the Soviet Union, United States, and the private consortiums *Urenco* and *Eurodif*, Australia, Brazil, Iran, South Africa, and Japan would obtain industrial enrichment capabilities.[6] However, for a variety of reasons, with the exception of Japan none of these countries began operating new enrichment plants over the course of the past three decades. Over this period of time the United States stopped using two of its three enrichment plants, and by 2001 the production of low-enriched uranium (LEU) for domestic use had fallen to 12 percent of industrial needs.[7]

Then, in 2005–2007, several states and groups of states presented a total of 12 proposals in the area of guaranteed supplies of uranium enrichment and nuclear fuel services. These proposals were meant, on the one hand, to remove fears related to the reliability of supplies to countries developing nuclear energy, and on the other hand to minimize the risks associated with the proliferation of dual-use enrichment technologies.[8]

On January 25, 2006[9] at a session of the Eurasian Economic Community (EurAsEC),[10] Russian President Vladimir Putin presented an initiative for the creation of international centers for the provision of nuclear fuel cycle services in Russia. The initiative envisioned the creation of international centers on Russian territory in four areas:[11]

- ❑ uranium enrichment;
- ❑ spent nuclear fuel (SNF) handling;
- ❑ training personnel in the nuclear sphere; and
- ❑ developing innovative nuclear technologies, including the International Thermonuclear Experimental Reactor (ITER), the International Project on Innovative Nuclear Reactors and Fuel Cycles (INPRO), and the creation of fast breeder reactors.[12]

As a first step towards the practical realization of the initiative, the decision was made to create the International Uranium Enrichment Center (IUEC).

How will the Center operate? What are the criteria for participation in the project? What countries are potential IUEC participants? These and other questions related to Russia's initiative for the formation of the IUEC are the subject of this article.

ENRICHMENT IN RUSSIA: CURRENT STATUS AND DEVELOPMENT PROSPECTS

Russia is the world leader in industrial uranium enrichment services with, according to various estimates, 40–45 percent of global capacity and a competitive enrichment industry.[13] Domestic enterprises have employed centrifuge enrichment technologies on an industrial scale since 1964; this method is 30 times more energy efficient[14] than its predecessor, gaseous diffusion.[15]

Centrifuge enrichment is an extremely complex technological process. The speed at which a modern gas centrifuge rotates reaches 1,000–2,000 revolutions per second, a world record for a mechanical device. Moreover, they can work nonstop for 25–30 years.[16] Tolerances for the production of critical centrifuge components are just two-three microns;[17] the series production of gas centrifuges requires extremely high skills and reminds of *haute couture* in engineering.[18]

This is how the work of an enrichment plant was described by Russian Academician and former Minister of Atomic Energy (2001–2005) Alexander Rumyantsev: «You enter, and there is complete silence on the shop floor, there are no people, although 500,000 centrifuges are spinning at over 1,500 revolutions per second.»[19]

The cost of gas centrifuges can be compared to the cost of an expensive automobile. Thus, when they were planning the production of new centrifuges, U.S. specialists were asked how they could reduce the cost of manufacturing from $100,000 to $50,000 per centrifuge.[20] To be fair, it should be noted that the U.S. centrifuges are approximately 12 meters high, considerably exceeding the dimensions of Russian centrifuges, and thus their cost is higher as well.[21]

Aside from Russia, centrifuge technology is currently only used on an industrial scale by the German-Dutch-U.K. consortium *Urenco*,[22] with a production capacity about 2.5 times smaller than Russia's, and Japan, with a capacity some 20 times smaller than Russia's. Other leaders in the field of nuclear energy–the United States and France–have to date not begun to employ industrial centrifuge enrichment plants and instead are using gaseous diffusion technology, which Russia stopped using over 15 years ago.

Retaining its leadership of the enrichment services market has special importance for Russia, given the reduction in the number of competitive industrial branches in the country and the displacement of high-technology exports by natural resource exports. From 1992 to 2002 Russian exports of hi-tech goods fell almost 50 percent,[23] as a result of which the country's share of global hi-tech exports is 0.13 percent, on a par with the Czech Republic, Norway, and Portugal.[24] In 2005, Russia had almost three times fewer hi-tech exports than the Philippines, 4.5 times less than Thailand, 10 times less than Mexico, 13 times less than Malaysia and China, and 17.5 times less than South Korea.[25]

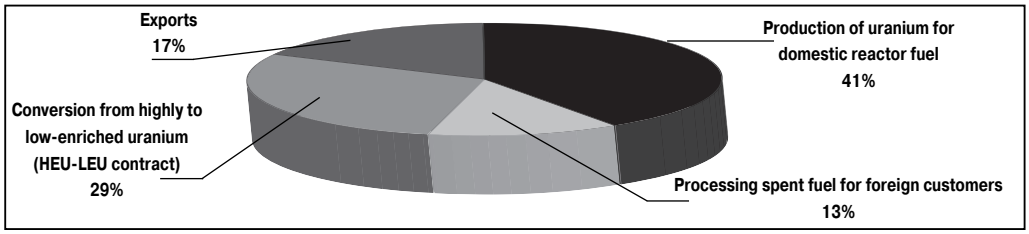
Russia has four uranium enrichment plants that were considered in the initial stage of project development as sites for the possible creation of the IUEP (see Table 1).

Table 1. **Enrichment Plants in the Russian Federation**[26]

Enterprise	Location	% of total Russian enrichment capacity
Urals Electrochemical Combine (UEKhK)	Novouralsk, Sverdlovsk Region, Urals Federal District	48
Electrochemical Plant (EKhZ)	Zelenogorsk, Krasnoyarsk Territory, Siberian Federal District	28
Siberian Chemical Combine (SKhK)	Seversk, Tomsk Region, Siberian Federal District	14.4
Angarsk Electrochemical Combine (AEKhK)	Angarsk, Irkutsk Region, Siberian Federal District	9.6

Russia's enrichment plants allow it to fulfill orders in four main areas (see Figure 1) (data as of 2000).[27]

Figure 1. **Utilization of Russia's Enrichment Capacity**



The realization of the branch's targeted program *Modernization of the Enrichment Complex through 2010* envisions the replacement of fifth-generation centrifuges that have exhausted their service lives with seventh and eighth generation centrifuges. They should increase Russia's total enrichment capacity by 2010 by 34 percent over 2000.[28] The program also provides for R&D on new, ninth-generation centrifuges. According to the plan, by 2010 the service lives of the first sixth-generation centrifuges that have been installed will have expired, and they will be replaced by ninth-generation centrifuges.[29]

AEKhK PRODUCTION POTENTIAL

The *Angarsk Electrochemical Combine (AEKhK),* which has been selected to be the site for the creation of the IUEP, is equipped with sixth-generation gas centrifuges and is Russia's youngest centrifuge enrichment plant: its first gas centrifuge cascades became operational in December 1990.

The *Modernization of the Enrichment Complex through 2010* program foresees the expenditure of 36.7 billion rubles (over $1.5 billion), of which about 2 billion rubles (or nearly $85 million) are allocated for the modernization of *AEKhK*. Under the program, 100 percent of the resources for this modernization are to come from the enterprise's own profits.

Thanks to measures taken in 2006, the productivity of the separation and conversion plants at *AEKhK* increased by 7 and 6.3 percent, respectively,[30] and the total enrichment capacity of *AEKhK* in 2007 was 30 percent greater than in 2000, totaling 2.6 million SWU.[31]

AEKhK's separative capacity is also being modernized under the framework of the subprogram *Safety and Development of Nuclear Energy*. The federal program *Security and Environmental*

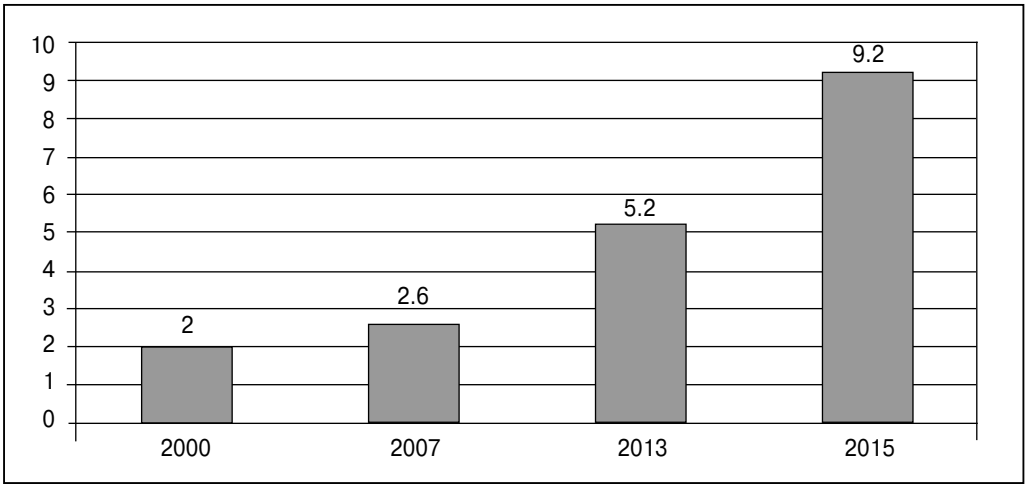
Protection in particular is aimed at the reconstruction of the enterprise's control and accounting systems.

Thus, at the current time *AEKhK* enrichment capacity is about 5 percent of global capacity, with 50 percent of its capacity devoted to export contracts[32] from China, the Czech Republic, Finland, South Korea, and Switzerland.[33] Uranium for the fulfillment of domestic orders is supplied by the *Priargunskiy Mining and Chemical Production Association* (Krasnokamensk, Chita region), while for foreign orders the raw material comes from Central Asia, the Czech Republic, Ukraine, and so forth depending on the customer.[34] *AEKhK*'s total annual separative capacity is equivalent to the production of fuel to load 22–26 *VVER-1000* reactors (or its Western analogy, the *PWR-1000*).[35]

On October 6, 2006 the Russian government approved the federal program *Development of the Russian Nuclear Energy Complex in 2007–2010 and its Prospects through 2015*, which added to and amended the nuclear branch plans for the modernization of enrichment production. According to the new federal program, the reconstruction of the enrichment plant at Angarsk should be completed by 2013, and in 2015 the combine's separative capacity should total 4.2 million SWU.[36] Over 10 billion rubles, or about $425 million, is envisioned to finance the modernization of the enrichment plant.[37] Further, like the earlier program for the modernization of the enrichment industry, 100 percent of the funds are supposed to come from extrabudgetary sources.

In addition, under another project being undertaken with the use of *AEKhK* infrastructure–a Russo-Kazakhstani joint venture–plans call for an increase of plant enrichment capacity of 5 million SWU (of which the capacity to obtain the first million SWU should be ready by 2012).[38] In all, by 2015 *AEKhK*'s separative capacity will be increased to 9.2 million SWU (see Figure 2).

Figure 2. **Enrichment Capacity at the *AEKhK* site in 2000–2015, millions of SWU**



Thus, two projects will be realized in the near future at the *AEKhK* site. The two projects–the IUEC and a Russian-Kazakh venture to create the closed joint stock company *Center for Uranium Enrichment (CUE)*–have been established by *Techsnabexport (TENEX)* and Kazakhstan's national nuclear company *Kazatomprom*. The *CUE* project envisions large-scale investment, to the tune of $2.5 billion,[39] and the construction of a new enrichment plant with a capacity of up to 5 million SWU on the basis of *AEKhK* infrastructure.

Besides this, *AEKhK* will continue to operate in the interests of domestic NPPs. That is, the plant's capacities will be divided between orders for the IUEC, the Russian-Kazakh joint venture, and NPPs in operation both on Russian territory and abroad.

WHY ANGARSK?

In mid-September 2006, Russia officially informed the International Atomic Energy Agency (IAEA) that the IUEC would be created on the basis of *AEKhK*'s enrichment capabilities,[40] 130 km from Lake Baikal in eastern Siberia.

The city of Angarsk, where the combine is located, has a population of just under 250,000, and is noted as the location of Russia's largest city museum of clocks, with a collection of over 1,100, as well as for Russia's largest oil refinery, with a capacity of almost 20 million tons per year (the tenth largest in the world), thanks to which it is considered Irkutsk's *petrocity*.[41] Angarsk's Moscow Street is known for the fact that its asphalt lies over the old route to Moscow, over which the Decembrists were transported, in chains and shackles, in 1826.[42]

But why was *AEKhK* chosen as the site for the IUEC?

The first reason is obvious – it is a relative simplicity of putting *AEKhK* under IAEA safeguards.

Three of Russia's four enrichment plants (*UEKhK, EKhZ* and *SKhK*) are located on the territory of closed cities (ZATO), to which access is limited for both Russians and foreign citizens, and which have a special security regime. However, *AEKhK* is located in a city without such severe restrictions. In the 1980s the Angarsk combine was taken out of the «weapons» fuel cycle, stopped producing highly enriched uranium (HEU),[43] and does not have any other defense production (unlike, for example, *SKhK*).[44] This substantially facilitates the process of putting the facility under IAEA safeguards and makes it easier to allow foreign experts to visit the facility (the Soviet Union/Russia declared that it had ended production of HEU for weapons purposes in 1989).[45]

Additionally, *AEKhK* specialists have experience in submitting a Russian-designed gas centrifuge plant to IAEA safeguards. In accordance with the intergovernmental agreement between Russia and China of December 18, 1992 on cooperation in the construction on Chinese territory of a gas centrifuge plant for uranium enrichment for nuclear energy, China was obligated to put the enterprise under Agency safeguards.[46] *AEKhK*'s enrichment plant was used as a model for planning the Chinese plant.[47] Since before that time the IAEA did not have any experience in safeguarding similar facilities (the safeguarding of *Urenco*'s gaseous centrifuge plant differs significantly from similar work at Russian facilities due to construction differences at these enterprises), a trilateral working group of experts from Russia, China, and the IAEA was created, which included experts from *AEKhK*.

The second reason is that the combine infrastructure exists and could be better utilized.

According to *TENEX*, 100 percent of the separative capacity at AEKhK is currently being used in an economically effective manner,[48] including through the enterprise's participation in the February 18, 1993 U.S.-Russian agreement on the conversion of HEU from nuclear warheads into LEU for use in NPPs (the HEU-LEU Purchase Agreement).[49] The downblending of HEU, i.e. mixing it with a diluent (LEU with a U235 content of 1.5 percent) does not occur at *AEKhK*, but the diluent itself is produced at *AEKhK*, providing a considerable amount of work for the combine's separative capacity.

At the same time, the plant has infrastructure that would permit the installation of additional separative capacities, since *AEKhK* was the last enrichment combine to be created in Russia (then the Soviet Union).[50] Significant production space was also freed up after the replacement of gaseous diffusion equipment with centrifuges.

In its heyday, gaseous diffusion facilities occupied four shops, each about 900 meters long and 60 meters wide. The Irkutsk and Bratsk hydroelectric plants were built to supply power to the combine enrichment plants. Old hands at *AEKhK* tell the following story about this:

> «Two months after the decree was issued by the Council of Ministers of the U.S.S.R on the beginning of the construction of the Angarsk combine, it became clear that an error had been made in the calculations: the capacity of the Irkutsk hydroelectric plant, then under construction, would not be enough for the combine to work at full capacity. The Bratsk hydroelectric plant could rescue the situation. In order to accelerate the beginning of its construction and get it on the list of facilities to be constructed in 1955, the signature of Nikita Khrushchev himself was needed. But

unfortunately he was not in Moscow at the time. He was traveling around the country. Minister of Medium Machine Building (the predecessor ministry to the Atomic Energy Agency) Yefim Slavsky managed to catch up with him in Volgograd, when he was leaving a hotel and getting into a car. After listening to the explanations, Khrushchev took the document and ordered his assistant: «Well, bend over!» Using his back as a table, he signed the document giving permission for the construction of the second hydroelectric plant of the Angarsk cascade.»[51]

Today the energy requirements of the enrichment process at *AEKhK* (and at other Russian enrichment plants) are significantly lower. In 1983–1991 the modernization of the separative plant was undertaken via the replacement of gaseous diffusion equipment in the first two buildings with centrifuge equipment. This modernization program resulted in the freeing up of two industrial buildings with a remaining service life of about 50 years and a size that would make it possible to install centrifuge equipment of just about any reasonable capacity. Today, both buildings have been mothballed. All of the necessary infrastructure is in the buildings' immediate proximity, including electric power lines of sufficient capacity, main pipelines for industrial water provision, etc.[52,53]

The third reason is the presence of uranium conversion facilities at the combine.

Russia has uranium conversion facilities, i.e. plants for the production of the raw material for further enrichment, at *AEKhK* and *SKhK*. Moreover, about 15 percent of the world's uranium hexafluoride conversion (U3O8-UF6) capacity is concentrated in Angarsk (about 8,000 tons per year).[54] Russia's other two enrichment plants (*UEKhK* and *EKhZ*) have to transport their material from the conversion plants in Angarsk and Seversk.

Finally, the fourth reason is the absence of centrifuge development and production divisions.

AEKhK does not have any divisions for the development of new centrifuge types, including ninth-generation supercritical models, like those at *UEKhK* and *EKhZ*.[55] This facilitates access by foreign specialists to the enterprise and decreases the potential risk of the proliferation of knowledge about centrifuge technologies to partners from foreign countries that might be looking for foreign assistance in the development of their own centrifuge uranium enrichment programs. This fact is of particular importance given the *nonproliferation* emphasis of the IUEC initiative.

AEKhK FINANCIALS

Assuming nonstop and trouble-free operations at *AEKhK*[56] at full capacity and world prices for plant services, simple calculations (based on Table 2) indicate that yearly profits would total $380 million from the provision of enrichment services and $80 million from the sale of uranium conversion services at market prices. Thus, theoretically the enterprise's annual profits should be about $460 million, given current capacities.

Table 2. **Production Capacities and the Market Value of *AEKhK* Services[57]**

	Enterprise capacity (as of 2007)	Cost per unit of service (as of March 31, 2008)
Enrichment	2.6 million SWU	1 SWU=$146
Conversion	8,000 metric tons	$10/kg

After the 2013 and 2015 increases in the plant's enrichment capacity to 5.2 million and 9.2 million SWU, the plant's total income will increase to $840 million and $1.4 billion, respectively (in April 2008 prices for enrichment and uranium conversion services).

AEKhK's real profits are considerably lower than those calculated,[58] which can be explained by a combination of several factors. They include: the modernization of production; the fact that a substantial portion of plant production serves the domestic market, where prices are determined by Rosatom and are considerably lower than on the market (domestic contracts are

equally distributed between the four enrichment plants); and the production of diluent under the HEU-LEU deal at below-market prices.[59]

IUEC: GENERAL FEATURES

In many ways, the IUEC project is a political initiative aimed at strengthening of the nonproliferation regime, and has been invoked to become a tool for the assured supply of enrichment services. At present, the project does not envision the installation of new separative capacity or large-scale investment, with the exception of investment in the creation of a guaranteed LEU fuel bank under IAEA control. The IUEC should become an *AEKhK* contractor, reserving a portion of its operational capacity through mutual obligations and chiefly taking orders for uranium enrichment services from the authorized organizations of states participating in the center. During the first stage of the initiative, plans call for IUEC orders to employ 300,000–500,000 SWU at *AEKhK*.[60] Thus, the initiative does not involve the direct operation of enrichment facilities by the international center or access by specialists from IUEC participating states to enrichment technologies.

Currently, there are no plans for IUEC to acquire a controlling block of *AEKhK* shares or for the conclusion of a fiduciary agreement between IUEC and *AEKhK*.[61] However, it is possible that in future the center might become the owner of a minority share of combine's stocks.

The IUEC is primarily targeted at countries just beginning to develop nuclear energy, which have limited needs for enrichment services. The initiative is not aimed at the large-scale provision of enrichment services and the resale of their product on the world market with high value added. The IUEC is designed to be market-neutral, which means preferred access to uranium enrichment services through the center for end users, that is, energy companies from the countries developing their own nuclear energy. Kazakhstan, which has no nuclear power reactors on its territory to date,[62] is the exception to this rule, but the leadership's intention to construct NPPs is well known.

In August 2007, an agreement on the creation of the IUEC in the form of an open joint-stock company was signed, and in September the procedure for registering it as a legal entity was completed. According to the agreement between the parties, 90 percent of IUEC stocks belong to Russia, while 10 percent belong to Kazakhstan.[63] Russia retained possession of the stocks that may in future be acquired by additional countries desiring to participate in the project. Moreover, Russia will retain a controlling block of IUEC shares (50 percent +1 voting share). In February 2008, Armenia completed the process of joining the center.

While the framework for the initiative was being worked out, a «leak» indicated that the possible provision of extraterritoriality to the center was under consideration. However, this would mean that the practical realization of the project would take at least five years. For this reason, the decision was made to provide additional assurances to participating states by other means: intergovernmental agreements that Russia will conclude with countries interested in participation in IUEC activities.

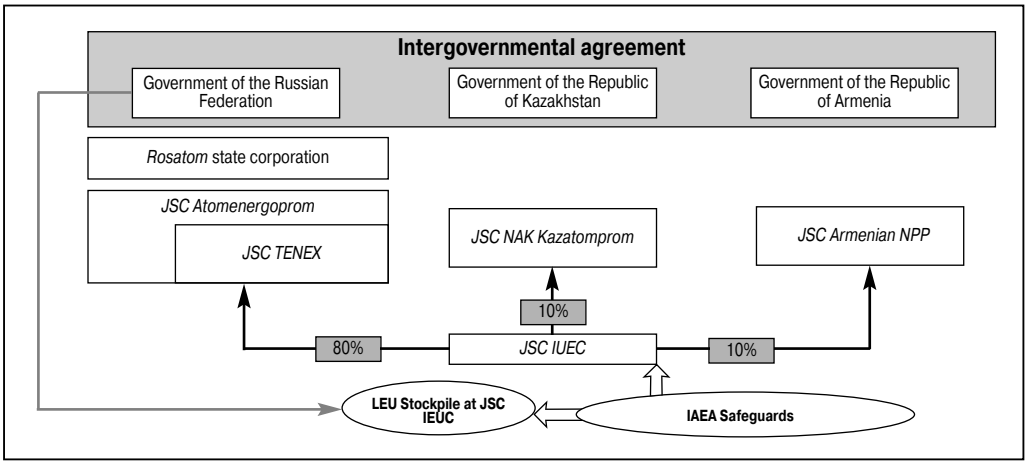
Another provision to ensure the reliable supply of IUEC enrichment services is the establishment of a guaranteed uranium reserve. The LEU (2–4.95) reserve, which will have about 120 metric tons in the form of hexafluoride (about 80 metric tons of fuel are needed for an initial load in a 1,000 MW reactor), will be held at the IUEC depot in Angarsk.

According to Article IX in the IAEA Statute, «members may make available to the Agency such quantities of special fissionable materials as they deem advisable and on such terms as shall be agreed with the Agency. The materials made available to the Agency may, at the discretion of the member making them available, be stored either by the member concerned or, with the agreement of the Agency, in the Agency's depots.»[64]

The uranium hexafluoride reserve created through the IUEC will remain the property of the Russian Federation, and can be supplied at commercial prices by IAEA decision when both a contractor and the market refuse to supply LEU for political reasons to a state developing the

peaceful use of nuclear energy that is in fulfillment of its nonproliferation obligations. The guaranteed reserve is valued at $300 million.[65] The establishment of the reserve may already begin before the end of 2008.

Figure 3. **IUEC Organizational and Legal Structure (as of December 2008)**



Source: *TENEX*

Since the operation of *AEKhK* enrichment equipment by IUEC members is not planned, the staff of the international center will consist of just a few dozen administrative personnel. In addition, depending upon the center's needs, specialists may be hired in the area of nuclear materials control and accounting, the application of IAEA safeguards, and other activities. The IUEC head office will be located in Angarsk and a branch office in Moscow.

In fall 2007 the hiring of IUEC staff began:[66] a board of directors has been formed, with *TENEX* Deputy Director General Alexey Lebedev selected as its chairman, while *TENEX* Director Alexey Grigoriev was appointed IUEC director general.[67] During the same session, the board of directors approved the financial structure and resolved that work on a concrete business plan should proceed. Provision of uranium enrichment services[68] by IUEC is expected to begin in late 2008/early 2009,[69] after which time the IUEC will be included in the list of Russian legal entities permitted to possess nuclear materials and will receive a license to handle nuclear materials from the Federal Service for Environmental, Technological, and Nuclear Oversight (Rostekhnadzor).

WHAT DOES THE INTERNATIONAL CENTER BRING TO THE REGION?

Irkutsk region, the site of *AEKhK*, is the source of 85 percent of Russia's mica, 53 percent of its synthetic resins and plastics, 50 percent of nitrogen fertilizers and caustic soda, 30 percent of aluminum, and about 10 percent of Russian gold.[70] However, despite the existence of significant natural resources (coal, oil, gas, iron ore, and gold), important enterprises in the metallurgical, chemical, natural gas and lumber industries, and its location at the crossroads of important transcontinental highways, Irkutsk continues to be of limited attraction to investors.

The average level of investment per capita in the region is 1.7 times lower than the Russian average.[71] In 2000–2004, the region was in the 20th percentile among Russian regions in terms of investment in fixed assets, along with the *depressed* regions of Ivanovo and Kurgan.[72] While the region's market potential is in the top two dozen of Russia's 89 regions (17th place in 2006),[73] it is 62nd in terms of investment risk.[74]

Increasing the investment attractiveness of Irkutsk region is one of the regional administration's main concerns. Among top-priority steps under consideration to achieve this goal are

measures that could improve the region's reputation as a reliable partner and expand its reputation beyond Russia's borders. Irkutsk region's leadership views achieving the rank of a key economic region within the Russian Federation, as well as the status of Siberia's *economic locomotive,* as key strategic objectives.

In this regard, the IUEC project with the participation of the IAEA could have a positive effect on the successful positioning of the region and its economic prospects at the federal and international levels. High technology is particularly attractive for the Irkutsk region administration, since all of its other *megaprojects* involve raw materials (resource extraction or exports of gold, oil, gas, and lumber).

THE ROLE OF THE IAEA

One of the key conditions for the project is that IUEC activities be put under IAEA safeguards. Agency safeguards are carried out in Russia on the basis of the Agreement between the Union of Soviet Socialist Republics and the International Atomic Energy Agency for the Application of Safeguards in the Union of Soviet Socialist Republics (INFCIRC/327) of February 21, 1985. As a nuclear weapon state, Russia provides the IAEA with a list of nuclear fuel cycle facilities where it will accept the application of safeguards on a voluntary basis. From this list, the Agency determines where it will apply safeguards.[75]

In the Soviet Union, the Agency viewed examining the development of technical procedures and methods as its main safeguards task in the country.

For this reason, the U.S.S.R made up a list of facilities that could be subject to safeguards consisting of NPPs and research reactors. In accordance with the safeguards agreement, the Agency has the right to choose any installation on the list for the application of safeguards. In practice, IAEA safeguards at various periods of time were applied to just three facilities in Russia (U.S.S.R):

- The *IR-8* research reactor, located at the Kurchatov Institute;
- The *VVER-1000* reactor (Novovoronezhskaya NPP No. 5); and
- The nuclear fuel storage depot at the machine-building plant (Elektrostal, Moscow region).[76]

Even before the agreement was signed, the Agency's international inspectors perfected technical procedures for safeguards on one of the *VVER-440* reactors at Novovoronezhskaya NPP, which was analogous to one built in Eastern Europe.

In 1991, Russia initiated work to undertake IAEA safeguards at the *BN-600* FBR at Beloyarskaya NPP, which was of interest to the Agency in view of the possible future growth of nuclear energy, and the development of procedures for the safeguarding of fast reactors. However, due to a shortage of IAEA resources safeguards were never applied to the reactor.[77] For the same reason, as of the end of 2007 not one of the facilities Russia has put on the list of those open to the monitoring of international inspectors has been chosen for the application of Agency safeguards.

In order to put the IUEC under IAEA safeguards, Rosatom initiated the conclusion of an agreement on this question at the interagency level, after which the government decided to include the site on the list of facilities open to international inspection. In January 2008, the Ministry of Foreign Affairs sent a note informing the IAEA that the IUEC and *AEKhK* had been included on the list of facilities open for the application of Agency safeguards.[78] Thus, for the first time enrichment plants located on Russian territory were included on the list of facilities open to IAEA inspections.

In accordance with the 1985 agreement, Russia (the Soviet Union) and the IAEA are each responsible for their own expenditures incurred in connection with the implementation of Agency monitoring in Russia; moreover, if Russia or persons under its jurisdiction incur extraordinary expenses as a result of specific IAEA requests, the Agency must reimburse such expenses provided that it has agreed in advance to do so. In any case, the Agency bears the

cost of any additional measuring or sampling which its inspectors request. However, there is an understanding that the application of safeguards to nuclear material at the IUEC will be paid for by Russia itself. IAEA safeguards will also be applied to the LEU reserve that will be created at IUEC.

POTENTIAL PROJECT PARTICIPANTS, OR WHO SHOULD WE EXPECT IN ANGARSK?

The initiative to create the IUEC initially viewed a state's renunciation of national enrichment programs as a requirement for participation in the work of the international center.[79] However, in consultations with the IAEA on issues related to multilateral fuel cycle initiatives, several countries, including Argentina, Australia, Canada, Kazakhstan, Ukraine, and South Africa, made it clear that they were not prepared to renounce their right to enrich uranium in the future. Furthermore, Brazil and Iran, which are actively undertaking research and development in the area of centrifuge enrichment, as well as Japan, which has a small enrichment capacity, are unlikely to give up their right to the development of this industry.[80]

Therefore, the decision was made to adopt a more flexible approach towards this issue, in accordance with which the renunciation of national enrichment programs is *welcomed*, but not required. In the preamble to the Russian-Kazakh agreement on the creation of the IUEC, there is a reference to the fact that at present Kazakhstan does not have enrichment capabilities.

Thus, according to the proposed arrangement, any country that would like to develop nuclear energy and is a member of the Nuclear Non-Proliferation Treaty and the IAEA can become a co-owner of the international center.[81]

Current and potential IUEC participant states can be broken down into three main categories.

First, these are the countries just beginning to plan for the development of nuclear energy that do not possess enough expertise, or economic and political motivation to create a national enrichment capability. Algeria, Belarus, Egypt, Indonesia, Jordan, Kazakhstan, Libya, Lithuania, Malaysia, Morocco, Thailand, Turkey, Uzbekistan, Vietnam and the countries of the Persian Gulf can be included in this category.

Second, there are countries with significant experience in the operation of NPPs that currently acquire enrichment services on the global market and have temporarily rejected the construction of their own enrichment plants. Armenia, Belgium, the Czech Republic, Finland, Hungary, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, South Korea, and Ukraine are in this category.

The above groups are the targets of the initiative. At the same time, I would suggest that the initiative could interest the third group of countries as well. These are states that have their own industrial-scale enrichment capabilities or are actively working on their creation, but have yet to reach the capacity to satisfy national requirements. Brazil, Iran, and Japan belong to this group.

The United States, which provides for just 12 percent of its own enrichment needs, could also be considered in this group. At present the United States has 104 power reactors, for which 55 percent of its nuclear fuel is produced from LEU obtained from Russia under the HEU-LEU Purchase Agreement. If by the time it expires (in 2013) the centrifuge enrichment plants being built in the states of New Mexico and Ohio have yet to reach their design capacities, U.S. companies will be faced with purchasing enrichment services abroad. However, in this case the form of U.S.-Russian cooperation will most likely be different from the IUEC, since the latter can not satisfy the needs of American NPPs.

One additional group of states interested in collaborating with Russia in the area of uranium enrichment comprises the most important uranium producers, in particular Australia and Canada. However, given the IUEC requirement of market neutrality, it is likely that the format for such cooperation (if realized) would be different.

The prospects for the participation of some countries in the IUEC are examined in more detail below.

Kazakhstan

About 21 percent of the world's uranium reserves are concentrated in 129 deposits located in Kazakhstan. In 2006, uranium mined in the country amounted to about 5,000 metric tons, or 10 percent of the world total. Plans call for *Kazatomprom*, one of the three leading uranium mining companies in the world, to reach a yearly yield of 18,000 metric tons by 2010,[82] and by 2015 to reach a maximum yield of 27,000 tons.[83] In all, plans call for about 1.2 million metric tons of uranium to be mined by 2050.[84]

Kazatomprom's strategy sees leadership of the uranium ore market as the first stage in the construction of a vertically integrated holding company for the production of the complete nuclear fuel cycle. Kazakhstan produces nuclear fuel pellets at the *Ulba Metallurgical Plant*, which it inherited from the Soviet Union. Thus, Kazakhstan is interested in acquiring the intermediate production step between mining uranium and manufacturing nuclear fuel: uranium enrichment. Russia, for its part, is interested in ensuring supplies of uranium ore from Kazakhstan. These needs will be partially covered through the IUEC (mostly through the joint venture created at *AEKhK*).

On May 10, 2007, in the presence of President of the Russian Federation Vladimir Putin and President of Republic of Kazakhstan Nursultan Nazarbaev, the signing of the Russian-Kazakh agreement on the creation of the IUEC took place in Astana.

Plans call for the IUEC and Russian-Kazakh joint venture to coexist on the *AEKhK* site.

Armenia

On February 6, 2008, the heads of the Russian and Armenian governments, Victor Zubkov and Serzh Sarkisian, exchanged notes on the conclusion of an intergovernmental agreement on Armenian participation in the IUEC. In accordance with the agreement, the privately held company – *Armenian Nuclear Power Plant* is – currently preparing all of the necessary documentation to obtain possession of a 10 percent of shares in the international center.[85]

Ukraine

Ukraine is considering the possibility of joining the center and the acquisition of 10 percent of its shares.[86] The possibility of Ukrainian participation in the IUEC is documented in the protocol on cooperation between Ukraine and Russia in the nuclear sphere, signed on June 4, 2007, by Rosatom head Sergey Kiriyenko and *Ukratomprom* head Andriy Derkach.[87] A draft agreement on joining the IUEC has been transmitted to Ukraine for study.[88] Plans call for related legal questions to be resolved by mid-2008.[89] However, the significant politicization of the question of Ukraine joining the IUEC should be noted, particularly given its plans to transfer several of its power reactors from the use of Russian fuel to fuel produced by *Westinghouse*.

South Korea

South Korea is actively seeking new sources of raw material for nuclear energy in the Central Asian region. On September 25, 2006, the prime ministers of Uzbekistan and South Korea signed a memorandum of understanding on the supply of Uzbek uranium. The agreement provides for yearly deliveries of 300 metric tons of uranium ore concentrate between 2010 and 2014.[90]

In April 2006, the South Korean company *Korea Resources Corporation* and Uzbekistan's State Committee for Geology and Mineral Resources (Goskomgeologii) agreed to create a joint venture for the industrial development of the large Dzhantuar uranium deposit in the middle of the Kyzylkum desert in Navoi region. According to preliminary data, the deposit's proven reserves are about 7,000 metric tons of uranium.[91]

Earlier, South Korea concluded an agreement on uranium supply with Kazakhstan. According to these plans, a Kazakh-Korean joint venture will begin production in 2008; its design capac-

ity is 1,000 metric tons of uranium per year. At present, 800 metric tons of Kazakh uranium is delivered to South Korea each year.[92]

Given Angarsk's geographic proximity to the Central Asian region, placing orders for the enrichment of uranium of Uzbek and Kazakhstan origin at the IUEC could be economically more advantageous for South Korea than transporting the uranium to *Urenco* plants, whose services South Korea is using today.

Iran

The main reason why Iran might possibly be interested in participation in the project is that its enrichment capacity is not sufficient to meet the country's nuclear energy needs. Iran's current plans for the development of nuclear fuel cycle enterprises, if realized, will still not permit it to obtain self-sufficiency in the next few years in terms of uranium mining and enrichment and meet the annual needs of the first unit of the Bushehr NPP (a fuel supply agreement for a period of ten years has been signed by the relevant organizations in Russia and Iran).

It would seem that Iranian participation in the IUEC could be viewed by the country's leadership as a project that could increase the country's *status* in the international arena, and particularly in the Middle East, since it would allow the state to participate in a joint project in the area of high technology with countries that have very highly developed nuclear programs, such as Russia, Ukraine, and possibly South Korea and Japan. Additional Iranian interest in the project could be elicited by the present *flexible* approach of the IUEC initiative towards the presence of national capabilities and efforts to create them in states participating in the project.

In addition to this, participation in the IUEC leaves open the possibility that the country could make maximum use of its own fuel production capabilities – primarily, this relates to the possibility that Iran could employ its national uranium conversion plants and supply that material for enrichment to the IUEC.

Japan

Japan is actively seeking new sources of raw material for its NPPs in Central Asia and Russia. Japanese companies are interested in the development of uranium deposits in Kazakhstan and Uzbekistan, as well as the Elkon uranium deposit in Yakutia.

In late 2005 the Japanese company *Itochu* concluded an agreement on the purchase of 3,000 metric tons of uranium from Kazakhstan over the next ten years. On January 23, 2006, the Japanese companies *Sumitomo* and *Kansai Electric* signed an agreement on the creation together with *Kazatomprom* of a trilateral joint venture for the development of the Western Mynkuduk deposit in South Kazakhstan. The enterprise's design capacity of 1,000 metric tons or uranium per year is expected to be reached in 2010. The mine's service life is expected to last approximately 22 years, with a total volume of uranium production of about 18,000 metric tons.[93]

A number of other Japanese companies, including *Marubeni Corp., Tokyo Electric Power Co., Toshiba Corp.,* and *Chubu Electric Power Co.,* have obtained the right to joint development of the Kharasan-1 and Kharasan-2 uranium deposits with *Kazatomprom*. According to current plans, over the course of 40 years the output will be 2,000 metric tons of uranium per year.

During Japanese Prime Minister Junichiro Koizumi's visit to Tashkent in August 2006, Japanese companies received proposals to participate in the development of Uzbek uranium deposits. The *Japan Bank for International Cooperation (JBIC)* and the government of Uzbekistan signed a memorandum of understanding according to which *JBIC* will provide credits in the uranium mining sector in Uzbekistan with the participation of Japanese companies and technologies.

Thus, there are plans to cover 30–40 percent of Japan's yearly uranium needs from Central Asian mines. This number is currently 3 percent of the yearly requirement for Japanese energy, or about 8,000 metric tons of uranium.

Joint Russian-Japanese development of the Elkon uranium deposit in Yakutia is scheduled to begin in 2009. According to the contract, 100 percent of the ore is to be sent to enrichment plants in Russia.

Japan's need for Russian enrichment services may soon grow, since it is cheaper to transport the uranium ore to Russian enterprises, located near the Central Asian region. At present, Japanese companies already buy 12–16 percent of the enrichment services they need in Russia; however, these bilateral relations could grow and this number could increase to 25–33 percent.

Japanese companies have shown an increased interest in the details of the IUEC on Russian territory. For instance, on September 1, 2006, a delegation from *Kansai Electric* visited *AEKhK*.[94] On March 20, 2008, *Atomenergoprom* Director General Vladimir Travin and *Toshiba Corporation* President Atsutoshi Nishida signed a framework agreement on cooperation in the peaceful use of atomic energy, which among other things envisions cooperation in the area of uranium enrichment. On the basis of this agreement, the partners will begin to prepare the technical and economic substantiation for cooperation in various areas, including discussing the method for cooperation in the area of uranium enrichment.

According to *TENEX* Director General Alexey Grigoriev, negotiations are also being conducted with a number of countries in Western Europe and the Pacific that are interested in joining the project.[95]

CONCLUSION

The creation of the IUEC could bring Russia substantial foreign and domestic political dividends – from the indirect expansion of Russia's presence on the global uranium market to an increase in the investment attractiveness of Irkutsk region, where the enterprise will be located. No less important is the restoration of the position of Russia, one of the depositaries of the Nuclear Non-Proliferation Treaty, as one of the main players in the process of strengthening the nonproliferation regime.

The International Uranium Enrichment Center will not solve all of the existing nonproliferation problems, but could offer a new basis for solutions to current crises in this sphere and prevent the appearance of potential new threats by offering *newcomers* to the field of nuclear energy a (temporary) alternative to national uranium enrichment capabilities. In particular, one of the elements of a *package* solution to the crisis surrounding Iran's enrichment program could be the participation of this state in the international center.

Given Russia's limited number of economically competitive industries today, the high technology component of the proposed project is particularly valuable. Of late the assertion that «countries that predominantly export the product of human intellect will triumph, while the significance of those countries whose welfare and place in the world has depended on their role in the extraction of natural resources and the use of traditional energy sources is falling» has become axiomatic.[96]

Among the numerous initiatives in the area of multilateral fuel cycle approaches, Russia's is the most developed in terms of national legislation and the large amount of organizational work that has been done for the creation of the center, in addition to which the enterprise has been included in the list of facilities subject to IAEA safeguards. The time will come when the IUEC will have to prove its economic attractiveness on the market for enrichment services for states beginning to develop nuclear energy; here Rosatom still has a lot of work to do.

For Russia, though, creation of the IUEC is seen as a pilot project, where the ways to create international centers for the provision of fuel cycle services can be perfected in collaboration with the IAEA.

It is also likely that another *byproduct* of the creation of the IUEC will be the improvement of the environmental situation at *AEKhK*. Thanks to the organizational work undertaken for the international center, a solution to the problem of processing the stockpiles of depleted uranium hexafluoride stored at the combine has already been identified.

Notes

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[2] This article was prepared as part of the PIR Center project on multilateral approaches to the nuclear fuel cycle, with the support of the Nuclear Threat Initiative (Washington D.C., United States).

[3] See, for example, James Lake, «The Renaissance of Nuclear Energy,» *eJournal USA*, July 2006, http://usinfo.state.gov/journals/ites/0706/ijee/lake.htm.

[4] «World Nuclear Power Reactors 2006–2008 and Uranium Requirements,» March 20, 2008, http://www.world-nuclear.org/info/reactors.htm (last accessed on April 6, 2008).

[5] If these plans had been realized, the financial volume of the U.S. part of the uranium enrichment market alone would have been about $25 million in March 2008 dollars. See «Enriched Uranium Is Next Big Industry in the United States,» *Gallup Independent*, August 20, 1973, p. 6.

[6] *Nuclear Proliferation and Safeguards*, Volume II, Part I, Appendix, Office of Technology Assessment, June 1977, pp. iv-46.

[7] «*Urenco* and the National Enrichment Facility (NEF),» http://www.urenco.com/fullArticle.aspx? m=1371 (last accessed on April 7, 2007); Yulia Kudrina, «What is Preventing a Russo-American 'Nuclear Friendship'?» *Atomprom Bulletin*, No. 6, November 2007, p. 44.

[8] Mohamed ElBaradei, «Nuclear Energy: The Need for A New Framework,» International Conference on Nuclear Fuel Supply: Challenges and Opportunities, Berlin, April 17, 2008, p. 4.

[9] For more details, see Yekaterina Rykovanova, «The Russian Initiative for the Creation of a System of International Centers for the Provision of Nuclear Fuel Cycle Services,» *Voprosy Bezopasnosti*, No. 4, May 2006, http://www.pircenter.org/data/publications/vb4–2006.html? PHPSESSID=5c4c3 c87dc83ce322ac3ecdabebca12f (last accessed on October 13, 2007).

[10] The Eurasian Economic Community (EurAsEC) is an international economic organization designed to assist in the formulation of common external customs boundaries, foreign economic policies, tariffs, prices, and other elements of a common market among member states (Belarus, Kazakhstan, Kyrgyzstan, Russia, Tajikistan and Uzbekistan). EurAsEC is the legal successor to the CIS Customs Union.

[11] «Nuclear Nonproliferation the International Uranium Enrichment Center,» presentation by Sergey Ruchkin, deputy director of the Strategic Analysis Department, *TENEX*, at the PIR Center conference *G8 Global Security Agenda: Challenges & Interests. Towards the St.-Petersburg Summit,* April 22, 2006, http://www.pircenter.org/index.php? id=105 (last accessed on October 14, 2007).

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[14] Irina Vakulina, «A Half Century under Construction,» *Details* (Angarsk), February 8, 2007.

[15] «Gas Centrifuge Uranium Enrichment,» http://www.globalsecurity.org/wmd/intro/u-centrifuge.htm (last accessed on on October 14, 2007); «Re-Enriched Nuclear Fuel Energy Balance Calculator – HELP,» World Information Service on Energy, http://www.wise-uranium.org/nfceuh.html (last accessed on October 27, 2007).

[16] Official website of the U.K.-Russia Closed Nuclear Cities Partnership, <http://www.cncp.ru/cities/novouralsk/history.shtml>; Irina Vakulina, «A Half Century...»

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[19] *Bulletin of the Russian Academy of Sciences*, Volume 74, No. 12 (2004), pp. 1076–1081.

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[21] Marvin Miller, «The Gas Centrifuge and Nuclear Proliferation,» in *A Fresh Examination of the Proliferation Dangers of Light Water Reactors* (Washington, D.C.: The Nonproliferation Policy Education Center, October 22, 2004), http://www.iranwatch.org/privateviews/NPEC/perspex-npec-lwr-102204.pdf (last accessed on October 27, 2007).

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[25] «Russia is Beginning Actively to Support the Export of High Technology,» *Phaethon*, http://www.faito.ru/archnews/1160534207,1175083171/ (last accessed on October 12, 2007).

[26] Data from *Nuclear Power in Russia*, Briefing Paper No. 62 (September 2006), http://www.uic.com.au/nip62.htm (last accessed on on October 1, 2007), which are in general agreement with the data found in V. D. Safutin, Yu. V. Verbin, and V. V. Tolstoy, «Status and Prospects for Enrichment,» *Atomnaya Energiya*, Vol. 89, No. 4 (October 2000), p. 339. According to the latter, the capacities of Russian enrichment plants are as follows: *UEKhK* – 49 percent, *EKhZ* – 29 percent, *SKhK* – 14 percent, *AEKhK* – 8 percent.

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[29] Federal Programs, Subprogram «*The Safety and Development of Nuclear Energy*» through 2005, official website of the Russian Federation Government, http://www.programs-gov.ru/cgi-bin/show_com.cgi? mod=result&prg=132&year=2005 (last accessed on October 1, 2007).

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[31] Alena Kornysheva, «Russian Uranium Will be Richer,» *Kommersant*, June 23, 2007.

[32] «*AEKhK* Business Card,» official website of the *Angarsk Electrochemical Combine*, http://www.aecc.ru/index.php (last accessed on October 1, 2007).

[33] *AEKhK* Director General Viktor Shopen press conference, «The Creation of an International Uranium Enrichment Center in Angarsk,» July 21, 2006, official website of the *Angarsk Electrochemical Combine*, http://www.aecc.ru/newsdetal.php? par=117 (last accessed on October 1, 2007).

[34] Ibid.

[35] According to the author's calculations, based on *AEKhK*'s capacity and the fact that production of enriched uranium for a 1,000 MW reactor requires 100,000–120,000 SWU.

[36] Sergey Kiriyenko, «By 2015 *AEKhK* Should Increase Its Separative Capacity by Four Times,» Nuclear.ru, June 22, 2007, http://www.nuclear.ru/rus/press/other_news/2107382/? send_friend=1 (last accessed on April 7, 2008).

[37] Federal Program «*Development of Russia's Nuclear Power and Industrial Complex in 2007–2010 and the Prospects for 2015,*» pp. 63–64. Decree No. 605 of October 6, 2006, «*On the Federal Program 'Development of Russia's Nuclear Power and Industrial Complex in 2007–2010 and the Prospects for 2015',*» official website of the Russian Federation Government, http://www.government.ru/government/governmentactivity/rfgovernmentdecisions/archive/2006/10/16/3040736.htm (last accessed on October 1, 2007).

[38] Sergey Kiriyenko, «*AEKhK* Capacity Will Increase by Four Times,» *Details* (Angarsk), June 28, 2007.

[39] Dmitry Verkhoturov, «Passions around Uranium,» *Expert*, December 1, 2006.

[40] Transcript of meeting between Nikolay Spassky, Federal Atomic Energy Agency (Rosatom) deputy director and head of the commission to establish the International Uranium Enrichment Center, and rep-

resentatives of the Irkutsk region executive branch and civic organizations, Angarsk, September 29, 2006, http://baikalwave.eu.org/Econews/newssent06.html (last accessed on October 4, 2007).

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[42] «The History of Angarsk,» http://www.gorodangarsk.ru/info/cityhistory (last accessed on October 1, 2007).

[43] Sergey Zinner, «The New State Commission for the Electrification of Russia (GOELRO), or the Nuclear Renaissance,» *Vsya Nedelya* (Angarsk), June 14, 2007.

[44] Viktor Svinin, «Kiriyenko Looked a Gift Horse in the Mouth,» *Nezavisimaya Gazeta*, December 19, 2007.

[45] «Arms Control and Proliferation Profile: Russia,» Arms Control Association, http://www.armscontrol.org/factsheets/russiaprofile.asp (last accessed on April 7, 2008).

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[47] V. Vandyshev, «*AEKhK* Meets All of the Conditions for the Creation of an International Uranium Enrichment Center,» Nuclear Branch Information and Exhibition Center, September 18, 2006.

[48] *TENEX* comments on draft article by the author, entitled «Will Angarsk's High Technology Enrich Siberia?» October 31, 2007, p. 6.

[49] For more detail, see «The Agreement between the Government of the Russian Federation and the Government of the United States of America on the Use of Highly Enriched Uranium Extracted from Nuclear Weapons,» in Vladimir Orlov, ed., *Nuclear Nonproliferation* (Moscow: PIR Center, 2002), Vol. 2, pp. 332–335.

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[51] Oleg Gulevsky, «Post Box No. 79,» *Oblastnaya Gazeta* (Irkutsk region), September 28, 2007.

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[53] Elena Lisovskaya, «Uranium Invasion,» *Vostochno-Sibirskaya Pravda* (Irkutsk), September 30, 2006.

[54] «World Nuclear Fuel Facilities,» World Information Service on Energy, http://www.wise-uranium.org/efac.html (last accessed on October 1, 2007).

[55] «From Generation to Generation,» Nuclear.ru, March 31, 2008, http://www.nuclear.ru/rus/interviews/2109348/ (last accessed on April 7, 2008); official website of the *Electrochemical Plant* Federal State Unitary Enterprise, http://www.ecp.kts.ru/ru/about/about.shtml (last accessed on April 7, 2008).

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Yevgeny Petelin, Nikita Perfilyev[1]

THE *NUCLEAR PANDA*: CHINA IN SEARCH OF ENERGY SECURITY[2]

When the policy of reform and openness that was initiated by Deng Xiaoping at the end of the 1970s was implemented, the Chinese economy began to rapidly develop. From 1978 to 2005, economic growth averaged 9.6 percent annually.[3] From 1980 to 2000, Chinese GDP increased four-fold, while energy consumption increased only twofold. This gave the Chinese leadership the opportunity to set an optimistic goal of once again increasing GDP fourfold by the year 2020, while simultaneously reducing energy consumption by 20 percent per unit of GDP. Assessments vary widely as to how realistic these goals are, but one thing is clear: energy consumption in China will increase nonetheless. The most modest estimates foresee electricity use increasing by 4.4 percent per year, while other data suggest that electricity consumption will outpace GDP growth.[4,5]

Theoretically, China, which has some of the world's largest coal reserves, is capable of meeting its growing needs by means of its own resources. And, in point of fact, coal occupies the predominant position in the nation's energy mix. Every week, a coal-fired electrical power plant is brought on-line in China. By 2007, however, the P.R.C encountered a coal shortage and, for the first time in its history, had to import it. One of the reasons for this was due to limitations in transportation infrastructure: the network of railroads is physically incapable of hauling raw materials from where they are being produced to where they are being consumed. Moreover, the growing demand for coal poses a very real threat to the environment, not only for China, but for the entire global community. In large Chinese industrial centers and cities, acid rainfall has already become quite commonplace, while CO2 emissions adversely affect human health and reduce economic growth.

In this regard, it is noteworthy that, during the summer of 2008, a great many coal-fired power plants located a short distance from the facilities that will be used during the summer Olympic Games will be closed 30 days before the start of the games and throughout their duration from August 8 to 26.[6]

It is not surprising that China views nuclear energy as an alternative that can partially satisfy its energy requirements without inflicting irreparable damage to the environment.

THE NUCLEAR ALTERNATIVE IN THE STRATEGY OF PEACEFUL DEVELOPMENT

The strategic decision to develop atomic energy was adopted by the Chinese leadership at the end of the 1970s. This decision was consistent with a general tendency that was emerging in Northeast Asia.[7] Both Japan and South Korea regard atomic energy as one of the most important avenues for solving energy problems.[8]

Arguments in favor of developing atomic energy for China are virtually identical to those made throughout the rest of the world. First, given current prices for raw hydrocarbons, building nuclear power plants is more economical than developing any other energy sector. The cost of building a new unit with a 1,000-megawatt reactor is approximately $2–2.5 billion U.S. dollars.[9] A new coal-fired power plant will cost approximately $1.2 billion to build, while a new gas-fired plant – about $500 million. In the future, however, the relatively low cost of materials and the degree of operating efficiency of a nuclear power plant will make it possible to produce cheaper electrical power.[10]

The second factor driving the nuclear alternative for China is the shortage of raw hydrocarbons and the presence of a number of problems associated with importing and hauling it. Analysts note that China's ability to provide itself with sources of energy is slowly but surely declining. In 1990, the country supplied 104 percent of its own energy sources, whereas in 1998, this figure was 98 percent, and in 2000, 97 percent. These figures exceed those for the United States (73 percent), India (84 percent), and Brazil (78 percent), and are much higher than in neighboring economically developed nations such as Japan (20 percent) or the Republic of Korea (17 percent). Russia, in comparison, provides 157 percent of its own energy sources,[11] whereas China produces less than 50 percent of the oil it needs. This is forcing China to increase its dependence on energy imports, primarily oil.[12] As a result, China is becoming increasingly vulnerable to increasing worldwide prices for oil, which is directly affecting its national economic health.

It is also important to note that the majority of imported oil is transported by sea and only a small proportion is transported on Chinese vessels. In 2002, out of 69.4 million tons of oil imported by China, 64.5 million tons were shipped by sea, including only 7 million tons on Chinese vessels.[13] This situation also prevailed in 2003.[14] The most vulnerable of the shipping lanes, both into and out of China, including those used for oil, is the Strait of Malacca, which joins the South China Sea with the Andaman Sea and accounts for 70 percent of Chinese oil imports. The strait, the width of which is only 40 kilometers at its narrowest part, can be monitored not only by the U.S. Navy, but also by various pirates and terrorists. In the P.R.C, it is presumed that, within the next 5–10 years, it could potentially pose a serious threat to oil imports and the Chinese economy.[15]

The third argument in favor of a nuclear alternative for China is the fact that nuclear power plants are relatively benign from an environmental standpoint. When analyzing the structural specifics of the Chinese energy mix, it's highly apparent that coal makes up a very high proportion of total energy consumption (more than 70 percent), thus significantly worsening the environmental impact of the Chinese energy industry, which emits more carbon monoxide that any other nation except for the United States. The «Program of Action for Sustainable Development in China in the Early 21st Century,» which was adopted on February 5, 2007, remarks on the necessity of making the transition to clean sources of energy, including nuclear energy.[16]

According to the 10th five-year plan, China planned, by the year 2020, to commission additional nuclear capacities in excess of 30 GW, as a result of which nuclear energy as a share of total energy production would reach 4 percent, i.e., 40 GW of a planned 1,000 GW of total capacity. Additional capacity has already reached 60 GW, which is much higher than the originally announced figure.[17] Considering that, by the year 2020, an additional 18 GW of nuclear capacity will need to be under construction, China will have to increase the rate at which it adds capacity.[18]

The 11th five-year plan (2006–2010) includes specific provisions for protecting the environment, which call for a 20 percent reduction in energy consumption per unit of GDP. This presumes an increased reliance on nuclear energy. Initially, the plan included the construction of 14 reactors. In the opinion of Chinese nuclear physicists, «starting in June 2006, a consensus began to form around the important role of nuclear energy for the sustainable development of China.» [19] «It is necessary to increase the relative proportion of nuclear energy and renewable sources of energy while simultaneously working towards reducing dependence on coal-generated electrical power,» said Zhang Gobao, vice chairman of the National Development and Reform Commission (NDRC) of the P.R.C. In his words, there is an increasing demand for the construction of new nuclear power plants in China, and new capacities are needed in various regions, and not just in the coastal provinces such as Zhejiang, Guangdong, and Jiangsu.[20]

The fact that uranium was mentioned separately in a document entitled «China's Policy on Mineral Resources in 2003» speaks to the importance of the development of nuclear energy in

China.[21] This document stresses the necessity of the rational use of energy resources and the possibility of attracting foreign technology for its development.

Thus, it should be noted that political circles in China are becoming increasingly convinced of the future potential of nuclear energy. «Nuclear energy is a clean and safe way to obtain electrical energy with a well developed and adaptable technology,» says the summary document of the session of the State Council of the P.R.C of July 21, 2004. «Increasing the share of nuclear energy in the total energy mix is critical for the development of high-technology and manufacturing industries, economic growth, improving the energy supply structure, maintaining energy security, and also for supporting the strategy of sustainable development,» the document notes.[22]

THE STATE OF NUCLEAR ENERGY

Nuclear energy already plays an important role in the Chinese economy. This primarily applies to the coastal regions, which are growing the fastest and which are located some distance away from coal reserves. According to data supplied by the P.R.C's National Bureau of Statistics, China generated 3,277 billion kWh of electrical energy, of which only 1.9 percent came from NPPs.[23]

This can be attributed to the fact that the civilian sector of the nuclear power industry in mainland China began developing relatively late. Despite the fact that China became the fifth-largest nuclear power in 1964, it wasn't until the beginning of the 1970s that Prime Minister Chou En-lai declared the need to develop a civilian nuclear power program. The first proposal for developing a civilian NPP was approved in November 1981.[24]

The Qinshan-1 NPP, which is located in the Zhejiang province 100 km from Shanghai, is the first NPP developed and constructed entirely by the Chinese. It was under construction for nearly seven years, beginning in March 1985.[25] It was connected to the grid in December 1991, which makes it the oldest NPP in mainland China. Since October 2007, under the supervision of *Areva*, work is being done to extend its service life beyond the originally projected 30 years.

The phase 2 reactors built at the Qinshan NPP are also of Chinese origin. Their design is based on the Qinshan-1 and consists of double-loop *CNP-600* light-water reactors. It took six and one-half years to build them.

Meanwhile, China, at a relatively early point, began to attract foreign companies to build NPPs. As a rule, this cooperation is realized on the basis of intergovernmental agreements. At present, China has entered into cooperative agreements in the area of the peaceful use of nuclear energy with 17 countries: Australia, Argentina, Belgium, Brazil, Great Britain, Vietnam, Egypt, Iran, Canada, Pakistan, Russia, the United States, France, Germany, Switzerland, South Korea, and Japan.

The construction of the Daya Bay NPP, which consists of two 944-MW reactors, began in August 1987 and was overseen by the French company *Electricité de France* with the participation of Chinese engineers. The plant was put into commercial operation in March 1994. The reactors were supplied by *Framatome* and are standard French triple-loop PWR-type reactors. From 1994–1996, *Framatome* had to make major repairs to the reactors, which resulted in the plant being idled. The reactor vessel heads were replaced in 2004. Today, the plant generates about 13 billion kWh per year.[26]

The phase 1 reactors of the Lingao NPP are virtual replicas of the Daya Bay reactors. Construction began in May 1997, with the first power block completed in May 2002 and the second in January 2003. The reactors are based on a French design that was 30 percent localized. For this reason, they received a Chinese designation – *CPR-1000*.

Canada did not remain on the sidelines. Phase 3 of the Qinshan NPP consists of two *CANDU-6* heavy-water reactors (PHWR) with a capacity of 650 MW. *Atomic Energy of Canada (AECL)* delivered a turn-key NPP. Construction of the first reactor lasted from July 1998 to December 2002. The second reactor was under construction from September 1998 and September 2003, i.e. for approximately five years.

Russia became the third country to supply a NPP to China. The intergovernmental agreement on cooperation in the construction of a NPP in China and Russia's provision of a state credit

to China was entered into force in 1992. The Chinese then decided to construct the power blocks at a site located in the Liaoning province. It took until 1997 to work out the details and develop a feasibility study for constructing the NPP at the selected site. Meanwhile, at the end of 1996, the Chinese decided to build a power plant at another site – in the Jiangsu province near the city of Liangyungan. On December 29, 1997, a general contract to build the Liangyungan NPP plant was signed (the plant was later renamed Tianwan).[27] Russia provided a credit of $1.5 billion for 13 years at a 4 percent annual rate of interest (instead of the $2.5 billion initially stipulated in the Agreement) with a target date of 2004 for bringing the first power blocks on-line and 2005 for the second power block. Repayment of the credit was scheduled to begin two years after the first power block began to operate. Construction began in October 1999.

Phase 1 of the Tianwan NPP was based on the design of the *NPP-91* and consists of two Russian *VVER-1000* reactors. The cost of the project amounted to approximately $3.2 billion. Tianwan is unique in that it is the first NPP in China to incorporate a digital monitoring and control system (DMCS), combining equipment from different suppliers and a high degree of automation. The system automates more than 94 percent of the plant's operations. The system was designed by the Chinese companies *Jiangsu Nuclear Power Corporation* and *China Nuclear Energy Industry Corporation*, by the Russian company *ZAO Atomstroyexport*,[28] and by the German company *Siemens.* The start-up date for the plant was delayed due to problems with the equipment. As a result, construction was not completed until 2007 and took almost eight years. The projected operational lifespan of the plant is 40 years.

Table 1. **Operational NPPs**[29]

Plant	Province	Type	Net capacity (each)	Operation	Manufacturer
Qinshan 1	Zhejiang	PWR	288 MW	1991	P.R.C
Daya Bay 1 and 2	Guangdong	PWR *(M-310)*	944 MW	1994	France, *Framatome*
Qinshan 2 and 3	Zhejiang	PWR *(CNP-600)*	610 MW	2002, 2004	P.R.C
Lingao 1 and 2	Guangdong	PWR *(CPR-1000)*	938 MW	2002, 2003	France, *Framatome*
Qinshan 4 and 5	Zhejiang	PHWR *(CANDU-6)*	650 MW	2002, 2003	Canada, *AECL*
Tianwan 1 and 2	Jiangsu	PWR *(VVER-1000)*	1,000 MW	2007	Russia, *Atomstroyexport*
Total: 11			**8,572 MW**		

Thus, there is now a total of 11 reactors operating in China with a total capacity of approximately 8.6 GW. Nine of these reactors are PWR light-water reactors, two of which are Russian *VVER* reactors,[30] plus there are two PHWR heavy-water reactors. Of these 11 reactors, only three are actually Chinese-made; the Lingao NPP reactors, while having a Chinese designation, are actually based on French technology.

PROSPECTS FOR DEVELOPING THE NUCLEAR POWER INDUSTRY

PWR-type reactors are the primary type of reactor used in China. At the same time, China had been actively reforming its nuclear sector in order to increase its self-sufficiency across the entire spectrum of nuclear technology, including the production and delivery of fuel assemblies (FA) and the production of NPPs and NPP equipment. Nevertheless, foreign designs are adapted for domestic use.

Table 2. **NPPs under construction**[31]

Plant	Province	Type	Reactor capacity	Construction started	Started operation	Manufacturer
Lingao 3 and 4	Guangdong	*CPR-1000*	1,000 MW	December 2005, May 2006	2010, 2011	P.R.C
Qinshan 6 and 7	Zhejiang	*CNP-600*	610 MW	April 2006, January 2007	2011, 2012	P.R.C
Hongyanhe 1 and 2	Liaoning	*CPR-1000*	1,000 MW	August 2007, April 2008	2012, 2013	P.R.C
Ningde 1	Fujian	*CPR-1000*	1,000 MW	December 2007	2012	P.R.C
Yangjiang 1	Guangdong	*CPR-1000*	1,000 MW	May 2008	2013	P.R.C
Total: 8			**7,220 MW**			

Presently, eight power blocks are under construction in China: three reactors in the Guangdong province, two each in the provinces of Zhejiang and Liaoning, and one in Fujian province (see Table 2). When all these power blocks are successfully completed and started up according to schedule in 2013, the total capacity of Chinese nuclear power plants will reach 15.8 GW, not counting those NPPs, the construction of which has not yet begun.

Moreover, it is of no small significance that all eight power blocks were built independently by China: the *CNP-600* type is based on Chinese technology, and the *CPR-1000* type is based on French technology. Meanwhile, the further localization of French technology is ongoing: whereas the third unit of the Lingao NPP will be 50 percent localized, the fourth unit will be 70 percent localized, while the reactor units of the Hongyanhe and Ningde NPPs will be 70 to 85 percent localized.[32] Thus, the policy of developing a nuclear energy industry based on foreign technology but doing it autonomously is paying off. One should note that China is developing a third-generation *CNP-1000* reactor based on French and American technology and which could start construction in 2016. In addition, China is actively engaged in research in the area of developing a high-temperature gas-cooled reactor and an experimental fast-neutron reactor.[33]

It is worth noting that these technologies could be exported by China to other countries in the future. So far, China is only constructing a Chinese-designed NPP in Pakistan. An intergovernmental agreement calls for the construction of up to eight power blocks. The capacity of the power block currently under construction is 300 MW. Moreover, the feasibility of constructing a *CNP-1000*-type reactor is being discussed.[34] In addition, China does not exclude the possibility of its participation in bids to supply reactors to other countries, for example, Belarus.[35]

The growth potential of the nuclear power industry is attracting the interest of international corporations. China is actively negotiating with foreign corporations that are bidding on the construction of nuclear power plants in China, for example, the American company *Westinghouse*,[36] the French concern *Areva,* and the Russian company *Atomstroyexport.* These three companies are on the short list for participating in new bidding.[37]

COOPERATION WITH THE UNITED STATES

China has been developing its cooperation with the United States in the area of nuclear energy for several decades. The first attempts were made as early as the 1980s. Thus, in 1985, an agreement was entered into regarding cooperation in the area of the peaceful atom. However, it did not reach the stage of practical implementation, as, in 1986, information about China's cooperation with Pakistan emerged, and the U.S. Congress banned the implementation of the agreement until it could be proved that such cooperation did not exist. Not until the Clinton administration did an agreement of intent to cooperate in the area of the peaceful use of nuclear energy came into force in 1997 between the U.S. Department of Energy and the P.R.C State Commission for Planning. The purpose of this agreement was to strengthen cooperation

on matters regarding developing nuclear technology and nuclear nonproliferation.[38] Nevertheless, this cooperation was ended after the so-called Cox report and ensuing allegations of Chinese nuclear espionage at the Los Alamos National Laboratory.[39]

Cooperation was not renewed until May 2004, when the NDRC and the U.S. Department of Energy signed a Memorandum of Mutual Understanding regarding cooperation in the area of energy policy. The political dialogue between the U.S. and China in the area of energy is based on the activity of U.S.-China joint ventures that are working in the area of high-energy nuclear physics, fossil-fuel energy, energy efficiency, and renewable energy, as well as the exchange of information in the area of energy production.

In June 2005 and September 2006, meetings were held in Washington and Hangzhou between representatives of the two countries regarding energy issues. These meetings were the foundation for cooperation in the area of increasing energy efficiency and developing new sources of energy over the long term. At the beginning of February 2006, the United States announced the Global Nuclear Energy Partnership. China was one of the nations that expressed its intent to join the program, having signed the declaration of the principles of the Global Nuclear Energy Partnership on September 15, 2007 at the IAEA headquarters in Vienna.

On December 16, 2006, Head of the NDRC Ma Kai and U.S. Secretary of Energy Samuel Bodman signed a Memorandum of Understanding in Beijing that accorded the *Westinghouse* Corporation the opportunity to construct four power blocks in China.[40] These would be the first third-generation power blocks in China. The Memorandum also provided for the possibility of technology transfer.

Practical development in this area did not being until February 26, 2008, when preparations were begun to build the Sanmen NPP in Zhejiang province. The first phase of the plant will entail the installation of two American-made *AP-1000* reactor units manufactured by *Westinghouse*.[41]

The Sanmen NPP will consist of a total of six power blocks. The Chinese authorities let it be understood that all of this plant's reactors would most likely be of one and the same type. Although the first two units will be built by *Westinghouse*, Chinese *AP-1000* clones might be installed in the other units.

According to the terms of the agreement with *Westinghouse*, the Americans will supply to the P.R.C a total of four *AP-1000* reactors and will also transfer the technology for building them. The *AP-1000* clones could, in the future, displace the *CPR-1000* reactors from the Chinese market (the French PWR reactors). Industry analysts presume that the transfer of technology to China «will compromise the American position in the Chinese market for NPP construction.»[42]

The state-owned energy company *China Guodian* received a credit of $300 million dollars from the Bank of China to construct an electrical power plant. As reported by *The China Daily* newspaper, the first phase of the power plant will become operational in 2014, about five or six years from now.[43] In September 2009, construction will begin on the Haiyang NPP, where two *AP-1000* reactor units will also be installed.

It is worth noting that the Sanmen NPP will become the first nuclear power station in the world to have installed the *AP-1000* reactors, which have never been tested before. Western nuclear engineers and scientists were skeptical of China's intent to clone the technology of the *Westinghouse AP-1000* reactor units. Their skepticism is primarily based on the fact that the *AP-1000* technology has not been used even in the United States. In this regard, it was observed that, for the Chinese government, such a step is fraught with risk and «that the choice of American technology had political implications.»[44]

COOPERATION WITH FRANCE

In many respects, the fact that France was the first country to supply China with nuclear reactors has facilitated cooperation in the area of nuclear energy between France and the P.R.C. In October 2006, during a state visit by French President Jacques Chirac to China, the two

countries agreed to cooperate more closely in the area of nuclear energy. On December 1, 2006, the expansion of cooperation between China and France was announced in Beijing amid a great deal of fanfare.

At the end of January 2007, Anne Lauvergeon, president of the *Areva* group, signed a preliminary agreement in Beijing – similar to the one signed by *Westinghouse* – to supply China with two third-generation *EPR* reactors, each with a capacity of 1,600 MW.[45] At the same time, China insisted for a long time that *Areva* include the transfer of its irradiated nuclear fuel processing technology as part of the reactor delivery contract.

In November 2007, *Areva* and *China Guodian Nuclear Power Corporation* (CGNPC) signed an agreement to supply China with two *EPR* reactors. The contract is valued at 8 billion euros ($11.9 billion).[46] Anne Lauvergeon called this agreement «historic and unprecedented in the world market for nuclear energy.»[47]

According to the terms of the contract, *Areva* will transfer its third-generation reactor technology to China. According to industry analysts, the transfer of this technology may take some time, possibly about 15 years, as was the case with the spent nuclear fuel (SNF) reprocessing plant in Rokkasho (Japan), which was built using *Areva* technology. In February 2008, the agreement was approved by the leadership of the P.R.C.[48]

PROSPECTS FOR COOPERATION WITH RUSSIA

Regarding cooperation between China and Russia, the largest joint project is the construction of the Tianwan NPP (TNPP), which is being carried out under the auspices of the intergovernmental Russian-Chinese agreement of December 18, 1992. As a result of the Russian company's successful completion of the first phase of the plant, an agreement in principle to construct the second phase of the TNPP was signed on November 6, 2007 between *ZAO Atomstroyexport* and *Jiangsu Nuclear Power Corporation* (JNPC).[49]

At present, this agreement serves as the basis for drafting a Russian-Chinese intergovernmental agreement for building the plant's third and fourth reactor units. It is expected that the TNPP will become the largest nuclear power facility in the country and will have eight power blocks with a total capacity of 10 GW.

Yu. G. Ivanov, the head of the *Atomstroyexport* directorate for NPP construction in China, announced that *Atomstroyexport* would begin manufacturing production versions of reactor units for nuclear power plants: «The necessary experience has been accumulated, and presuming the contract for building the third and fourth TNPP power blocks is signed, *Atomstroyexport* will be able to utilize its mass-production know-how, since the units projected for construction will be identical to the first two TNPP reactor units.»[50]

Today, a major complication is the fact that an absolute condition for the participation of foreign corporations in the construction of NPPs on P.R.C territory is their willingness to transfer technology. Perhaps it was this requirement on the part of China that was the reason why *Atomstroyexport* only participated formally in the December 2006 bidding for the contract to build an NPP in the P.R.C, when *Westinghouse* won the contract for supplying reactors to China.[51] Moreover, *Atomstroyexport* is simply overbooked with external orders, inasmuch as it is the only company in the world that was simultaneously building seven power blocks outside Russia – two Tianwan power blocks in China, two power blocks for the Kudankulam NPP in India, one reactor unit for the Bushehr NPP in Iran, and two power blocks for the Belene NPP in Bulgaria.[52] Currently, the Russian side is refusing to transfer its NPP construction technology.

China and Russia are cooperating in the area of uranium enrichment. In particular, on the basis of a 1992 agreement, Russia built a gas centrifuge plant for uranium enrichment in the P.R.C. The agreement stipulates that «the Russian Party, during the time between the start-up of the gas centrifuge plant, when it will have a capacity of 500 metric tons SWU/year[53] (for uranium), and its expansion to 1,000 metric tons of SWU/year (for uranium), will consider the possibility of selling to the Chinese Party the technology for manufacturing gas centrifuge equipment under a supplemental agreement.»[54] Within the framework of this Agreement and the Supplemental

Protocol of 1996, the construction of three phases of the gas centrifuge was completed using Russian technology on P.R.C territory: the first phase, with a production capacity of 200,000 SWU/year in the city of Hanzhong in October 1996; the second phase, with a production capacity of 300,000 SWU/year in the same city in May 1998; and the third phase, with a production capacity of 500,000 SWU/year in the city of Lanzhou in November 2001. On November 6, 2007, A. A. Grigoryev, director general of *OAO Techsnabexport*, and Chen Xin Yang, president of the *China Nuclear Energy Industry Corporation*, signed a framework agreement for providing technical assistance to China in the construction of the fourth phase of the gas centrifuge plant.[55] Work in this area continues; however, the supplemental agreement on transferring technology has not been signed. Beginning in 2010, *Techsnabexport* will supply uranium products to China. This agreement will be in effect for 11 years.

In addition, China had been planning to participate in building the world's first floating NPP on Russian territory. Besides a credit of 400 million rubles from the Chinese partner, P.R.C participation was predicated upon the body of the vessel for the floating NPP being built in a Chinese shipyard. In 2005, there was discussion about signing a contract for 85 million rubles with the shipyard.[56] The Russian side, however, walked away from the agreement and, as of today, the floating NPP is being built without Chinese involvement.[57]

One more possible avenue of cooperation is the construction of a Chinese experimental fast neutron reactor. Both sides are working to activate cooperation in this area.[58]

DEVELOPING COOPERATION WITH CANADA

Despite China's decision in June 2005 not to plan for the further construction of heavy-water NPPs of Canadian design,[59] Canada's nuclear designers have not given up on the Chinese market. On September 9, 2005, an agreement on cooperation was signed. Leaders of both states were present at the signing.[60] *AECL* and *China National Nuclear Corporation (CNNC),* agreed to work jointly in a number of areas, to include: developing a design for an improved *CANDU* heavy water reactor specifically for the Chinese; work in the area of materials engineering for the heavy water program; handling of radioactive waste (RW); the *CANDU* reactor fuel cycle; development and improvement of computerized support systems for NPP operators; and future cooperation in areas such as hydrogen production. The new agreement is considered an important step towards strengthening Chinese-Canadian nuclear ties.[61]

Table 3. **Planned NPP Construction**[62]

Plant	Province	Type	Reactor capacity	Construction started	Started operation	Manufacturer
Ningde 2, 3, 4	Fujian	*CPR-1000*	1,000 MW	September 2008, July 2009, March 2010	2013–2015	P.R.C
Taishan 1 and 2	Guangdong	*EPR*	1,600 MW	December 2008, January 2010	2014, 2015	France, *Areva*
Yangjiang 2, 3, 4	Guangdong	*CPR-1000*	1,000 MW	February 2009, September 2010, July 2010	2013–2015	P.R.C
Hongyanhe 3 and 4	Liaoning	*CPR-1000*	1,000 MW	March 2009, July 2010	2013, 2014	P.R.C
Sanmen 1 and 2	Zhejiang	*AP-1000*	1,000 MW	March 2009	2013, 2014	United States *Westinghouse*
Haiyang 1 and 2	Shandong	*AP-1000*	1,000 MW	September 2009	2014, 2015	United States *Westinghouse*
Total: 14			**15,200 MW**			

When analyzing the plans of the Chinese government, it is worth noting that, by the year 2015, 14 more power blocks are planned for construction in addition to the 11 that currently exist and the eight that are currently under construction (see Table 3). Thus, with the successful completion of the construction and on-time start-ups of all the power blocks listed in 2015, the aggregate capacity of Chinese nuclear power stations will reach 31 GW; in other words, it will double in comparison with the aggregate capacity projected for 2013. Moreover, it is presumed that six of the 14 power blocks will be built with the assistance of foreign companies (*Westinghouse* and *Areva*).

URANIUM SUPPLY ISSUES AND SNF MANAGEMENT

Consistent with its confirmed uranium reserves, China possesses 70,000 metric tons of natural uranium, an amount that is theoretically sufficient to meet its NPPs' near-term requirements.[63] At present, eight reactors are under construction[64] and, by the year 2015, 24 reactor units are slated to come on-line,[65] a figure that, according to Cao Shudong, director of the Nuclear Power Office of the P.R.C's Commission of Science, Technology, and Industry for National Defense, will lead to a four- to six-fold increase in uranium consumption by the year 2020.[66]

In 2008, China will need 1,396 metric tons of natural uranium, or 2.1 percent of global consumption.[67] The production of 840 metric tons at several mines covers more than half of existing demand. The Chinese Nuclear Uranium Corporation, which controls all uranium mining in the country, plans, in the near future, to begin operating another mine in Fuzhou province that will be able to produce 200 metric tons of uranium a year, as well as increase output at the Yining mine to 300 metric tons. In addition, from 1963 to 1996, China operated a mine in Xinjiang province, which produced up to 1,000 metric tons and which is now inactive.[68]

Table 4. **Working uranium mines**[69]

Mine	Province	Nominal capacity (metric tons of uranium per year)	Year started
Fuzhou	Giangxi	300	1966
Chongyi	Giangxi	120	1979
Yining	Xinjiang	200	1993
Lantian	Shaanxi	100	1993
Benxi	Liaoning	120	1996

In February 2008, it was announced that Chinese geologists had discovered the largest deposits of natural uranium ore in the country, located not far from the Sino-Kazakh border in the Yi Li river region of the Xinjiang Ulghur Autonomous Region of the P.R.C. According to a statement released by Wan Chen, a representative of the P.R.C State Committee on Geological Prospecting, inferred uranium ore reserves are estimated to be 10,000 metric tons.[70]

In 2010, China will need 3,600 metric tons of uranium annually and 2.5 million SWU. By 2020, these figures could increase to 10,000 and 7,000,000 respectively.[71] It is therefore obvious that China's own uranium reserves are insufficient. In order to secure its NPPs with fuel, the P.R.C is trying to obtain access to uranium reserves in other countries.

In September 2006, a strategic agreement was signed in Beijing between the Australian company *PepinNini Minerals Ltd.* and the Chinese company *Sinosteel Corp.*, in partnership with *CNNC,* to jointly develop and operate the *Curnamona Province* project in South Australia, to include the development of uranium deposits in the Crocker Well Uranium Field and the Mt.

Victoria Uranium Deposit. *Curnamona Province* is estimated to have 67.5 thousand metric tons of ore with a uranium-oxide content of 0.5 kg/t.[72]

The *China International Nuclear Uranium Corporation* (*SinoU)*, which was formed by *CNNC*, is developing uranium mines in Niger and Nigeria, and is also looking at the feasibility of mining operations in Mongolia and Algeria.[73]

At the end of September 2007, the Kazakh national nuclear company *Kazatomprom* signed an agreement with *CGNPC* and *CNNC* to form a joint venture (JV) for mining uranium deposits in Kazakhstan. The parties to the agreement specifically agreed that the Chinese company would obtain access to Kazakh uranium deposits and that *Kazatomprom* would be allowed to invest in the nuclear power industry of the P.R.C.[74] Moreover, *Kazatomprom* and *CNNC* signed a framework agreement «on deepening and expanding strategic cooperation,» which outlines the basis for a strategic partnership in nuclear energy. In accordance with these documents, all uranium mined by the Kazakh-Chinese JV will be delivered to China in the form of more highly refined nuclear fuel products.[75]

In November 2007, *CGNPC* received a 24.5 percent equity stake in *UraMin*, an *Areva* subsidiary that specializes in the development of uranium deposits in Namibia, the Central African Republic, and South Africa. An addition, *Areva* committed to supplying the P.R.C with about 23,000 metric tons of uranium by 2022, an amount sufficient for 17 fuel loads, and this became part of the deal to supply French reactors for the Taishan NPP.[76] The fuel will be produced in France.

In addition, in order to guarantee an uninterrupted supply of fuel to this NPP, the Commission of Science, Technology, and Industry for National Defense announced in April 2007 that a strategic uranium reserve will be created in China as well as a commercial system of reserve deliveries. This reserve will be developed using natural uranium mined in the Yi Li river basin of the Xinjiang Ulghur Autonomous Region and the Ordos River basin, which is located in the Inner Mongolia Autonomous Region in northern China. It is expected that all the parameters of the government reserve will have been finalized by 2010.[77]

In regard to enrichment capacity, China has three Russian-built plants in its civilian nuclear power sector with a total capacity of 1,000,000 SWU/year. The remaining consumption is currently met by *Urenco* and the Russian concern *Techsnabexport*. The plant in the city of Yibin (Sichuan province) fabricates 11 metric tons of fuel assemblies (FA) per year for Qinshan-1 and 26 metric tons of FAs for both reactor units at the Daya Bay NPP. The Baotuo plant provides FAs for the two Canadian reactors at the Qinshan NPP site. Making the installation self-sufficient will require the addition of new capacities for uranium mining and enrichment as well as fuel production.[78]

Another important question having to do with the development of nuclear energy is the management of SNF. According to plans for increasing the share of NPPs in the energy mix, the yearly volume of SNF will be roughly 600 metric tons in 2010 and 1,000 metric tons in 2020, while the volume of accumulated fuel will be 3,600 metric tons and 12,300 metric tons, respectively. China still does not have a national program for handling SNF, but relevant legislation is being drafted.

The construction of a centralized wet storage capacity of 500 metric tons of SNF was completed in 2003 on the grounds of the Lanzhou nuclear facility. Its storage capacity can be doubled.[79]

Pilot projects for fuel reprocessing, based on Chinese technology, have also been launched. The projected capacity is 50 metric tons per year and can potentially be increased to up to 100 metric tons. It is expected that operations will begin in 2008. If the pilot project is successful, plans are being considered to build a large commercial SNF reprocessing plant by the year 2020. It is quite likely that it will be placed under international safeguards.[80]

Moreover, *CNNC* signed an agreement with *Areva* that provides for the possibility of building a SNF reprocessing and MOX fabrication plant. The projected cost is 15 billion euros.

FROM *NUCLEAR PANDA* TO *NUCLEAR DRAGON*

The Chinese leadership views nuclear energy as a priority area for ensuring the energy security of the P.R.C. Although, in relative figures, NPP contribution to total energy production (two percent of current electrical power generation with a planned increase to four-six percent by 2020) seems insignificant, the absolute figures are impressive.

In this sense, the policy of relying on domestic resources with the involvement of foreign technologies is bearing fruit. If before, China relied on reactors supplied from abroad, now, after localizing foreign technologies, it has gradually become self-sufficient in all phases of NPP construction. In light of the fact that an indispensable condition for foreign participation in the construction of NPPs on P.R.C territory is the willingness of foreign participants to transfer technology, it can be concluded that, in the future, China is planning to completely wean itself foreign assistance in the construction of its NPPs and, in addition, to establish its own ability to export technology for the development of peaceful uses of nuclear energy. All eight of the reactors currently under construction are being built by the Chinese themselves.

There is yet another noteworthy feature connected with technology transfer. As the history of building NPPs in China has shown, the reactor technologies that were successfully introduced have ultimately become associated with one of the top three Chinese corporations. Thus, *CGNPC*, as a result of its transactions with the *Framatome Corporation*, obtained the technology for building PWR-type reactors, and is now building *CPR-1000* reactors while gradually increasing their degree of localization. Today, one can predict that, in the future, *CGNPC* will begin building reactors based on the French *EPR* reactors supplied by the French concern *Areva*. The *CNNC* Corporation does not yet possess any foreign technology and builds reactors of completely Chinese origin. Moreover, *CNNC* and *China Power Investment Corporation (CPI)* are beginning to cooperate with *Westinghouse* to build *AP-1000* reactors and, consequently, these companies will, in the future, come to possess the technology for producing this type of reactor.

Providing existing and new NPPs with fuel is not a straightforward matter. China does not have sufficient uranium reserves. At the same time, the national policy for creating a strategic reserve, in combination with commercial deliveries, will provide the country with a greater level of energy security if only because it is much easier to accumulate and store a uranium reserve that can support uninterrupted, long-term NPP operation than it is to create, for instance, strategic three-month oil reserves. The success of *Areva*'s reactor business is, to a great extent, based on the fact that, first, the company brought its Chinese partners into its uranium business and, second, it provided a service and support guarantee for the entire operating life of all the NPPs it is building. *Areva* is currently providing China with a broad spectrum of services in the area of nuclear energy: uranium mining, reactor construction, extending the operational lifespan of NPPs, SNF reprocessing, and MOX fuel fabrication. From the Russian side, the spectrum has a different look: construction of reactors and a gas centrifuge enrichment plant, the provision of uranium products, and the joint construction of a fast neutron reactor. It can be said that cooperation with Russia occupies a special niche in the development of the P.R.C's nuclear power industry.

In the future, China could become a competitor to the current leaders of the reactor business. China is already building NPPs in Pakistan. If the rumors about the preparation of a Chinese-Pakistan agreement similar to the one between the U.S.A and India turn out to be true, then cooperation between the two countries in the area of nuclear energy will expand. Nevertheless, it is premature to talk about the emergence of China as a major player on the global nuclear market anytime soon. The P.R.C has its hands full with the imperatives of domestic development. Plans to build 86 reactors within the next 10 years will require a colossal investment of labor and resources in order to be successfully realized. For Russia, this primarily means that part of the Chinese *nuclear pie* will be taken by Russian companies.

Notes

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[2] This paper will examine the prospects for the development of nuclear energy in mainland China alone, excluding Taiwan.

[3] From a presentation given by U. Bango at a meeting of speakers of parliament of the SCO member nations. Xinhua, May 5, 2006, http://russia.mofcom.gov.cn/aarticle/todayupdates/200605/20060502329363.html (last accessed on March 17, 2008).

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[7] A similar tendency can be seen in Taiwan, which also needs nuclear energy and where a significant proportion of electrical power is already provided by nuclear sources. Nevertheless, nuclear energy has become a controversial political issue in Taiwan. The *Democratic Progressive Party*, which has announced its key goal to be a «Taiwan free of NPPs,» is coming out against the completion of the Kungliao NPP and is also looking at the possibility of shutting down Taiwan's first and second NPPs prior to their scheduled decommissioning. A review by A. I. Kukshinov *(Atomstroyexport*) of the current article, p. 1.

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Roman Ustinov[1]

PERSIAN GULF: ATOMIC TRICK OR NUCLEAR TREAT?[2]

On December 10, 2006 Cooperation Council for the Arab States of the Gulf (CCASG)[3] held a summit in Riyadh, the Saudi capital, adopting the Final Communiqué, which among other things mentioned the conduct of a joint study to forge a joint program in the field of nuclear technology for peaceful purposes.[4] During the final press conference heads of the six GCC member states reiterated many times that it will be conducted according to international criteria and systems. They also underlined that the countries do not want to possess nuclear weapons and are going to develop the nuclear program transparently, trying to make the Middle East a zone free of weapons of mass destruction (WMD).[5]

Response was dubious. Arab media commented mildly, merely stating the fact.[6] Western analysts started guessing for a link between the peaceful atom in the Persian Gulf and Iran potentially obtaining nuclear weapons.[7]

Experts and analysts give opposite judgments. Some say it is inevitable that such countries as Saudi Arabia and the United Arab Emirates (U.A.E) will get an A-bomb for potential deterrence of Iran, others say there are objective reasons explaining the need for economies of the Persian Gulf to go nuclear seeing it as an alternative source, more promising in the long run.

It is very interesting to note the reaction of other Middle Eastern countries. As early as January 19, 2007 *Haaretz*, a newspaper in Israel, published an interview with Abdullah II, King of Jordan, saying his country aspired to develop nuclear power for peaceful purposes.[8] Yemen was equally quick to announce its plans of cooperation with the United States and Canada to develop nuclear energy and cover electricity deficit. Activities even closer to implementation are seen in Turkey and Egypt.[9]

ENERGY BALANCE IN THE PERSIAN GULF

A comprehensive analysis of the energy balance–electric energy generation and consumption, and fuel mix in production–allows to understand reasoning of those countries causing them to develop nuclear energy. Generation and consumption figures prove that today Persian Gulf states have no deficit.

Table 1. **Electric Energy Generation and Consumption in GCC states as of 2005, GWh[10]**

	Bahrain	Kuwait	Oman	Qatar	Saudi Arabia	U.A.E
Production	8,698	43,734	12,648	14,396	176,124	60,698
Consumption	7,897	27,363	8,793	12,125	135,002	53,874

Hence, let's look at a statement by Abdul Rahman al-Attiyah, the secretary-general of the Gulf Cooperation Council, who said in early 2007 that the huge energy needs of the fast-growing Gulf countries warranted development of nuclear energy.[11]

Nuclear energy projects, especially in countries with no experience in that area, are no quick deal. Construction and commissioning of one nuclear power plant usually takes five years (allowing for a downward trend for that time). Given all challenges that the regional countries would have to face, the real time required for the first plant to be working in GCC countries is ten years. IAEA Director General Mohamed ElBaradei expects 10-15 years to finalize construction and commissioning of a station in the region.[12] Meanwhile, Abdul Rahman al-Attiyah says the project will be in implementation phase as early as 2009.[13] This might be the most optimistic scenario, but even in this case the first regional nuclear plant will not start its operations before 2020.

Considering consumption forecasts of electric energy in the world in general and in the Gulf in particular, such claims seem to be convincing. World power consumption is expected to have a stable annual growth of 1.5–2 percent on the average.[14] Major growth is expected in members of the Organisation for Economic Cooperation and Development (OECD). However, the Ministry of Water and Electricity of Saudi Arabia expects consumption growth by 30 GW by 2030, which means doubled current capacity for economic development and to satisfy the growing demand in water resources.[15] The United Arab Emirates expects annual power consumption growth of 10 percent until 2020, related to large financial projects and the tourism industry.[16] The situation is the same in all other countries of the region: seven-eight percent of annual growth in Kuwait (most per capita consumption in the region), and doubled demand in Qatar.

The fuel mix for power produced in GCC countries comprises only oil and gas, the latter having a very significant share, and that is true for most countries of the region. In Bahrain and Qatar gas is the main fuel. Saudi Arabia and Kuwait mostly rely on oil, while the United Arab Emirates and Oman mostly use natural gas. Thus, most hydrocarbons that are not exported are actually used to produce electricity, which does not allow using them for industrial applications.

BP Statistical Review of World Energy 2007 gives the following figures for oil reserves:

Table 2. **Known Oil Reserves in GCC Countries as of 2006 Year End**[17]

	Kuwait	Oman	Qatar	Saudi Arabia	U.A.E
bln. tons	14.0	0.8	2.0	36.3	13.0
bln. barrels	101.5	5.6	15.2	264.3	97.8

The picture becomes more telling when compared against oil production in the respective countries.

Table 3. **Oil Production as of 2006 Year End, thousands of barrels per day**[18]

Kuwait	Oman	Qatar	Saudi Arabia	U.A.E
2,704	743	1,133	10,859	2,969

International Energy Outlook 2007 by the U.S. Energy Information Administration gives reserve-to-production ratios. Saudi Arabia, with most reserves in the region, will last for 75 years, Kuwait–110, Qatar and Oman–50 and 19 years respectively.[19]

Moreover, in the future there seem to be no plans for significant production cuts. The *Outlook* indicates that global oil consumption is to rise from 83 million barrels per day in 2004 to 97 million in 2015, and to 118 million in 2030.[20] With so high increase (and the figures look real, given the sweeping growth of China and other Asian countries), a significant production decrease in countries streaming energy resources to half of the globe would

inevitably lead to a surge in global prices. Obviously, oil importers will do their best to prevent this from happening.

It would not be true to say that Persian Gulf region lacks gas reserves. However, the distribution is uneven. Qatar has a lot, Saudi Arabia and the Emirates have much less, but still more than other countries of the world.[21]

Table 4. **Known Gas Reserves as of 2006 Year End, trillion cubic meters**[22]

Bahrain	Kuwait	Oman	Qatar	Saudi Arabia	U.A.E
0.09	1.78	0.98	25.36	7.07	6.06

Under known plans, Gulf countries are to increase gas production significantly. Today this energy resource is only used internally (only Qatar does gas exports): to generate electricity, for industrial purposes, to purify water, and in petrochemical production, among other things. Thus, the countries save oil, which is mostly exported, and the revenue from the treasury is used to fund economic growth. However, to support high growth rate of national industrial production even more resources are needed, which hints at increasing gas production. Such plans have been announced by all the six states. At the same time, most of them simply don't have enough reserves for their projects. That's why such countries as Bahrain, Kuwait, and even the Emirates despite their own significant reserves, have looked into several options of natural gas imports from Qatar or Iran.

In the Emirates the main problem is a high price on gas field development, as well as a large share of sulfur. Saudi Arabia also faces some challenges: despite having world's fourth natural gas reserves, its production is relatively low explained by an inevitable increase in oil output together with the side gas.[23]

Thus, not all countries of the region, even in the mid-term perspective, will be able to satisfy their growing demand for electricity using just the oil and gas. In the long run, after the *oil lakes* of the Gulf start to dry out, the countries most probably will face severe shortages of power, sometimes happening there even now.[24]

NUCLEAR POTENTIAL

In their official statements Gulf leaders indicate that they need the peaceful atom to satisfy growing demand of regional economies for electric energy and fresh water.[25] Together with that, it is considered (mostly by Western experts) that nuclear power in Gulf countries would allow cutting down on carbon dioxide emissions, thus reducing the *greenhouse risk.*

How can these countries benefit from nuclear energy?

Firstly, high efficiency of nuclear power plants will enable the countries, though to a limited time and extent, to satisfy growing electricity demands.

Secondly, it would allow using some oil capacity for increased exports and at internal refineries. Both will add to modernization and diversification of the economies and ease dependence of economic growth on oil revenues.

Thirdly, CCASG countries will be able to manufacture with high added value, which is now done in oil importing countries. This spells extra revenues.

Fourthly, a reactor complemented with a distiller would simplify tackling the problem of fresh water.

Fifthly, extra electrical capacity would facilitate agricultural development, which is troublesome in Gulf countries today.

And finally, green production technologies and climate change are also important. Lady Barbara Thomas Judge, chair of the U.K. Atomic Energy Authority, said: «Nuclear energy's rel-

evance is rising in a world beset by global warming and shrinking oil supplies»–even among countries with the largest reserves.[26]

Besides, for many years nuclear power industry has been the hallmark of scientific progress and advanced thinking in developed countries. After Iran started its research in the area other countries of the region also expressed interest in similar projects, which is explained by diversity of the Arab world and high competition within it. Shia-lead Iran is already in an advanced stage of nuclear development, it is even into uranium enrichment, which raises concern of the international community. For Sunnis of the Persian Gulf this has become a scientific challenge. GCC countries are striving for a technological balance in the region so that no single state could build up its potential for the other countries to depend on its technologies. In fact, Gulf countries want to show they have just the same resources and capabilities (including management) as Iran to develop nuclear power industry and potentially compete in that area. It can be said that the whole program is a kind of *message* to Iran, and a very strong one, telling that Gulf countries are not going to envy their neighbor, but will use their financial resources to build up own potential. Some experts think this is the original motivation.[27]

PER ASPERA AD ATOMUS

Development of nuclear energy in a region that has never had it will inevitably cause a number of difficulties.

One of the major issues Gulf countries are to encounter is lack (or, actually, totally no) experts and technologies. There are two ways to tackle those staff and technological needs: either try it locally or procure abroad. The Gulf countries seem to be trying to do both at the same time. However, in this particular case, it is important to keep in mind a lump sum to be used for sourcing of technologies (and that is exactly what will be done, most probably). Similarly, foreign experts can be invited. On the other hand, the countries can educate their own staff by cooperating with the IAEA and sending their citizens to study abroad. It should be noted that the program is long-term, for generations to come, which allows for educating local experts.

From the very beginning GCC countries have been claiming the program will be run under supervision and with involvement of the IAEA. In February 2007 Abdul Rahman al-Attiyah, the secretary-general of the Gulf Cooperation Council, said GCC was going to involve the IAEA in its program from the beginning, to make its nuclear bid «a transparent process, within international standards.»[28] Besides, cooperation with the IAEA even when looking into nuclear perspectives is explained by the fact that Gulf countries want to benefit from technologies, expertise, and best practices of the agency. On February 22, al-Attiyah turned to IAEA Director General Dr. Mohamed ElBaradei to request the IAEA assistance with developing the preliminary study, determining the required infrastructure, and assuring the appropriate training of nuclear personnel.[29]

In mid-May 2007 Gulf Cooperation Council Secretariat General announced its first meeting with experts from the IAEA to discuss technical details of the initial feasibility study for the GCC nuclear program.[30] The meeting was held on May 21–22 in Riyadh.

Another challenge for the peaceful nuclear program is its multilateral nature within one international organization of six member states. On the one hand, joint capabilities (financial, technical, and management) will add to a quicker and more efficient development. On the other hand, it is obvious that sooner or later (rather sooner than later) there will be issues of power distribution, the volume of contribution, and the executing side (s). Shared nuclear plants are practically inexistent in the modern world.

Consideration should be given to the fact that CCASG is no solid block, but a rather *loose* entity that focuses more on interests of individual states than speaks in one voice. Until now there have been no large projects with total involvement. Mind here: candidates to host the blocks are Saudi Arabia and the Emirates. Again, here are some difficulties.

Saudi Arabia is the region's leading state in terms of its financial resources and economic potential. Moreover, Saudi Arabia needs extra electrical capacity more than others, in order to develop its technological base. Quick population growth,[31] expanding manufacture, diversification projects, and regulated electricity tariffs all call for immediate capacity increase. Increasing competition and concerns over the nuclear program of Iran add to that need. By the way, Saudi Arabia is the only country in the region that once had nuclear plans. In 1979 Western media reported its plans to establish nuclear research centers as a first step to build the nuclear industry. It was supposed that two reactors will be considered: one on the Gulf shore, and the other one at the Red Sea.[32]

In addition to its economic potential Saudi Arabia has other advantages, such as vast lands and access to two water areas: the Red Sea to its west and the Persian Gulf to the east. Other countries of the region cannot boast that much territory, which again prevents them from building a nuclear plant. Thus, two stations with water distillers at the Red Sea and the Persian Gulf would allow Saudi Arabia to resolve internal energy issues and, should need be, provide energy to neighboring countries: Kuwait, Qatar, and Bahrain.

When the nuclear issue was considered in Saudi Arabia back in the 1970s, two industrial zones were selected for low-capacity reactors to produce electricity and fresh water: Jeddah at the Red Sea and Dhahran at the Gulf.[33] A feasibility study was conducted to consider geology, seismology, and infrastructure, including means of transport. Today those two locations are likely to be reconsidered. There can be a significant issue with Jeddah, since it is very close to Mecca.

Besides, Saudi Arabia doesn't have uranium ore. Small uranium and thorium deposits are found in Tabuk basin, but no development has been done so far. However, the country is very rich in phosphates, now with many years of development. The largest deposits are in al-Jalamid (213 million tons) and Umm Wu'al (537 million tons), smaller ones are in al-Amud (24 million tons), and Sanam (23 million tons).[34] Making uranium out of phosphates is economically feasible if its market price is above $60 per kilo. Today the market price is above that mark, which not only makes it feasible to convert phosphates into uranium, but also removes some risks related to uranium imports from abroad.

Interestingly, despite their lack of technologies and experience in nuclear energy, Saudi scientists were involved in many projects and experiments related to uranium, isotope enrichment, radiation protection, spent fuel handling, and reactor maintenance.[35] Moreover, Saudi research centers were involved in joint projects with Iran, Syria, Pakistan, the United States, and some European countries.[36]

As to spent fuel storage, today Saudi Arabia has no infrastructure to that end. Research centers are the main source of nuclear waste. To address it, a special temporary storage structure was built in 1994 together with the IAEA. It is comprised of one room of 40 sq. meters, with one area reserved for liquid radioactive solutions storage and one for solid waste.[37]

Obviously, no other country of the region is so ready to create the nuclear industry as Saudi Arabia. Same concerns organizational capacity.

Interestingly, all countries of the region, including Saudi Arabia with its most prepared research infrastructure, have no internal rules and regulations to start going nuclear, i. e. it is required to finish accession to quite a few treaties in nonproliferation and development of nuclear power industry.

The Emirates is another country with sufficient financial and organizational capacity to carry out nuclear projects. It needs extra electrical power for large financial and tourism undertakings. Only most developed areas at the Gulf–Dubai and Abu Dhabi–have a potential capacity to create the nuclear infrastructure. But these are being turned into large tourist areas, and all industries are removed, which would be hard to change into nuclear power industry development.

Nuclear construction in other Gulf cities outside Saudi Arabia and the Emirates is not feasible enough, and too risky in safety terms, too. Those countries are not that large, while energy needs can be satisfied using the capacity of a potential station at the Gulf shore in Saudi

Arabia. The head of a business zone for energy companies in Doha said Qatar already owned enough gas to supply its small population for generations.[38]

Additionally, most of the countries are very close to Iran and Iraq with terrorism threat coming from them. On the whole, the terrorism threat in the region, especially against infrastructure, especially against a nuclear plant, is a serious issue hindering development of the industry.

Extra challenges for the regional nuclear initiative might include long time required for the program, and cooperation with other countries.

NONPROLIFERATION: WHEN A CIGAR IS JUST A CIGAR

The peaceful nuclear initiative of Gulf countries gave journalists and experts a very good chance to test their rhetoric as to when we see an *Arab* A-bomb. Media (mostly Western media) have come up with reports and comments proving some hidden motives behind the peaceful atom schemes for GCC states to get hold of nuclear weapons.[39] Expert community of the Persian Gulf believes the project is only required to get the necessary technologies and follow the path of Iran, should it create the weapons.[40] Some Russian experts share that view.[41]

However, there is still no detailed expert analysis of the issue. Saudi Arabia obviously raises some concerns. Ever since the 1990s rumors have been circulating regarding its past military nuclear project and connections to the pervasive Abdul Qadeer Khan.[42] A new burst of interest to the issue was caused by an article in *The Guardian* of September 18, 2003 on a secret Saudi A-bomb project.[43] After that, the most comprehensive review of Saudi infrastructure that could help to create WMD is found in *Yaderny Kontrol,* 2004.[44]

On July 24, 1994, as early as a decade before the article in *The Guardian, The Sunday Times* published materials obtained from a Saudi defector, a former permanent representative of that country to the United Nations. Official papers show indications that Saudi Arabia contributed financially to the nuclear program of Pakistan in exchange for nuclear weapons in case of an aggression.[45]

The international community got even more suspicious when Crown Prince Abdul Aziz, Saudi second deputy prime minister, and Nawaz Sharif, the then prime minister of Pakistan, visited a Pakistani enrichment facility and met A. Q. Khan there.

On July 16, 2005, when its relations with the United States were at lows, Saudi Arabia signed the so-called Small Quantities Protocol with the IAEA, which again was regarded by experts as an attempt by the country's leadership to start developing nuclear weapons. The protocol allows states considered to be of low risk to opt out of more intensive inspection regimes in return for a declaration of their nuclear activities. In addition, the protocol allows for the possession of up to 10 tons of natural uranium and up to one kilogram of plutonium without reporting. Before it was joined by the Saudis, 75 nations had signed the protocol, but only after that event the IAEA started internal consultations to amend the text as it gives *a loophole* for potential proliferation. Especially given the fact that before the protocol was signed, the United State, the European Union, and Australia pressed hard on the IAEA for comprehensive inspections in Saudi Arabia.

Fragmentary information on cooperation with Pakistan on that topic also concerned the Emirates. However, notably, GCC countries are most consistent in promoting the Middle East into a nuclear-weapon-free zone. Leaders of regional countries constantly denounce Iran for its activities outside IAEA safeguards and Israel for staying away from NPT. Moreover, when discussing regional nuclear perspectives, regional officials have been reiterating they were going to involve the IAEA in their activities from the beginning.

Moreover, until now the Gulf states have never indicated their intention to enrich uranium or reprocess nuclear wastes, while these two links in the fuel cycle allow converting to military applications.

COOPERATION: NEW HORIZONS

The question of cooperation in implementing the nuclear program of Gulf states is a key issue, considering all the difficulties mentioned above.

Iran was among the first to offer support and assistance to GCC counties.[46] Given the format of *Realpolitik* Iran currently pursues in its foreign policy, such initiatives are easily explained. Moreover, Iran seems ready to follow that line in the region as consistently as it can. In July 2007 Manouchehr Mottaki, minister of foreign affairs of Iran, called upon all Gulf countries to establish the nuclear consortium together with Iran so as not to allow outside powers to disrupt this goal.[47] The fact that Iranian President Mahmoud Ahmadinejad was invited to observe at CCASG summit on December 3–4, 2007 in Qatar serves to prove how deeply the GCC initiative is linked with the nuclear activities of Iran. Though the high-level discussion did not prioritize nuclear energy issues, the fact that for the first time in GCC history Iranian president was invited to observe is both functional and symbolic to that end.

Firstly, in addition to discussing Iranian initiative to sign a pact on regional security and cooperation in economic and energy projects, including a free trade zone, GCC countries offered Iran to get involved in developing nuclear industry in the region.

Secondly, such steps can be interpreted as a move of GCC countries from a feasibility study of the nuclear issue to the next stage, looking for partners to implement the goals set.

Thirdly, there seems to be an attempt of GCC states to find right *connections* in order *to link* their nuclear industry program to the one now developed by Iran.

The United States infrangibly promised to assist in building peaceful nuclear industry in states of the Gulf. Speaking in the Gulf Research Center in Dubai in January 2007, U.S. Undersecretary of State Nicholas Burns said President George W. Bush's administration would be supporting civilian nuclear power programs among its six Gulf Arab allies as a means to combat global warming.[48] However, it seems that U.S. interests in this case are not commercial, but rather focused on regional security and a balance of power. Direct involvement of the United States in construction of a nuclear plant seems unlikely, especially considering the fact that U.S. companies have had no foreign orders to build a reactor for quite a time. However, the Unites States is obviously interested in preventing Russia from getting into the region in favor of European companies.

Mustafa Alani from the Gulf Research Center thinks that at a certain point Gulf countries might start to cooperate with India and Pakistan, both of which have a lot of experience in the area.[49]

Generally speaking, the question of cooperation and competition is pretty much of an enigma at the initial stage of nuclear industry development.

Japan, Germany, and France have best prospects for direct cooperation (which is especially true for France, a traditional supporter of Middle Eastern countries in this area). France was among the first to respond. Very soon after the GCC summit a spokesman for the French Ministry of Foreign Affairs said France agreed to work with GCC on the peaceful development of nuclear energy.[50] And in July 2007, just two months after he entered the office, French president Nicolas Sarkozy had a meeting with the president of the U.A.E to discuss cooperation in peaceful use of nuclear energy. It was agreed to set up special committees to put in place the mechanism of cooperation. The two leaders agreed upon the necessity of activating a bilateral cooperation agreement on peaceful nuclear usage that was signed in the 1980s. Nicolas Sarkozy expressed France's readiness to assist the U.A.E in setting up a nuclear power-based electricity generation program.[51]

At the same time, when agreeing to help Libya develop a nuclear reactor to supply drinking water from desalinated sea water, Nicolas Sarkozy said that to consider the Arab world «is not *sensible* enough to use civilian nuclear power» would, in the long run, risk a *war of civilizations.*[52]

Recent events in relations between France and GCC countries seem to be demonstrating that Riyadh, Abu Dhabi, and Doha are ready for close cooperation with France on nuclear energy

issues. In fact, the GCC tour by Nicolas Sarkozy, visiting Saudi Arabia, Qatar, and the Emirates, serves to prove that six months after the initial agreement between France and the Emirates on nuclear cooperation were filled with practical steps. This has resulted in a peaceful nuclear cooperation agreement signed by France and the Emirates on January 15, 2008, setting legal and technical framework for further joint activities.

A similar plan is expected to join forces of *Total,* long trying to expand its business, including nuclear, with *Areva,* and *Suez*–France's three largest energy companies.[53] The three are expected to submit to U.A.E administration a joint project for two 1,600 MW reactors. *Total* would offer its expertise in large-scale projects, *Areva* would design the reactor, while *Suez* would work as a utility company.[54]

A day before the U.A.E visit of the French president, in Qatar, there was signed a memorandum of understanding between *Electricité de France* and Qatar administration covering nuclear issues and providing for negotiations to start electricity generation in the U.A.E using nuclear power plants and renewable sources.[55] It should be noted, however, that it does not mean specific investments, but rather a feasibility study of potential projects.

Given the quick pace of cooperation development between France and GCC countries (all documents drafted in just six months) it can be expected that all other things being equal, potential projects may soon go into implementation phase.

Japanese involvement also looks promising, given the country's technological potential, also in desalination reactors, which is most interesting for countries of the region. Moreover, consideration should be given to the fact that neither Japan, nor France and Germany, unlike the United States, have the serious regional issue of Iraq.

Looking at positions of the competitors, it would be hard for Russia to penetrate into the regional market. There was a notable visit in February 2007 by Russian President Vladimir Putin to Saudi Arabia, Qatar, and Jordan. Nuclear cooperation was not mentioned in official statements or Russian media. At the same time, particular attention was given to it by Western and Arab journalists. Similar attitude was towards a visit to the Emirates by Russian Foreign Minister Sergey Lavrov, who came there just a few days after Vladimir Putin's Middle East tour.[56] Saudi Foreign Minister Prince Saud al-Faisal said in an interview that the six Gulf states would like to enter the nuclear energy arena with Russia's help.[57] The minister said the Russian president had offered help during his first visit to the kingdom, and Saudi Arabia contacted the other countries in the Gulf Cooperation Council during Putin's visit.[58]

In this light it would be important to look at al-Faisal's visit to Moscow in mid-February 2008. According to Russian media, during his few hours in Moscow the minister of foreign affairs of Saudi Arabia offered a number of joint projects in economic, energy, and military technical areas should Moscow decide to wind up its contacts with Iran.[59] The media only report specific volumes of military equipment the Saudis plan to procure.[60] Nevertheless, taking into account that cooperation between Russia and Iran in peaceful nuclear industry is no less important than Iranian purchases of Russian arms, it is obvious that Minister al-Faisal couldn't help mentioning potential cooperation between Russia and Saudi Arabia in that area, too.

However, considering the fact it is now about construction contracts, GCC countries will play *the Russian card* in order to gain support of other players. In this case, it is particularly important, which elites Russia could use to penetrate into that market. Most probably, it has best chances only as part of a consortium.

There are some potential areas, where cooperation between Gulf nations and Russia has most chances to be implemented:

- Training in nuclear technologies, based on joint programs, special courses, or supplying a small-capacity research reactor.
- Construction of power blocks in one of the consortium countries.[61] It should be noted here that GCC countries want to have a distilling reactor, and here Russia has some competitive advantage, including expertise in sea-based nuclear stations.[62]
- Assistance in plant maintenance, which includes both operation and low-enriched uranium. It would be promising here to develop cooperation with the International Uranium

Enrichment Center in Angarsk, which would mitigate political risks connected with enrichment technologies appearing in the region.

- ❑ Maintaining safety of operations for the reactors, which is important, especially in the region and for the industry image in general.
- ❑ Nuclear waste storage. This can be implemented in the form of low-enriched uranium supplies and nuclear waste return.

TOO MANY CONDITIONS

Resolution of GCC countries to develop their nuclear industry is obvious. Going nuclear is explained by growing demand in all regional countries for electric power and long-term perspective of oil and gas shortage. Additionally, there is a need for fresh water to develop agriculture. Plans to diversify economic growth and refine the oil locally require an alternative energy source.

A totally different motivation lies in technological competition with Iran, which requires building up capacity to avoid possible energy dependence from it.

At the same time, developing a nuclear project jointly, within CCASG, would go well only at the first step of feasibility study to look into possible plant sites. When implementing the project, the states will play individually, especially Saudi Arabia, and the Emirates, under certain conditions though. Countries of the region still have to do a lot of work to build the infrastructure, also draft a legal framework, establish competent government authorities and research centers, join international legal instruments covering nuclear energy and nonproliferation, as well as bilateral framework cooperation agreements on peaceful nuclear usage.

Given all the above, we should not overlook a possibility to switch from peaceful to military nuclear development, as well as the general security landscape of the region should nuclear industry emerge there.

Notes

[1] I appreciate advice I received while working on the article from Anton Khlopkov, executive director of the PIR Center; Ildar Akhtamzyan, member of the PIR Center Advisory Board; Gennady Evstafiev, senior advisor of the PIR Center; Roland Timerbayev, chairman of the PIR Center Executive Board; Vladimir Orlov, president of the PIR Center; Alexey Ubeev, deputy head of the Department of External Affairs of JSC *Atomstroyexport;* Alexander Koldobsky, deputy director of international relations of the Moscow Engineering Physics Institute (MEPhI); Yevgeny Satanovsky, president of the Institute of the Middle East; Wael Al-Assad, director of Multilateral Relations Department of the Arab League; and Pavel Mansurov, then assistant editor of *Security Index.*

[2] The analysis is mainly focused on GCC countries. It does not include the nuclear program of Iraq, discontinued under resolution 687 of the UN Security Council of April 3, 1991, or nuclear energy projects of Iran, very well described in Western and Russian specialized sources.

[3] CCASG comprises the United Arab Emirates, the Kingdom of Bahrain, the Kingdom of Saudi Arabia, the Sultanate of Oman, Qatar, and Kuwait. More details at CCASG website: http://www.gcc-sg.org/eng/

[4] The Final Communiqué of the Gulf Cooperation. December 10, 2006. http://www.ain-al-yaqeen.com/issues/20061222/feat5en.htm (last accessed on June 16, 2008).

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[9] As soon as in 15 years' time Turkey is planning to commission three energy blocks with total capacity of 5,000 MW; the first one is to be started in late 2007. Egypt wants to build four reactors, finishing the first one within a decade.

[10] International Energy Agency, http://www.iea.org/Textbase/country/index.asp (last accessed on June 16, 2008).

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[12] Maurin Picard, «L'Afrique... «

[13] Mohammad Ezz Al Deen, «Gulf Nuclear Plans Take Shape, Says Al Attiyah,» Gulf News, February 6, 2007, http://www.gulfnews.com/region/General/10102238.html (last accessed on June 16, 2008).

[14] *International Energy Outlook 2007*. United States Department of Energy, www.eia.doe.gov/oiaf/ieo/index.html (last accessed on June 16, 2008).

[15] Ibid.

[16] Ibid.

[17] *BP Statistical Review of World Energy*, June 2007.

[18] Ibid.

[19] *International Energy Outlook*...

[20] Ibid.

[21] Reference figures: same historical data of largest gas reserves, trillion cubic meters: Russia–47.65; Iran–28.13; the United States–5.93.

[22] *BP Statistical Review*...

[23] *International Energy Outlook*...

[24] There are frequent blackouts in various parts of Saudi Arabia; the Ministry of Electricity and Water of Kuwait also issued multiple warnings about possible outages in summer 2007.

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[27] Emile El-Hokayem, telephone conversation with the author, August 3, 2007.

[28] «Persian Gulf states to move ahead...»

[29] Quoted as in Richard Weitz, «Gulf Cooperation Council Moves Forward with Nuclear Energy Plans,» *WMD Insight*, April 2007, http://wmdinsights.com/I14/I14_ME3_GCCMovesForward.htm (last accessed on June 16, 2008).

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[33] «Saudi Arabia: country profile,» SIPRI, July 2004, http://www.sipri.org/contents/expcon/cnsc3sau.html (last accessed on June 16, 2008).

[34] *Saudi Geological Survey*, http://www.sgs.org.sa/index.cfm? sec=74&sub=196&sub2=201&pageNumber=1 (last accessed on June 16, 2008).

[35] «Saudi Arabia country profile...»

[36] Ibid.

[37] Ibid.

[38] Quoted as in «Gulf Arab countries could lead...»

[39] See for example, Sammy Salama, Heidi Weber, «The Emerging Arab Response to Iran's Unabated Nuclear Program,» Monterey Institute for International Studies, January 22, 2006. http://www.nti.org/e_research/e3_83.htm (last accessed on June 16, 2008); Joseph Cirincione, Uri Leventer, «The Middle East's Nuclear Surge; Recipe for War,» *New York Times Media Group.* http://www.lexisnexis.com.library3.webster.edu/us/lnacademic/results/docview/docview.do?risb=21_T1922416020&format=GNBFI&sort=RELEVANCE&startDocNo=1&resultsUrlKey=29_T1922416023&cisb=22_T1922416022&treeMax=true&treeWidth=0&csi=8357&docNo=1 (last accessed on June 16, 2008).

[40] Mustafa Alani, the Gulf Research Center, telephone conversation with the author, August 13, 2007.

[41] Yevgeny Satanovsky, president of the Institute of the Middle East, interview with the author, July 2, 2007.

[42] Check out for more details: Akaki Dvali, «Will Saudi Arabia Acquire Nuclear Weapons?» Monterey Institute of International Studies, March 2004; «Saudi Arabia Special Weapons,» Global Security, http://www.globalsecurity.org/wmd/world/saudi/index.html (last accessed on June 16, 2008).

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THE *NUCLEAR RENAISSANCE*: RUSSIA IN GLOBAL CONTEXT

The world has been demonstrating particular interest in the development of nuclear energy sector in the recent years. Today it seems that the growing energy demands of mankind can hardly be met without resorting to peaceful nuclear energy uses. However, reliance on this sector raises a number of significant issues.

Nuclear renaissance is topical for Russia as well – the country plans to increase the share of nuclear energy by 30 percent of general energy balance by 2020, and this is quite an ambitious task. At the same time, if Russia focuses only on domestic matters, it may miss the global train and lose the thriving international market. What is the proper balance? Which role should Russia play in *nuclear renaissance*? What are the difficulties and how to overcome them?

All these problems were discussed by renowned experts – Valentin Ivanov, academician of the Russian Academy of Natural Sciences, chair of the Board of Directors and Scientific-Technical Council, *ZAO Energomontazh International*; Vladimir Kagramanyan, assistant to director general on innovative nuclear energy technologies, the Leipunsky Institute of Physics and Power Engineering (IPPE); Alexander Polushkin, deputy director general on development, *Rosenergoatom*; Nikolay Ponomarev-Stepnoi, vice president, the Kurchatov Institute; Alexey Ubeev, deputy head of the department of external relations, *ZAO Atomstroyexport*; and Alexander Chebeskov, head of the section of nuclear energy systemic analysis, IPPE.

SECURITY INDEX: What is the realistic forecast of the global nuclear energy development by 2020–2030? What will its share in global energy balance be? What are the prerequisites for the implementation of such plans? Can nuclear energy in Russia really account for 30 percent of energy balance by 2020? How to ensure sufficient fuel supplies to newly built reactors?

VALENTIN IVANOV (RUSSIAN ACADEMY OF NATURAL SCIENCES): First of all, one has to mention the major reasons for rapid development of nuclear energy sector. They go beyond the fact that organic fuel reserves are exhausting. We have enough of them, let's say, for the next one hundred years, including tar sands, Arctic shelf and the Antarctic. Another important factor is the potential expansion of the *golden billion*. It has advanced energy- and resource-saving technologies, but also high specific consumption of energy resources per capita. Now that this community may be joined by China, India and Latin America (over two billion people representing booming economies), it will be necessary to produce and deliver to consumers the enormous amount of organic energy resources (oil, gas, and coal) every minute, every hour, every day. This is a real mission impossible for any kind of transport, let alone political issues that prevent shipments (look at Ukraine, Belarus, or *Nord Stream* construction in the Baltic Sea) and *force majeure* (man-made disasters, earthquakes, sabotage, etc.). Hence, energy sectors in the future should be regional by nature, so that delivery (both fuel shipments and energy transfers to consumers) may not affect energy security. Beside energy systems relying on local resources (mostly renewable), only nuclear energy meets these criteria.

Moreover, the latter has available resources for several thousand years, taking into account breeders of plutonium and thorium.

Nonetheless, by 2020–2030 not much will change, as far as the amount of nuclear energy production is concerned. These years will be marked with massive decommissioning of reactors with expired service lives. So the industry of all nations that use nuclear power plants (NPPs) will hardly cope with the task of developing sufficient capabilities and equipment to replace them in electrical generation or surpass the current levels.

Russia is not an exception. On the contrary, it will feel even stronger impact of this process. In the 1990s our infrastructure required for NPP construction was ruined, there is a qualitative and quantitative shortage of human resources (from builders to applied science and safety monitoring). My estimate would be 20 percent of Russia's energy balance by 2030 – this is much more realistic than the astonishing figure of 30 percent.

If this 20-percent level is achieved and Russia does not take extra commitments on supplying uranium to Russia-designed foreign reactors, our domestic reserves (including the Elkon field) with some indispensable import of raw materials (e.g. from Kazakhstan) will be enough to ensure the operations of light water reactors, such as *VVER-1000*, to be constructed, in accordance with the aforementioned *Rosatom*'s plans.

By 2030, if the current strategy is implemented, a few commercial NPPs with fast breeder reactors (FBRs) should emerge. They will have closed fuel cycle with 1.2–1.3 breeding ratio. This will enable us to use accumulated spent nuclear fuel from *VVER-1000* reactors (and partly from *RBMK-1000*) for the second time after regeneration. Besides, the production of excessive plutonium in FBRs means the appearance of a new resource, with new balance of fissile materials – and this will determine the quantity and characteristics of new NPPs after 2040–2050.

ALEXEY UBEEV (*ATOMSTROYEXPORT*): Possible mid-term nuclear energy development scenarios differ even within the IAEA, which is a highly respected and the traditionally prudent in its assessments. According to the optimistic scenario, total capacity of NPPs in the world may amount from 360 GWe now to 510 GW by 2020. In other words, within the next 10 years it will be necessary to build and commission 10–12 reactors per year – and today it seems nearly impossible. A more realistic figure is six-seven new NPPs per annum, so by 2020 the world may obtain 420–430 GW from the nuclear sector. Taking into account the expected intense process of decommissioning, the share of nuclear energy will not change much and should fluctuate between 16 and 20 percent of global energy balance. Obviously, in some states and regions that are active in developing peaceful nuclear energy uses, this balance may be different.

Such playing with the figures may last forever, since it is always easier to make long-term forecasts than to answer a specific question. For instance, how many NPPs will become operational next year? In fact, the next one-two years will be quite indicative for Russia and the global nuclear industry – will the plans of NPP construction and building of appropriate infrastructure succeed or will they remain on paper? According to the IAEA, the construction of infrastructure required for normal functioning of nuclear energy sector should take 10–12 years. May it happen that the countries currently zealous to build NPPs will abandon their plans after facing inevitable structural, administrative, financial, legal, personnel and other problems?

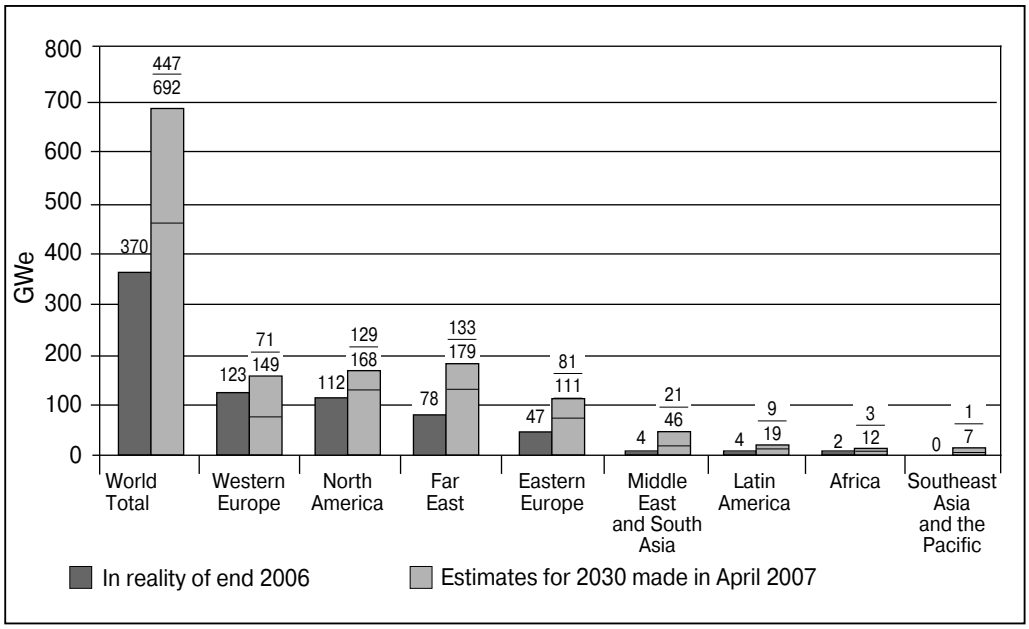
All aforementioned difficulties in construction of NPPs together with the limited capabilities of nuclear power machine-building (especially for the equipment that has long production cycle) can be overcome. Such situations occurred in the history of global nuclear energy development. The statistics says that in the 1970s mankind built 162 reactors with the total capacity of 120 GW; in the next decade, another 176 reactors with 190-GW capacity were constructed. Meanwhile, since the early 1990s until now the international community has commissioned only 19 power plants (implications of Chernobyl and the Three Mile Island tragedy). This means 20, or even 30 (like in the United States) years of reluctance! Hence, there is no continuity in the industry and in personnel training.

Another factor that may impede the ambitious plans is the lengthy process of licensing (two-three years) and construction (7–10 years). These are real terms, not declared ones. For instance, the building of the European Pressurized Water Reactor (EPR) in Olkiluoto (Finland) lags two years behind the schedule. In parallel, the licensing goes on. The Japanese argue that theoretically it takes three years to build power plants – but there is no practical evidence yet. Our endless construction process has been criticized since the Soviet times.

There is slow progress in solving legal and financial issues related to harmonization of domestic and international legislation on such urgent matters, as civil liability for nuclear damage, intellectual property rights, or risk insurance. They are topical now that Russia sets up joint ventures, strategic alliances, establishes international centers, and builds nuclear facilities abroad.

ALEXANDER CHEBESKOV (IPPE): Among many short-term forecasts of nuclear energy development, the most reliable seem to be the assessments of the IAEA consultancy on nuclear capacity projections. This task force was established about 30 years ago and provides annual estimates of nuclear energy development in different countries based on the bottom-up approach. With the help of the special software, such national forecasts are extrapolated at the regional level and finally at the global level. The reports have only low and high levels, which are published in updates and annual reports. Figure 1 indicates the results of the latest meeting at the IAEA in April 2007.

Figure 1. **Estimates of Nuclear Capacity Development by Region by 2030**



It is clear from the chart that in all regions there is an expectation of capacity growth. The only exception is Western Europe, the minimal scenario for which implies substantial reduction in nuclear capacity by 2030.

In general, the expected growth rate varies from 20 percent to 90 percent, if one compares 2006 and 2030. However, despite such optimistic forecasts the share of nuclear energy in the global balance will decrease to 5.7–5.9 percent by 2020 and 4.9–6.1 percent by 2030. In fact, in late 2005 it was 6 percent. The same process will happen in electrical generation – going down to 14–15 percent in 2020 and 12–13 percent in 2030 (in comparison with 15.5 percent in global electrical generation in 2005).

In February 2008, the Russian government approved the general scheme of deployment of power generation facilities. The basic scenario implies the commissioning of new facilities with

the capacity of 137 GW by 2020, out of which 25 percent should belong to the nuclear industry (37 new reactors). The optimistic option maintains that the share of nuclear energy may reach 30 percent (42 new reactors).

At present, the new Strategy of Nuclear Energy Development is being elaborated in Russia. Among its goals is the growth of total capacity of NPPs – 100 GW in 2030 and 300 GW in 2050. If such output is achieved, the share of nuclear energy in electrical generation in Russia will exceed 30 percent.

According to different estimates, Russia has enough uranium to develop nuclear energy until 2030. After that the country needs a radical shift – massive commissioning of FBRs and closed nuclear fuel cycle in the energy sector.

ALEXANDER POLUSHKIN (*ROSENERGOATOM*): I would like to say a few words about the investment program of *Rosenergoatom*. Its large scale can be understood in comparison with the activities of the corporation in the last 10 years.

Until 1998 there were practically no investments in the nuclear energy sector of Russia. Some money was allocated to develop new projects, such as *NPP-91, NPP-92, BN-800, KLT-40S,* and maintain the facilities under construction, the building of which was suspended in 1991–1992.

Everything was against further progress of nuclear energy – post-Chernobyl syndrome of the general public, opinions of the leading politicians (who made their careers on two slogans – «*A bas* the Communists!» and «*A bas* the NPPs!»), the lack of money (only 10 percent of produced electricity were paid for), stagnation of industry and collapse of construction companies. It seemed that our industry would never revive...

In summer 1998 the first post-Chernobyl federal program of nuclear energy development was approved. Some hopes emerged. The program did not provide for new large-scale construction, it ran out of money, it was not perceived well in the regions, but anyway it was a breakthrough – the government clarified its position.

Since then and until 2005 the situation began to change to the better and this was quite a dynamic process. The construction of two reactors was finished and they became operational (Rostovskaya No.1 and Kalininskaya No.3). Russia started to upgrade and extend the service lives of existing NPPs – Novovoronezhskaya No.3 and No.4; Kolskaya No.1 and No.2; Leningradskaya No.1 and No.2; Kurskaya No.1 and No.2; Bilibinskaya No.1, No.2, No.3, and No.4. The construction of reprocessing facilities for radioactive waste was launched. The annual amount of investments grew from 3 billion rubles in promissory notes in 1998 to 20–24 billion rubles in hard cash in 2005. Projects abroad – Iran, India, and China – helped to maintain the production plants that manufactured equipment for NPPs.

Since 2006 the revolutionary changes in nuclear energy development and investments have begun. The new management team headed by Sergey Kiriyenko elaborated and passed through the government the federal program of nuclear energy sector development in 2007–2010 with the prospects of its extension to 2015. This document implied the commissioning of two reactors per year starting from 2012.

The new project – *NPP-2006* – was developed. The construction of *BN-800* at the Beloyarskaya NPP commenced; the building of Rostovskaya No.2 and Kalininskaya No.4 was resumed; new engineering companies were set up on the basis of existing design bureaus. New construction sites were opened for Novovoronezhskaya No.2 and Leningradskaya No.2; the service lives of Leningradskaya No.3, Kurskaya No.3, Novovoronezhskaya No.5, Kolskaya No.3 and No.4, Beloyarskaya No.3 were extended. New program of raising the capacity of existing NPPs was launched. The amount of investments in 2006 achieved 35 billion rubles, in 2007 – 60 billion rubles (out of which 18 billion were appropriated in the federal budget). The plan for 2008 is 120 billion rubles (with 50-billion support from the federal budget)!

Particular attention is paid to the extension of service lives of the first and second generation reactors. The investments here will amount to 15–17 billion rubles in 2008.

A few years before the service life (it is about 30 years) is expired, the detailed examination of equipment, buildings and facilities takes place. The list of equipment and technical systems to be replaced or fully repaired is formed. Besides, the list of deviations is created and the decision to eliminate them is taken (if the technology does not allow – the compensation measures are elaborated). After thorough analysis the project of service life extension is prepared, reviewed by the experts and approved for implementation by Rosatom.

This area is one of the today's priorities. First of all, by spending $300–400 million we can extend the service life of a megawatt reactor for another 15 years – this is beneficial for the economy. Secondly, such extension helps to maintain the serial construction of new NPPs without losing the general capacity level of the nuclear energy sector.

Another important issue is the handling of spent nuclear fuel and radioactive waste. The amount of investment in waste management will be 10–13 billion rubles in 2008 – each NPP is constructing facilities for reprocessing and storage of liquid and solid waste accumulated during the years of operations.

However, our primary task is to develop new facilities. Here we speak about finishing the construction of some reactors (with high degree of readiness, the building of which was suspended), new NPPs (under the *NPP-2006* project with the capacity of 1,150 MW), conservation of sites where the construction has to be put off, and elaboration of new designs for the future. It is planned to invest 75–80 billion rubles in 2008 in such activities. Before that we had to comply with the goals set in the federal program of nuclear energy development until 2015. Starting from this year we have a new orientation point – the aforementioned general scheme of power facilities deployment until 2020.

In accordance with the general scheme, we should commission one reactor per year until 2012, two reactors per annum in 2012–2014 and, at least, three blocks starting from 2015. The total capacity of the facilities that will become operational in 2009–2020 should amount to 32,000 MW. Meanwhile, we will decommission 3,700 MW of old plants, so nuclear energy production in Russia by 2020 should exceed 51,000 MW. Average annual power generation at an NPP should increase from 150 billion kWh now to 380 billion kWh.

During the first years of program implementation, the federal budget and *Rosenergoatom* will pay the costs nearly 50/50. Later on, the corporation will increase its contribution into the investment program and by 2015 there will be no federal investments.

It is noteworthy that beside serial construction of NPPs with *VVER* reactors (1,150 MWe), there are plans to make operational an FBR at the Beloyarskaya NPP No.4 by 2012. This reactor should have the capacity of 800 MWe (*BN-800*). Experts believe that this technology will make the future of nuclear energy sector. Russia is a leader in this area and after commissioning of *BN-800* and closed nuclear fuel cycle (spent fuel is returned to the reactor after regeneration), its leading positions will only strengthen. The lessons learned at the Beloyarskaya NPP could be used to devise the plans of global nuclear energy development in the second half of the 21st century.

Another curious project that we have is the floating NPP with the 70-MWe capacity. The pilot version should become operational in Severodvinsk by 2010. There are reasons to believe that this project is quite promising – and not only for intense use in the Russian northern regions, but also abroad. Beside electricity, the floating NPP produces heat and can also be used for desalination.

One has to note that funding is no longer a decisive factor in the program implementation. Nowadays, the key issue is the supply of resources, above all human resources, materials and equipment.

SECURITY INDEX: What are the major problems and challenges related to large-scale development of nuclear energy sector in the world, especially when it comes to some countries that lack the experience of operating high-capacity NPPs?

VALENTIN IVANOV: As a rule, politicians and experts fear the proliferation of fissile materials (enriched uranium and plutonium extracted from spent nuclear fuel or targets) that may facil-

itate the development of nuclear weapons and expansion of the *nuclear club*. The existing fuel cycle technologies for reactors do provide for the production of enriched uranium and plutonium at some stage. There are different proposals on how to reduce the risk of proliferation in this case (leasing of fuel, leasing of NPPs, work with highly radioactive fuel to prevent the use of fissile materials without strong biological protection, etc.).

In my opinion, a more significant problem is the lack of clear and coherent policy of spent fuel management. If there is no decision on centralized (a few centers in the world) long-term supervised storage of spent nuclear fuel, the nations that have limited nuclear energy uses and are freshmen in this area immediately face a serious challenge. The existence of many storage facilities that are scattered around the world in different geographical conditions without clear vision of what should be done with them next, only exacerbates the risk of incidents and accidents.

ALEXEY UBEEV: Let me touch upon the nonproliferation issues connected with the *nuclear renaissance*. Obviously, as nuclear materials and technologies proliferate, there is a growing risk of their diverted use, above all when it comes to sensitive technologies of nuclear fuel cycle – uranium enrichment, storage and management of spent nuclear fuel and radioactive waste. The multilateral solutions towards nuclear fuel cycle, the tightening of export controls may help to reduce the risks, if the nations abandon in good faith their legitimate right (under the NPT) to develop peaceful nuclear energy technologies. The task of the near future is to make international initiatives attractive from political and commercial point of view. The acceptance of new technological barriers (nuclear energy systems with inherent security) requires rejection of attractive, but hazardous technical solutions. It is suggested to supply certain proliferation-sensitive equipment and compact nuclear *batteries* in the form of a *black box*, which prevents unauthorized use. In fact, floating NPPs and low-capacity nuclear reactors are the prototypes of such *batteries*.

It is evident that the phenomenon of *nuclear renaissance* has many aspects and is quite a mosaic, so it is difficult to forecast whether it will make a comprehensive picture, or only some elements of it will survive. And God save us from new Chernobyl!

SECURITY INDEX: How can Russia help to solve these problems? What are the major competitive advantages of Russia in comparison with other suppliers of nuclear equipment and services? What will the share of Russia on global nuclear market (NPPs, fuel, enrichment services) be in the foreseeable future?

VALENTIN IVANOV: Russia has appropriate legislation that enables us to return to our territory radioactive waste and fissile materials from spent nuclear fuel of Russian origin. This is a good offer for the countries that start peaceful uses of nuclear energy, but not all of them prefer the Russian fuel. There is a need to elaborate further international laws and national legislation, so that this problem gets a global solution.

My opinion is that one of the primary advantages of the Russian fuel supplies is their ability to take away spent nuclear fuel without returning radioactive waste. This advantage is the second in the list headed by Russia-designed reactors. After implementation of the pilot project on floating NPP (*KLT-40S*) Russia will be able to lease NPPs and solve the problems of spent nuclear fuel and complete decommissioning (there is no need for dismantlement, deactivation, collection and disposal of radioactive waste). Such benefits are quite attractive for potential customers from Indonesia, India, and even China. Russia has designed (at the level of concepts) low-capacity NPPs (3–10 MW) with integral construction and high safety and security level. They are easily transported, provide for more than 10 years of operations without reloading, and can do practically without permanent staff. This is also an attractive offer for many countries.

As far as regular equipment for serial NPPs is concerned (*VVER-1000*), I can hardly see any potential benefits for Russian suppliers and Russian projects here. This market witnesses tough competition.

ALEXEY UBEEV: A few words about economic component of nuclear energy. The construction of any NPP is a multibillion euro project and it will take long to pay back the investments.

Experts assume that the average cost of one kWh exceeds 2,000 euros and it is rapidly increasing. The development of innovative reactors and nuclear fuel cycle technologies (*INPRO, GIF-IV, GNEP* international programs) will take even longer to implement, have higher risks and unpredictable practical output.

Now the companies are not only interested in construction, but also in management of NPPs, in electricity sales. However, even these earnings will not be enough to maintain the nuclear fuel cycle enterprises, including safe management of spent nuclear fuel and disposal of radioactive waste. Without organizational and financial support of the state, the development of nuclear energy sector, at least, at the initial stage, is hardly possible. The government should provide loans for construction, tax breaks, higher tariffs for electricity generated at the NPPs, assurances on compensation of possible nuclear damage, etc. A good example of effective state support is France, where the president works as a personal lobbyist of the national nuclear energy sector. After all this sector account for only two mass products – electricity and heat, so to raise the profits of NPPs one should develop this second component as well.

I would like to unveil some myths concerning the successes of Russian nuclear industry. There is a false impression that our success in getting contracts for construction of NPPs is accounted for by low price of domestic technology, or even dumping. But believe me, no one will take up unprofitable projects – in the past we did feel the affect of politics, but nowadays only technologies and economic factors compete.

So, one should not have a gloomy picture. Fundamental reforms in the industry, substantially increased funding, including budgetary expenditure, promising research (including some ideas and technologies which were not realized earlier for different reasons) – all this makes a good starting point for the development of Russian nuclear complex. We have products, services and technologies to offer to the world market. For instance, take our unique experience of industrial operation of FBRs (*BN-350, BN-600*), power plants of ships, etc. It is important to offer the potential clients a full set of services – from infrastructure development and personnel training to construction of NPPs, nuclear fuel leasing, its removal and withdrawal and decommissioning.

VLADIMIR KAGRAMANYAN (IPPE): The initiative of Vladimir Putin to establish the global nuclear power infrastructure (GNPI) is aimed at solving the problems that you mention. It was set forth on January 25, 2006 in St. Petersburg in the course of the Eurasian Economic Community summit. Such global infrastructure should enable all concerned parties to have equal access to nuclear energy and comply with the nonproliferation commitments. The key element of such infrastructure should be the system of international centers that will provide nuclear fuel cycle services, including uranium enrichment under the IAEA control and on the principles of non-discriminatory access. Russia is ready to set up such center on its territory – with innovative technologies, new generation of reactors and fuel cycles – on the basis of broad international cooperation. Such centers, as it was mentioned at the press conference in the Kremlin on February 1, 2006, could also provide for disposal of spent nuclear fuel.

Nowadays Russia builds more NPPs abroad than any other country. China got two blocks with *VVER-1000* reactors at the Tianwan NPP, there is an agreement to build additional blocks at this site. The work at the Kudankulam NPP in India has reached its final stage – it means the commissioning of another two blocks with *VVER-1000* reactors; and the parties negotiate the construction of additional blocks there. The work at the Bushehr NPP in Iran is coming to an end. At the same time, the construction of the Belene NPP in Bulgaria starts. Russia gets ready for tenders on NPP construction in Belarus, Egypt, Turkey, etc.

At present, *TVEL* supplies nuclear fuel to 14 states for 74 NPPs. The corporation intends to expand its share on the world market with the fuel for pressurized water reactors and conquer up to 30 percent of global market by 2010. *TVEL*'s production is reliable and has a good image abroad. One has to note that Finland and the Czech Republic have decided to replace their fuel supplier – *Westinghouse* – with *TVEL* for the NPPs in Loviisa and Temelin.

As far as uranium enrichment technology is concerned, Russia has an indisputable leadership in the world. At present, Russian enterprises are replacing their equipment with the eighth-

generation centrifuges, which have higher production capacity. New ninth- and tenth-generation equipment is being designed. According to Deputy Director General of the Urals Electrochemical Combine Gennady Soloviev, at one of the recent meetings of Rosatom's Scientific-Technical Council U.S. and Russian devices were compared,

> «Americans followed the path of developing very large, supercritical 15-meter machines. Russia decided to develop small ones – about half a meter – which are assembled by 20 into a single unit. If one takes industrial output of a U.S. centrifuge at the experimental plant and by Russian centrifuges assembled into a unit, it will turn out that Americans produce 325 SWU a year, while our centrifuges provide for two and half time higher result. The difference may be smaller in comparison with *Urenco*, but still our equipment is 150 percent more efficient.»

SECURITY INDEX: How deep should Russia's cooperation with foreign companies be when it enters the global market? What would the benefits of such cooperation be?

VALENTIN IVANOV: To my mind, Russia should make maximum use of interaction with foreign companies. Technologies that are used to build reactors, to dispose of radioactive waste, to create nuclear fuel cycle, to manage spent nuclear fuel are too complicated and should not confine to national limits. Deep cooperation in the development of global nuclear energy sector means geographical expansion of the market, exchange of experience and higher efficiency of all activities in this sector. For instance, Russia has not yet carried out (even at the experimental level) a large-scale disposal of high level waste, while some countries already operate such facilities. Many other examples can be made.

It is also clear that the notion of cooperation nowadays implies the effective use of economic, market mechanisms.

ALEXEY UBEEV: International cooperation in the industry is inevitable, if we want to remain competitive. We have things to borrow from our partners, as far as some bulky equipment and instrumentation and control systems are concerned. For example, during the construction of the Tianwan NPP, *Atomstroyexport* maintained close cooperation with the French-German *Areva NP-Siemens*. The interaction will continue in building the NPP in Bulgaria. Today the world has four-five large transnational holdings that divide the world nuclear technology market. Besides, the demand for NPP construction is so high now (so far mostly at the level of declarations) that all actors will obtain enough contracts. The alliances can be established to implement specific projects, but it does not mean that *ad hoc* coalitions should prevent the companies from competing with each other in other tenders.

VLADIMIR KAGRAMANYAN: Russia should obviously cooperate with foreign companies to promote its production on the world market. This is especially true for the areas, in which Russia has not yet achieved the required potential after the collapse of the Soviet Union. Cooperation with foreign companies will enable Russia to reach the appropriate level of manufacture of equipment and various systems for nuclear energy sector.

As far as nuclear technologies are concerned, Russia has an evident priority here – I mean uranium enrichment and FBRs; and they should be further advanced.

* * *

NIKOLAY PONOMAREV-STEPNOI (THE KURCHATOV INSTITUTE): The *Security Index* journal posed a number of important questions concerning *nuclear renaissance* to the round-table participants.

The analysis of energy problems in the short-term and long-term perspectives enables us to argue that the tensions on the world energy market continue to heighten.

Developing countries have new production facilities and, hence, their demand for energy grows. The gap in per capita energy consumption between the developed and developing nations is narrowing and in the next decades it will be necessary to double or even triple global energy production. The process is inevitable and to solve the issue, mankind should discover and use new energy resources. If people do not want to lose the world, they should *switch on* all possible sources of energy to meet this growing demand.

Under these circumstances, the maintenance of energy security becomes the highest priority in the world. One of the solutions would be to ensure large-scale progress of nuclear energy sector. Year by year new states declare their intention to develop nuclear energy – most of them are developing countries, even those whose *energy well-being* seems to be out of question. So, the *nuclear renaissance* is not a whim of transnational corporations planning to gain new profits, it is an imperative of our era determined by the desire to ease tensions on the energy market and, hence, to ensure energy security.

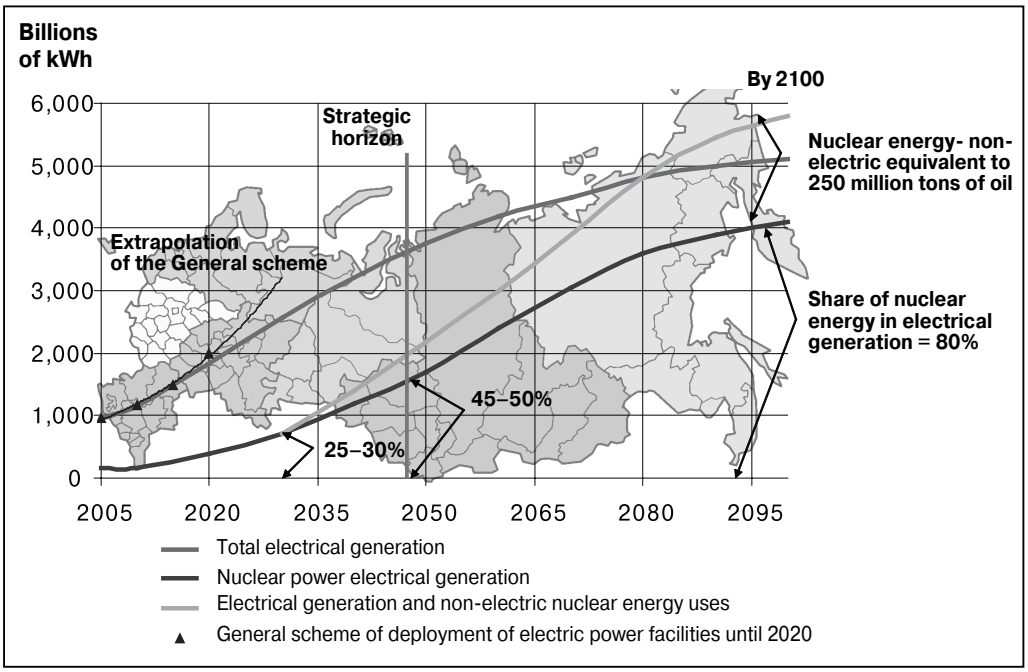
To mitigate the tensions, there is a need for dramatic change in the amount of nuclear energy uses. This will imply new role of nuclear energy sector in the energy balance of many countries. According to our estimates,

- By mid-century the total amount of operating nuclear facilities in the world should increase five times.
- The range of countries and regions practicing peaceful nuclear energy uses will significantly expand, including those nations that do not have previous experience of nuclear technology uses and, hence, do not possess specialized nuclear safety procedures and nonproliferation skills.
- Nuclear energy development will be based on the experience of the past. However, new challenges (the scale of use, the growing number of users, new areas of application) would require innovative solutions. The nuclear energy sector will witness changes – the use of FBRs that will supply fuel to the nuclear energy sector, the nuclear fuel cycle will include spent fuel reprocessing and recycling of fuel materials, i.e. it will be the closed nuclear fuel cycle. Nuclear reactors will be used not only for electrical generation at NPPs, but will get new applications, such as energy support for industrial technologies (e.g. hydrogen production). Beside high-capacity reactors connected to unified electricity grids, regional NPPs of low and medium capacity will be developed – they will supply local customers with heat and electricity.
- Mankind should agree that nuclear energy development is a vital need, but it should also demand for maintenance of nuclear, radiation and environmental safety and other nonproliferation safeguards. Hence, new approaches towards nonproliferation are prerequisites for *nuclear renaissance*. Additional measures should be taken to reduce the proliferation risks, or at least, to keep them at the current level. Such steps should be taken in all spheres – political, institutional, technological – and this may be a matter of special debate in the *Security Index* journal.

Why should Russia participate in this *renaissance*, if it has immense organic fuel reserves? The country faces serious energy problems, as its economy is booming. Most of electricity is produced in Russia by burning natural gas (over 75 percent in the fuel balance of thermal power plants). Taking into account the export significance of gas, one of the key tasks for the Russian energy sector is to ensure its diversification in the coming decades, e.g. by using coal, developing nuclear energy and hydropower plants. However, there is one particularity in this sector of economy – most of traditional sources of energy are situated behind the Urals, while most of consumers are concentrated in the European part of the country. So it is quite difficult to provide for large-scale increase in electrical generation at thermal and hydropower plants, since coal and electricity require long-distance transportation. Therefore, it is important to develop nuclear energy capabilities in the European part of Russia. Figure 2 demonstrates our estimates of electricity production and nuclear energy development until 2100 (taking into account the current update of the Strategy of Russia's Energy Development until 2030). Such long-term forecast is accounted for by the need for huge capital investments in nuclear technologies and long service life of nuclear power plants.

Even large-scale development of nuclear energy cannot solve the problem of growing demand for engine fuel and heat for industry and housing. The use of nuclear energy capabilities in the hydrogen production, in energy-consuming industries and in public utilities is also inevitable. So in the future this part of nuclear energy sector may become comparable to traditional electricity production at NPPs.

Figure 2. **Development of Electrical Generation in Russia until 2100 and the Role of Nuclear Energy Sector**



Source: The Kurchatov Institute

Successful implementation of the tasks set in Russia's nuclear energy development programs should ensure good competitive position of our technologies on the global market. A target would be to conquer 20 percent of the world nuclear market.

The roundtable participants shared their views on the development of nuclear energy sector. As expected, their positions did not always coincide. However, I assume that there is a common feature in all statements – the willingness to find the optimal scenario of nuclear energy development in the conditions of growing global energy shortage. Let us hope that the alarming notes concerning unrealistic scale of the plans and pace of nuclear energy development will disappear thanks to the decisive actions of the international community aimed at confronting the growing threat of the energy crisis.

Roland Timerbaev

THE ROLE OF THE NUCLEAR FACTOR IN THE MODERN WORLD

In its significance for mankind, the discovery of nuclear energy and its application can be compared to the industrial revolution of the late 18th – early 19th century. The atomic revolution of the 20th century plays even more critical role for the fate of humanity. Its impact on historical development depends on its final purpose – whether it is turned for the good or for the bad of our planet.

For more than 60 years now people feel the growing effect of nuclear energy discovery. Intense research activities in this area started in late 19th – early 20th century. However, the culmination point of studies that proved the possibility of practical use of atomic energy occurred in the 1930s – on the eve of World War II.

Nuclear energy can dramatically change the terms of existence of the human race. If it follows peaceful and only peaceful way, it may meet the increasing demand for energy. If it is used as a weapon, it may lead to the irrevocable result – global nuclear catastrophe that would mean the end of the modern civilization.

Nuclear science developed relatively transparently and equally in Europe, the Soviet Union, and the United States before World War II. Soviet academics worked freely in the U.K, France and Denmark; German researchers visited the U.S.S.R and other countries; Americans were welcomed in Europe. Their studies were published in academic journals which were widely disseminated in the global expert community. Adolf Hitler's reign forced many scientists from Central Europe to move to Great Britain and then to the United States. A physicist with Hungarian origin, Leo Szilard, convinced the great mind of Albert Einstein (who immigrated to the U.S.A earlier) to sign the famous letter to President Roosevelt in 1939. This document marked the decisive stage of nuclear weapons development. And the first application of nuclear energy was not its peaceful use, but the creation of an A-bomb.[1]

Due to the nuclear factor, the fundamental shift in international affairs took place – relations were spoiled for a long while (leaving though some hope for improvement). U.S. and British leaders classified all works connected with the nuclear energy uses and concealed them from their major military ally – the Soviet Union. Even after the first test in July 1945, President Truman in his conversation with Joseph Stalin in Potsdam did not mention the creation of nuclear weapons. But the Soviet leader had already got this information from his intelligence sources.

Research is an international, global process. During the difficult years of World War II Soviet scientists passed through the hardships and did not suspend nuclear studies, even though their scale was quite modest. They obtained substantial support from Western colleagues (Klaus Fuchs and others), who briefed them for free on U.S.-based activities. One may also argue that the U.S. *Manhattan Project* was aimed not only (and not so) against Hitlerism and militarist Japan, but also against the U.S.S.R. The events that followed are well-known – crazy

spiral of nuclear arms race between two superpowers, which achieved its apogee (from the point of accumulated nuclear warheads) in the late 1970s – early 1980s.

Peaceful nuclear energy uses started a decade later – in the 1950s – first in the Soviet Union, Great Britain and the United States, and then in other countries. At present, over 70 nations have energy or research nuclear reactors. After a short break caused primarily by large accidents at nuclear power plants (NPPs) in Chernobyl and the Three Mile Island, the development of nuclear energy continued at new pace. The early 21st century witnesses a real *nuclear renaissance*, mainly at the background of skyrocketing oil and gas prices and the lack of adequate replacement in the form of alternative and renewable energy sources.

However, the key problem (and can it be solved as such?) is that there is no unbreakable red line that could separate nuclear energy progress into solely military or exclusively peaceful uses. How can one rule out the possibility of nuclear energy use as a weapon?

Mankind has been trying to resolve this dilemma for decades. There are some achievements. At least, nuclear weapons were employed only once, more than 60 years ago, to bomb the Japanese cities of Hiroshima and Nagasaki and have never been used since then. Nonetheless, the *sword of Damocles* of nuclear danger still threatens the life of human beings.

During the first two decades after the invention of nuclear weapons, the states did not see as a priority the issue of prevention of proliferation. Those who had nuclear technologies initially even helped some other countries to make or upgrade their A-bombs. Washington assisted London and connived at weaponization of Israel; the Soviet Union rendered aid to China; France helped Israel and Iraq; Canada worked with India. Some states developed independent atomic projects – Sweden, Switzerland, South Africa, Brazil, South Korea, and so on.

In the mid-1960s the eventual and long-awaited drift towards rosy, but not yet final goal has begun – this was the idea of universal agreement on nuclear nonproliferation. And in 1968 the Non-Proliferation Treaty (NPT) was signed.

However, this document did not and could not by definition be the silver bullet and totally eradicate the possibility of nuclear weapons use. Despite the commitment to negotiate further steps on nuclear disarmament, the treaty provided the right to possess nuclear weapons to already existing five nuclear weapon states. Obviously, the NPT had and continues to have a positive impact on narrowing down the window of proliferation opportunities. But it proceeds from the assumption that the existence of nuclear factor in the world is inevitable.

Thanks to a number of bilateral U.S.-Soviet/Russian agreements on strategic arms reduction and limitation, the amount of nuclear weapons has decreased twice or even three times since the peak of nuclear confrontation. However, according to some experts, nuclear weapon states still possess about 20,000 warheads on active duty or in reserve. 95 percent of this amount belongs to Russia and the United States. Thus, nuclear factor is still with us and will stay longer, or maybe forever. What is its role in the world?

NUCLEAR FACTOR IN THE COLD WAR AND *COLD PEACE*

The emergence of nuclear weapons played a significant, if not decisive, role in the start of the Cold War. Its origins and progress are normally accounted for by the seizure of Eastern Europe by the Soviets after World War II, or by the circle of U.S. military bases around the U.S.S.R, or by ideological confrontation between two superpowers, or by the U.S. plans of nuclear attack against the Soviet Union and respective plans of Moscow's massive conventional intervention in Western Europe, or by some other aggressive thoughts of either party.

Most of these statements may claim to be true, but one has also to admit that the nuclear factor was an evident feature of the Cold War – from beginning to the end, if we have seen the end. One may take, for example, ideological confrontation between the two blocs before the invention of nuclear weapons. Was it as sharp and mutually hazardous in the times of the Communist International (Comintern) as it was after World War II and during the nuclear era?

One thing is clear – the development of nuclear weapons intervened in the course of global history. Even today the *cold peace* relies on nuclear deterrence, i.e. on the capabilities of mutually assured destruction. Moreover, senior military officers on both sides make occasional statements about the possibility of using nuclear weapons in critical situations, even for preemptive strikes.

According to independent experts from the Federation of American Scientists, the Natural Resource Defense Council and the Union of Concerned Scientists, the U.S. policy based on launch-on-warning principle is extremely dangerous, since

> «it also gives the United States the ability to launch its weapons quickly and without warning. Not only could this posture result in a mistaken U.S. launch, but–given the high accuracy and large number of deployed U.S. nuclear weapons–it also gives Russia an incentive to keep its forces on hair-trigger alert to protect its vulnerable nuclear missiles from a surprise U.S. attack. This, in turn, increases the very real risk of a mistaken, unauthorized, or accidental launch of Russian missiles.»[2]

As a possible example of such unpredictable circumstances, the experts refer to the 1995 incident, when the Russian early warning system registered the possible launch of a nuclear missile from a U.S. submarine in Norway and triggered the emergency nuclear decision process, involving the top leaders of the country at that time. American scientists argue that only eight minutes later the system found out the fact of false alert – this was a scientific research rocket.

To ensure safety and security of nuclear arsenals, extraordinary measures should be taken. Sometimes they are neglected due to the so called human factor. A recent example is the delivery of six cruise missiles onboard of a B-52H aircraft on August 30, 2007. By mistake the missiles were armed with nuclear warheads during the entire flight from the Minot air force base in North Dakota to Barksdale in Louisiana. The incident was the case of special investigation by the independent expert panel appointed by Pentagon's Defense Science Board. On February 13, 2008 the *Washington Post* quoted retired general Larry Welch, who headed the group of experts. At the hearings in the Senate Armed Services Committee he maintained that «the decline in focus has been more pronounced than realized, and too extreme to be acceptable.»[3]

Some more dangerous incidents were mentioned in the *Washington Post* and *Global Security Newswire* on March 25, 2008. For instance, the United States delivered some Minuteman components to Taiwan by mistake. One may assume that similar incidents may occur in other nuclear weapon states as well.

Some responsible politicians and experts urge nuclear weapon states to increase the interval between warning and making decision on the launch of ballistic missiles with nuclear warheads. This could minimize the risk of accidental or unauthorized launch.[4] Such proposals require attention and consideration, but are they realistic with the current level of trust between the states? Without sufficient or even minimal, but adequate mutual transparency such steps would only create the illusion of security against an accidental or unauthorized launch. Will the states rely on this? Hardly.

One should not ignore the fact that immense expenditure on the development and maintenance of nuclear and missile arsenals affect negatively civilian economy and welfare. During the Cold War arms race accounted for six percent of U.S. GDP, while defense expenditure of the Soviet Union amounted to 20–40 percent of economy (as some U.S. experts believe).[5] The infrastructure suffered a lot. According to the 2001 assessment of the American Society of Civil Engineers, the infrastructure got the following grades (with «A» as the highest): aviation – «D»; bridges – «C», dams – «D», roads – «D+», schools – «D-», navigable waterways – «D+», and so on.[6]

CHALLENGES TO NUCLEAR NONPROLIFERATION

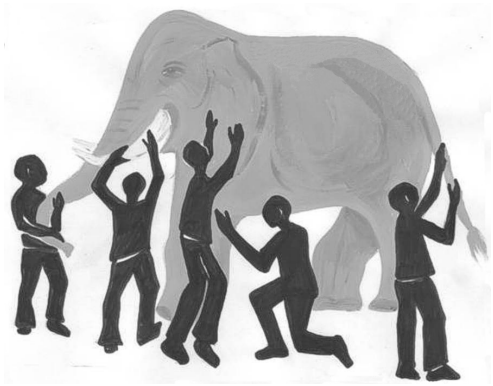
The conclusion of the NPT was possible due to the compromise between nuclear and non-nuclear weapon states. This was a deal based on the commitment of the latter not to manufacture A-bombs and the commitment of the former to follow the path of nuclear arms reduc-

tion and disarmament. Non-nuclear weapon states also got the right to peaceful nuclear energy uses. Without such agreement there would be no treaty.

What is the distinction between the military and peaceful nuclear energy uses? The treaty has no solution, since it is impossible at the current level of development of science and there are no realistic prospects in the future. At the same time, there are numerous attempts to develop and produce proliferation-resistant reactors. By the way what about the right of the states to carry out uranium enrichment and irradiated fuel reprocessing, if they are declared as designated for solely peaceful uses?

The importance of the NPT is in its ability to contain nuclear proliferation – since the signature of the agreement only a few *de facto* nuclear weapon states emerged. After all, most of them were aimed at developing nuclear weapons in the past and it was a well-known fact that accounted for their refusal to join the treaty. The problem is that nuclear technologies cannot stop progressing and nowadays there are quite a number of states – maybe 30 or 40 – which will sooner or later be able to manufacture nuclear weapons.

Figure 1. **Struggle against Proliferation**



Despite persistent efforts of the most active proponents of nuclear nonproliferation and undertakings of the International Atomic Energy Agency (IAEA), Nuclear Suppliers Group (NSG) and others to strengthen the regime, it is always under attack. It seems that the way towards complete nonproliferation is a lengthy and even endless process. Nuclear weapons become more and more attractive to some countries that are concerned about their security and feel external pressure or threats, or pretend to raise their status in the world, or have some aggressive plans. The acquisition of such weapons, if necessary technologies are available, is more than a dream – it is a reality. Moreover, some experts assume that while after the end of the Cold War nuclear confrontation became less acute (at least, declaratively) among nuclear weapon states, the interest of others towards acquisition of nuclear weapons only increased.[7]

Another matter that is topical in the 21st century is the possibility of unauthorized seizure of nuclear materials or even some components of nuclear weapons by terrorists. If they succeed, can they make a bomb? It is difficult to answer, but it is clear that they can use radioactive materials for their malignant purposes. By the way, many countries in the world possess nuclear materials. For instance, highly enriched uranium (HEU) is used in over 140 research reactors all over the world, and some of them do not have appropriate protection. Efforts are taken to enhance their security and have low-enriched uranium (LEU) as a fuel, but this process will take time and is quite expensive.

There is another risk – the so called *black market* of nuclear materials and technologies. The UN Security Council takes steps to curtail such illicit trafficking, but such threat cannot be eradicated totally – the demand is growing and such trade is extremely profitable.

So, despite the measures to prevent the proliferation of nuclear weapons, new challenges will continue to confront the nonproliferation regime. One should not forget that nuclear nonprolif-

eration can only be effective if it is perfect, not subject to political intrigues, loopholes and softening for the sake of *double standards* and daily interests of some actors.

CIVILIAN NUCLEAR ENERGY SECTOR

In the last 50 years nuclear energy sector has achieved substantial results and contributes a lot to providing adequate supply of energy in the circumstances of permanently increasing demand. Nuclear sector accounts for 15–16 percent of global electrical generation,[8] and in some developed countries (France, Japan, and some others) this percentage is much higher. After a short pause in the development of nuclear energy sector, a number of states, especially in Asia, expand the construction of new nuclear power plants. Russia, the United States, India, Pakistan, Japan, South Korea, Canada and some other nations have announced such plans. Many European countries concerned about environmental protection and radioactive pollution take wait-and-see or negative stance on the matter.

Existing NPP construction plans are based on the past generations of reactors, which cannot ensure 100 percent operational safety and are not fully proliferation-persistent. The attempts to set up multilateral nuclear fuel cycle centers under the IAEA supervision, in order to curb the proliferation, are not fruitful either, except the Russia-based International Uranium Enrichment Center in Angarsk, which is under construction.

The work is under way to develop innovative nuclear technologies. This is a project proposed by Russia *(INPRO*) under the IAEA auspices; *Generation IV* international initiative; and Global Nuclear Energy Partnership (GNEP) sponsored by the United States. However, it is too early to speak about realistic outcome of all these projects and their prospects.

Nuclear energy development is a source of many other problems. Many reactors were decommissioned in the world after their service lives had expired. As of 2006, nine power plants around the world had been completely decommissioned, with their sites released for unconditional use. 17 plants have been partially dismantled and safely enclosed, 30 are being dismantled prior to eventual site release and 30 are undergoing minimum dismantling prior to long-term enclosure.[9]

Nonetheless, according to the IAEA, about three quarters of existing reactors are 20 or more years old. Their service lives are extended for certain periods by respective national bodies, but in the next two decades the problems of decommissioning will only aggravate.

The work is done to minimize the use of HEU in civilian sector, to ensure conversion of research reactors to LEU and return HEU in the states of origin. There are some modest results in this area. At the same time, the international conference in Oslo in 2006 raised concerns about the strategy of minimization of HEU use in reactors – it should not limit the number of countries that obtain significant research results and, hence, provide commercial preferences.

The use of thermonuclear fusion declared half a century ago as the final solution to energy demands of mankind is only a project at its initial stage. And it will take decades to make this dream come true. Meanwhile, human demand for energy will demonstrate nonstop growth.

SPENT NUCLEAR FUEL AND WASTE MANAGEMENT

Spent nuclear fuel management is one of important factors affecting the future of nuclear energy sector. According to the IAEA estimates, the amount of spent nuclear fuel generated annually is about 10,500 tons of heavy metal. One third of this amount is reprocessed with uranium and plutonium contained in the fuel being recycled. Two thirds are kept in safe interim storage awaiting a decision on its future management.

As for the future, the IAEA believes that there will always be «a need for the deep geological disposal of high level waste, long lived waste or the spent fuel itself.»[10] While most experts agree that technical solutions exist for safe permanent disposal, progress in demonstrating these

solutions has not been rapid – there is no operational deep geological disposal facility yet. The United States announced in 1999 the establishment of such pilot plant in the Yucca Mountains, but radioactive waste has not yet been deposited there for many reasons – political, environmental, and financial.[11]

In case of true *nuclear renaissance*, the issue of radioactive waste management will inevitably become a serious environmental task of global scale.

While such negative implications of pre-nuclear age as global warming can be somehow regulated and some activities are under way, the use of atomic energy adds new much more complicated problems – both of military and civilian nature. These challenges occurred a few decades ago in the course of nuclear revolution, so will mankind find the way and capabilities to protect itself from hazardous effects of nuclear factor mismanagement?

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Nowadays one should evidently strive for limitation and reduction of nuclear weapons, i.e. move towards the world free of nuclear weapons and strengthen the international nonproliferation regime. It is important to be able to set the goal of complete nuclear disarmament and seek the ways to accomplish this mission. It is important to have the clear vision for the future, even distant future. But at the same time, it is advisable to determine a realistic short-term strategy.

One has to admit that this is a challenging task, since the world has entered the era of unpredictability and uncertainty. On the one hand, some nations assume that they can neglect the others and have a license to do anything they want. On the other hand, new centers of power emerge and their behavior in the future can hardly be foreseen. Hence, some nuclear weapon states do not rush to take new arms reduction commitments supported with appropriate transparency measures and monitoring. Others even try to build up their allegedly limited nuclear arsenals.

Nonetheless, it is necessary to start – it's a must. The practice of bilateral U.S.-Soviet/Russian agreements on arms limitation and reduction still has some potential, taking into account the nuclear superiority; but other states should also be involved in this process.

George Shultz, William Perry, Henry Kissinger and Sam Nunn in their article published in the *Wall Street Journal* on January 15, 2008 urge the international community to drift towards nuclear-weapon-free world through «an agreement to undertake further substantial reductions in U.S. and Russian nuclear forces beyond those recorded in the U.S.-Russia Strategic Offensive Reductions Treaty. As the reductions proceed, other nuclear nations would become involved.»[12] The Russian side – Foreign Minister Sergey Lavrov – gave positive response to this and other proposals which complied with the Russian initiatives.[13]

How to implement this program? Perhaps, the Russian and the U.S. leader (after the presidential elections in November) should discuss the specific ideas at the bilateral level and then invite heads of all nuclear weapon states to join them at the negotiation table for informal debate and seek some common solutions. Even if this approach is not successful, it will at least give a moral and political impetus to self-restraint and further agreements in nuclear sphere.

The issue of nuclear nonproliferation has recently got a new aspect. The pace of nuclear energy development slows down in the West and moves to the East – to Asia and then to Latin America. Nearly daily or weekly this or that Middle East or Asian nation declares the plans of nuclear energy facilities development. Hence, the nonproliferation challenges and concerns also migrate in these regions. The IAEA does its best to ensure that nuclear materials are not switched from peaceful to military uses.

But certainly this is not enough. There is a need to develop meaningful and comprehensive strategy aimed at achieving exclusively peaceful nuclear energy uses under tight control. We are doomed to coexist with peaceful nuclear energy – without it, increasing energy demands of human race cannot be met.

Notes

[1] Leo Szilard was the first to realize the consequences of atomic energy discovery. Together with Enrico Fermi he created the first reactor in 1942 and remembered his words on that day: «This day will go down in history as a black mark against mankind.» See William Lanouette, *Genius in the Shadows. A Biography of Leo Szilard, the Man behind the Bomb* (Chicago: University of Chicago Press, 1994), p. 245.

[2] *Toward New Security*, Federation of American Scientists, Natural Resources Defense Council, Union of Concerned Scientists, February 2008. Among the authors are Bruce Blair, Robert Norris, Hans Kristensen, Frank von Hippel, Thomas Cochran, and Richard Garwin.

[3] Walter Pincus, «Panel Cites Drop in U.S. Attention to Nuclear Arsenal,» *Washington Post*, February 13, 2008, http://www.washingtonpost.com/wp-dyn/content/article/2008/02/12/AR2008021202498.html (last accessed on March 7, 2008).

[4] This idea is contained in the famous article by leading U.S. politicians. See George Shultz, William Perry, Henry Kissinger, and Sam Nunn, «Toward a Nuclear-Free World,» *The Wall Street Journal*, January 15, 2008.

[5] Richard Rhodes, *Arsenals of Folly. The Making of the Nuclear Arms Race* (NY: Alfred A. Knopf, 2007), pp. 197, 205.

[6] Ibid, p. 307. The author has no data on the state of Russian infrastructure, but assumes that situation is not better, but worse here.

[7] Such opinion is supported by famous nuclear expert Therese Delpech, director of strategic affairs at the French Atomic Energy Commission. See Therese Delpech, *Savage Century. Back to Barbarism* (Washington, DC: Carnegie Endowment for International Peace, 2007), p. 89.

[8] According to some experts, e.g. Pierre Goldschmidt, ex-Deputy Director General of the IAEA, the percentage will stay at this level until 2030, since it will take a long time to develop new generation of reactors, while the old ones will be decommissioned step by step. See Pierre Goldschmidt, Lecture at the 24th Conference of the Nuclear Societies, Israel, February 19–21, 2008, *Carnegie Nonproliferation News*, February 21, 2008. For the same reason nuclear energy will not help to solve the problem of global warming. Experts believe that this would require tripling of NPP capacity and annual commissioning of 25 reactors until 2050 – this sounds unrealistic with the current level of human capabilities. See Testimony by Carnegie Senior Associate Sharon Squassoni before the US House of Representatives Select Committee on Energy Independence and Global Warming on March 12, 2008, http://www.carnegieendowment.org (last accessed on March 15, 2008).

[9] IAEA Annual Report 2006, GC (51)/5, p. 4.

[10] Ibid., p. 3.

[11] According to Frank von Hippel, there is a dark cloud over U.S. *nuclear renaissance* plans, since the storage facility may become operational no sooner than 2017, while the storage facilities functioning at the NPPs have very little room for waste left. See *Scientific American*, April 2008.

[12] George Shultz, William Perry,...

[13] Statement by Foreign Minister Sergey Lavrov at the Conference on Disarmament in Geneva on February 12, 2008.

CENTRE RUSSE D'ETUDES POLITIQUES, GENEVE

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Vladimir Orlov,
President, Centre russe d'études politiques

The goal of *Centre russe d'études politiques* (CREP) is the strengthening of international peace through reenergizing dialogue on international security issues between Russia and Europe, as well as Russia and Switzerland. This dialogue should involve international experts, government representatives, political scientists, university students, business executives, and media representatives.

Key areas of research include the transformation of the international security architecture; analysis of responses to new security threats and challenges; energy security; and nonproliferation of weapons of mass destruction.

CREP is a nongovernmental, nonprofit organization incorporated in the form of an Association, with a few dozen members from Russia, Switzerland, the United States, the United Kingdom, Germany, France, and Kazakhstan, among others. PIR Center has become new center's key Russian partner, and CREP, for its part, represents the PIR Center in Switzerland and Europe.

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(available in English, French, German, Italian, Russian)
For more information, please, contact info@crep.ch

Nikolay Ponomarev-Stepnoi, Vladimir Sukhoruchkin

NUCLEAR RENAISSANCE AND NONPROLIFERATION

The expected *renaissance* of nuclear energy sector gives a new impetus to discussions about new approaches towards nonproliferation. The analysis of economic aspects of global energy development indicates the trends and challenges for nuclear energy sector and implies that this industry has a good growth potential if safety and security (nuclear, radiation, environmental, proliferation risks) are ensured and sufficient fuel resources are available. Such turn of events is caused by increasing tensions at the fuel markets and the need to enhance energy security of Russia and the world.

To cut off the shortage of energy on the planet, there is a need for dramatic expansion of nuclear energy uses. According to our estimates, by mid-century the total capacity of nuclear facilities may increase five times. All this may result in accessibility of nuclear materials and higher risks of nuclear technology proliferation leading to the acquisition of nuclear weapons. To prevent such developments, mankind should start thinking anew and devise additional measures, at least, to keep the risks at the current level. Such measures should be taken in all spheres – political, institutional, and technological.

POLITICS MATTERS

Political sphere is apparently the most unpredictable from the point of potential changes and optimal solutions. It is clear that at the current stage neither institutional nor technological measures (except military ones) undertaken at the international level can prevent the creation of a nuclear weapon by a more or less developed nation, if the latter has taken the political decision to do so. Even the absence of nuclear energy capacity in such state can hardly save us from the risk of nuclear proliferation. At present, one may only claim that the eradication of political motivation of some countries to possess nuclear weapons is the effective way to prevent horizontal proliferation, i.e. to limit the number of nuclear weapon states.

One of the factors facilitating the common solution would be to expand as much as possible the engagement of nations in implementation of institutional and technological measures within the framework of the nonproliferation regime.

Under the current circumstances, the matter of particular concern related to the nuclear material and technology expansion is the nuclear component of international and sub-national terrorism.

There are two cases here – a terrorist organization may be supported by some state or may act independently of all states and in secret. The first option implies that similar steps (prevention of inter-state horizontal proliferation) should be taken to curb such efforts. The second option allows us to use effectively institutional and technological means.

As far as the threat of nuclear terrorism is concerned, one has to bear in mind an obvious thing. It would be enough for the terrorists to create one or a few simplest A-bombs, in order to achieve their goals. In case of a state, one may speak about the development of an arsenal of advanced nuclear explosive devices and delivery systems. The efforts of terrorist groups may also be aimed at making a so called dirty bomb or at destroying a hazardous radioactive facility with the help of conventional weapons and, hence, provide for contamination of the area.

It would be advisable to conduct permanent studies of the existing nonproliferation challenges, as well as potential risks that may emerge in the course of large-scale and rapid nuclear energy development. Such approach would enable the international community to take adequate, non-chaotic measures and not to lag behind the security threats. This research should be based on systemic analysis of nuclear energy development and unbiased assessment of factors that exacerbate proliferation risks.

The list of such factors include growing nuclear energy capacity; increasing number of states using nuclear energy; increasing number of nuclear power plants (NPPs), including regional low-capacity ones; increasing number and types of fuel cycle facilities; growing turnover and amount of transferred nuclear materials; variety of nuclear reactors, including fast breeder reactors (FBRs); expanding area of technological application of nuclear reactors; introduction of reprocessing and recycling of nuclear fuel in the nuclear fuel cycle; and increasing amount of radioactive waste.

Such systemic analysis should underpin recommendations on specific measures to tighten nonproliferation regime. Obviously, the recommendations will be the result of a compromise, but they may identify the promising concepts of nuclear energy development that will be less proliferation-sensitive. By the way, to find the right balance between energy security and nonproliferation, the international community requires a set of comparable quantitative criteria that will facilitate the decisionmaking process. At present, mostly qualitative criteria formulated 40 years ago are employed, but remember that they are based on the outdated levels of nuclear technologies, their costs and accessibility, let alone the bias caused by the bipolar system of international affairs that existed then.

Nuclear technology development has made them more affordable – from the point of price and from the point of decreasing secrecy. The emergence of some technologies, such as centrifuges for uranium enrichment, has had revolutionary impact on the balance of proliferation risks. Therefore, relative degree of proliferation risk of various nuclear technologies and even types of nuclear materials should be monitored and re-estimated on permanent basis by international experts, while their recommendations on counter-proliferation should be regularly updated.

One should strive for establishing the methodology of quantitative risk assessment using the system of terms similar to those formulated in the 1970–1980s with respect to nuclear and radiation safety of nuclear plants. In fact, the latter is an efficient tool of comparative evaluation and selection of power plants in accordance with their safety parameters.

Nonetheless, nonproliferation risk assessment is impeded with the political component, which makes them subject to speculations or hostage of political decisions of the past (taken in a different situation and at a different level of nuclear technology development).

QUANTITATIVE ANALYSIS: WAYS AND MEANS

Some time ago we suggested a method of quantitative risk assessment based on statistical data processing based on opinions of the expert community. Such method enabled us to evaluate the risks of secret nuclear weapon production in case of unauthorized diversion of different types of nuclear materials and to identify the weak points of the existing nonproliferation regime.

It would be reasonable to implement a similar project and work out the methodology of risk assessment for the proliferation of nuclear materials and technologies in the conditions of

expanding geography, application areas and variety of customers, as well as emerging innovative reactor and fuel cycle technologies.

The final product would be a realistic tool required to prepare institutional decisions aimed at tightening nonproliferation and to evaluate innovative projects of nuclear reactors and fuel cycles that may be proliferation-prone. Some recommendations can already be made even with the current level of knowledge:

- preventing the availability, production and consumption of low-enriched uranium (LEU), e.g. through shift to nuclear energy of high temperatures with higher efficiency of the NPP heat cycle;
- reprocessing of irradiated reactor fuel, so that mixed uranium-plutonium fuel may be manufactured and used;
- using thorium as a basic nuclear material that does not create direct proliferation risks;
- giving nuclear fuel some self-protection characteristics by integrating into it the fragments of fission.

Besides, such methodology of risk assessment may facilitate certain activities within the framework of large-scale nuclear energy development:

- development of the concept of international nuclear fuel cycle centers, which will reduce the proliferation risks by carrying out the most proliferation-sensitive fuel cycle operations under international control, i.e. uranium enrichment, LEU bank, fuel production and shipment, spent nuclear fuel storage and reprocessing, fuel recycling;
- future establishment of nuclear energy technological centers for fuel regeneration, burning of actinides and, perhaps, production of hydrogen with the help of nuclear reactors and its supplies to the states that are not ready for nuclear energy uses;
- leasing of nuclear fuel and nuclear power plants;
- introduction of innovative control and regulation mechanisms and monitoring techniques for nuclear materials, reactors and nuclear fuel cycle technologies;
- modernization of the international practice of regulation and control with the help of global distant monitoring of nuclear materials at all stages of declared nuclear activities;
- elaboration of scientific grounds for reducing the amount and curbing the circulation of hazardous nuclear materials at all stages of nuclear fuel cycle and reducing the amount of fissile materials in storage facilities separated or in bound state;
- categorization of nuclear materials and fuel cycle technologies from the point of their attractiveness;
- supervision of technologies that are proliferation-prone;
- assessment of the dirty bomb risks and regulations for the management of radioactive fission products and actinides;
- rules of supplying nuclear facilities with nonproliferation systems (physical protection, control and accounting, etc.) in-built in the design at the stage of project development;
- control of proliferation of knowledge in the area of nuclear technologies and other sensitive information;
- nuclear export control analysis based on quantitative assessment of proliferation risks;
- elaboration of the concept of unified nonproliferation regime based on the IAEA safeguards and multilateral approaches towards nuclear fuel cycle management.

Along with the development of nuclear technologies (that actually impedes nonproliferation activities), there emerge new methods of control over nuclear power plants and nuclear materials uses. Among them is the computer and TV distant monitoring, which enhances the efficiency of control and cuts down the costs. Various monitoring systems have already been tested in the field (e.g. in the course of the U.S.-Russian experiment involving the Kurchatov Institute).

Such global distant monitoring of nuclear materials should be integrated in the practice of international control and regulations. The mandatory use of such tools to monitor the amount and transfers of fissile and radioactive materials at all stages of fuel cycle may prevent the production and unauthorized use of nuclear materials, or their theft in the process of shipment.

As far as innovative reactor designs and nuclear fuel cycle technologies are concerned, the following primary tasks may be set forth:

- analysis of the structure and elements of nuclear energy and fuel cycle from the point of proliferation risks – ratio of fast breeder and slow reactors, closed fuel cycle with reprocessing, separation and recycling of actinides and fission products;
- expert assessment of proliferation risks related to the implementation of innovative projects and introduction of non-traditional nuclear energy technologies; requirements for innovative nuclear technologies, closed nuclear fuel cycle (reprocessing, separation, recycling, management and isolation of radioactive waste), nuclear plants for decentralized users;
- elaboration of ways to minimize the equilibrium amounts of radionuclides and amount of radioactive waste;
- analysis of the proliferation risks related to storage of spent nuclear fuel, management of radioactive fission products and actinides, disposal of radioactive waste;
- conditions and requirements for final isolation of radioactive waste;
- development of technologies and designs that would provide for inherent protection of hazardous nuclear materials, e.g. production of fuel with the lowered proliferation risks;
- computer system of control and accounting of nuclear materials based on their monitoring and detection.

Appropriate research in these areas aimed at reducing the proliferation risks is an essential component for the promotion of secure large-scale nuclear energy development along with the nuclear and radiation safety measures.

Vladimir Orlov

WARM-UP IN GENEVA

The battles in the conference hall in Palais des Nations in Geneva can be best seen from *strategic heights*. So during the recent session of the Preparatory Committee for the 2010 NPT Review Conference[1] – better known in professional slang as PrepCom – the PIR Center delegation made free with the protocol and occupied one of such *royal seats* normally designated for the delegation of the Kingdom of Tonga.

THE SHOW STARTS

Obviously we realized that this monarchy in the South Pacific was not strongly connected with Russia. Perhaps, the only thing in common was the hobby of the late king who collected *balalaikas*... However, Tonga – being a fully-fledged and distinguished state party to the NPT since 1971 – this time skipped the PrepCom session in Geneva, unlike other 106 member states. It's common knowledge that nature abhors the vacuum and we could not leave such holy place empty. So the Tonga seats were occupied *ad interim*, for nine days in spring, as we expected no significant voting dilemmas during the session.

Our *throne* provides the best view of the conference hall. It is an easy guess to say which delegation is the most numerous – in the era of Russian foreign policy offensive at all fronts, including nonproliferation, the representation of Moscow seems unprecedented. By the way, the huge delegation from Russia demonstrated perfect discipline – despite all Swiss temptations right behind the gates of Palais des Nations, Russian envoys concentrated their will and stoically stayed over most of the daily PrepCom discussions. The list of absentees was as short as never before.

A few springs of the PrepCom life make bubbles in the conference hall. Here is the European Union, this time acting via Slovenia – after all, it is so difficult for 27 states to agree on a consolidated position (and they do not always succeed in this). There is the Iranian delegation headed by laconic Ambassador Ali Reza Moaiyeri from Geneva and his hyperactive deputy Ambassador Soltanieh from Vienna who is always in contact with diplomats from other countries. Here stands Dr. Christopher Ford who leads the U.S. delegation and is willing to compete in oratory with Soltanieh. There sits Ambassador Anatoly Antonov, one of a few heads of delegations at the PrepCom with the excellent institutional memory. He knows about the NPT much more than others and his passionate attitude to the treaty surprises many – so without any significant effort he becomes a center of gravity at the session.

Suddenly I see a crowd near the Kyrgyz delegation. What is going on? Well, at least, one face there does not look Kyrgyz at all – sorry for such a bold statement, but this is true. A novice would be astonished, but veterans of the NPT debates know this long-time ally of Kyrgyzstan. Of course, it is Professor William Potter from Monterey. His official status here is modest – an advisor to the Kyrgyz delegation at the NPT-related sessions for the last 15 years and one of

the founding fathers of the nuclear-weapon-free zone in Central Asia (established in 2006 by the Treaty of Semipalatinsk). His informal influence is much higher – Prof. Potter is a doyen of the nuclear nonproliferation corps. How many of his ex-employees and former students are there in the conference hall? In which delegations are they? I start with the assistant to the chairman... and after a while lose count. Bill Potter is always in the hall and he constantly meets quiet visitors from nearly all delegations. How many lines in the official documents of dozens of NPT states parties are written upon his advice? How many paragraphs have been edited by him? How many ideas that are freely voiced today are the results of scrupulous brainstorming and simulations in his class in Monterey?

Meanwhile, another center of attraction emerges – Dr. Rebecca Johnson. Unlike Bill Potter, she is not affiliated with any delegation – just a free backbencher of the NPT debate. But this nice modest lady is an idol of many delegations, especially not very large one. Who else, except Rebecca, is able to stay *imprisoned* in the conference hall for nine days and do it with pleasure? She keeps the track of every statement, summarizes them and sends out by email to her extensive dissemination list. In fact, her NPT diaries have been regularly published since 1995, when she was not a Dr., but more a disarmament grassroots activist. If your delegation comprises one or two diplomats only, you will worship Rebecca and her works. You go for a cup of coffee or two, you skip the sessions to sip some fresh air of the Geneva Lake, and eventually you become addicted to Ms. Johnson's *magnum opus*. One can hardly imagine the exact number of diplomatic telegrams from New York, Vienna or Geneva that have been made as a copy-paste of Rebecca's minutes. And one can be hundred percent sure of Rebecca's accuracy – the copy-paste will contain only exact information and quotes. So in many world capitals there must be an entirely new generation of diplomats who (even unexpectedly for themselves) see the issues of nuclear nonproliferation through the eyes of Rebecca Johnson.

Thus, the stage is full of actors. Now let us look at the presidium.

EVER-LIVING PATIENT

I am not strong in math, and not all the delegations were as disciplined and reluctant to Swiss temptations as the Russians. However, I would note the strong representation of France, Japan, and Ukraine at this PrepCom session. The Ukrainian delegation was so numerous, since this time the PrepCom was chaired by Vladimir Yelchenko, ambassador to the international organizations in Vienna. During the session this energetic and at the same time balanced and reasonable Ukrainian diplomat caused sympathy of the majority of delegates. «Sometimes some of you tried to make me angry, but it is almost impossible to make me angry,» he said at the end of the session. On his left is High Representative for Disarmament, UN Under-Secretary General Sergio Duarte. On the right hand side is Tariq Rauf from the IAEA, who is a close associate of IAEA Director General Mohamed ElBaradei.

Bulky and solemn presidium reminds of the Politburo at the Lenin Mausoleum in Moscow. At the 1995 NPT Review Conference one of my friends called the treaty «patient in the intensive care department», while all other participants at that time were speaking about ever-living NPT. So this time I remembered the Lenin mummy and asked this colleague of mine, «How is our ever-living patient?» We both agreed that the NPT was certainly embalmed and stuffed, but looked more alive than dead.

And the course of the PrepCom proved that we were more right than wrong.

At least, the session demonstrated some action, scenarios, bright statements, and lots of substance. Specific discussion in Geneva went on in sharp contrast with the last year session in Vienna. At that time the PrepCom fell the hostage of the Iranian delegation for one week, and the envoys of Tehran were using endless procedural matters to compensate for the defeat in the form of UN Security Council sanctions that were inevitable. Nonetheless, well-respected Yukiya Amano, who chaired the PrepCom in Vienna, managed to launch the substantive discussion and succeeded in creating the working paper by the chair, in which he summarized the course of the discussion.

In Geneva the procedural issues were quietly and without any pressure on Iranians moved into a separate cluster and it was approved smoothly in the course of voting masterminded by Vladimir Yelchenko. For instance, it was decided to hold the next PrepCom session in New York on May 4–15, 2009, while the NPT Review Conference will be summoned in New York on April 26-May 21, 2010. The coming PrepCom will be chaired by a diplomat from Zimbabwe (I assume that U.S. and U.K. officials could highly praise the UN rotation principles at that moment). And the candidacy for the strategically important post of the President of the 8th NPT Review Conference will be nominated by the UN Secretary General. I guess this will be a candidate from the Asia Pacific region, even though there are no evident nominees yet. There is no doubt that the President of the NPT Review Conference is a non-technical figure – he is a politician. The best example was Jayantha Dhanapala from Sri Lanka, whose art of diplomacy ensured indefinite extension of the NPT in 1995 without voting, i.e. without heated argument and dividing lines. And what was no less important – his efforts resulted in the approval of the package agreement on the principles and objectives for nuclear nonproliferation and disarmament, which is still topical today.

Hence, when it came to substance, it was clear that the major debate at the PrepCom session was focused on three general pillars and four specific matters.

Three pillars are the same that underpin the architecture of the international nuclear nonproliferation regime, i.e. disarmament, nonproliferation and peaceful nuclear energy uses. Four specific issues originated from these areas and were as follows.

First of all, what is the actual pace of nuclear disarmament and how is the unequivocal commitment of the nuclear weapon states (as it is stated in the 2000 Final Document) to eliminate their nuclear arsenals implemented? (Article VI of the NPT).

Secondly, what is the situation with non-compliance, above all on the part of Iran and Syria? (Articles II and III of the NPT).

Thirdly, what are the limits for the sovereign right of the state to peaceful nuclear energy application, especially bearing in mind the more and more obvious *nuclear renaissance* that proselytizes so many *beginners*? (Article IV of the NPT).

And *finally*, what should be done against the states that may resort to the right of withdrawal from the treaty? (Article X.1 of the NPT).

NUCLEAR FIVE **AGAINST ALL**

As usual at such conferences, the delegations of the *nuclear five* had to report on their measures to carry out the Article VI commitments.

One of the first to speak was Anatoly Antonov. He reminded that, «As of January 1, 2008 the Russian Federation possessed not more than 900 deployed strategic offensive delivery vehicles and 4,200 warheads assigned to them in accordance with the START Treaty. We keep fulfilling obligations under the Russia-U.S. Treaty on Strategic Offensive Reductions which cuts the number of strategic nuclear weapons down to 1,700–2,000 by each side before December 31, 2012.»[2]

The head of the Russian delegation also believed that it was necessary to «make the process of strategic offensive arms reduction and limitation predictable, transparent, irreversible and accountable. In this context it is essential that in the U.S.-Russia Strategic Framework Declaration issued in Sochi on April 6, 2008 Presidents Vladimir Putin and George Bush expressed their intention to develop a legally-binding arrangement following expiration of the START Treaty as a next step to implement the obligations of the two countries under Article VI of the NPT.»[3]

It is noteworthy that Ambassador Antonov emphasized the importance of the Russian initiative on concentrating nuclear weapons within the national territories of the nuclear weapon states, «Implementing it would enable us to expand to the utmost the territories completely free from nuclear weapons.»[4]

My conversations with the European diplomats indicated, however, that the initiative had already been forgotten and unfortunately, Moscow did not do much to promote and explain it to the partners. For instance, a German official clearly stated his attitude to the Russian proposal – he was happy that Moscow had undertaken such voluntary commitment but he did not understand (or pretended that he did not understand) that it was more the appeal to curb the proliferation of U.S. sub-strategic nuclear weapons deployed around the world, including Germany.

Meanwhile, the working paper by the chair[5] urges the states parties to reconsider the role of nuclear weapons in strategic planning after the end of the Cold War and mentions the 2009 NATO summit that could become a good platform for such review.[6] Moreover, the document appeals to the non-nuclear weapon states that belong to regional alliances with the *nuclear five* to report on their efforts aimed at reducing the dependence on nuclear weapons in the collective security arrangements.[7] Finally, the value of the Russian initiative is pointed out in paragraph 24.[8] At the same time, it recommends (strangely to the Russian ear) to provide legally binding character to the 1991–1992 U.S.-Russian unilateral commitments on tactical nuclear weapons.[9] This idea has been long promoted by such experts, as William Potter, and in recent years has got certain support among the non-nuclear weapon states.

In general, 22 out 63 paragraphs in the working paper (i.e. more than one third) are devoted to nuclear disarmament and this reflects the ratio of these issues in the PrepCom debate.

I am not planning to give comprehensive coverage of all matters in this area discussed at the PrepCom, but let me stress a few moments that may be further elaborated at the 2009 PrepCom session.

First of all, in the corridors of the PrepCom (and to a less extent at the stage) there was a heated debate on the *Hoover Four* proposals, i.e. the program articles by Sam Nunn, Henry Kissinger, George Shultz, and William Perry published in the *Wall Street Journal* in January 2007 and 2008.[10] Their vision implies slow drift towards *nuclear zero,* the world free of nuclear weapons, and the United States should allegedly play the leading role in this process. The working paper by the chair refers to this initiative, albeit indirectly, in paragraph 2 and then mentions it in paragraph 28, where the proposal of the U.S. patriarchs is interrelated with 10 recommendations on disarmament elaborated at the international conference in Oslo in February 2008.[11]

Let us remember that two months before the PrepCom Russian Foreign Minister Sergey Lavrov gave a positive assessment of this initiative in his statement at the Conference on Disarmament in Geneva. At the same time, the Russian agencies cannot agree upon the motivation underlying the proposals of the *Hoover Four*. Without predicting the result of such domestic discussions, let us hope that they would eventually take the form of public debate and, hence, involve the expert community and NGOs. The role of nuclear weapons in Russia in the 21st century is an extremely significant issue and it should take an appropriate place in the agenda of current discussions concerning the future of Russia – be it Russia-2020 or Russia-2050.

Another priority is the entry into force of the Comprehensive Test-Ban Treaty (CTBT). Some participants of the PrepCom welcomed the accession of such nations, as Colombia, the Bahamas, Malaysia and Palau, but pointed out that the stride forward would be ratification as soon as possible of the CTBT by those nine states, without decision of which the agreement would not enter into force and which still refrained from joining the treaty.

The deployment of missile defense systems was at the periphery of discussions. Russia obviously could not help tackling this issue, «Hasty deployment of the Global Ant-Ballistic Missile Defense without due consideration of other States' security interests may provoke them into building up their own missile armaments and thus propel their spread throughout the world, as well as affect the process of nuclear disarmament in general.»[12]

It is noteworthy that the working paper by the chair goes even further and complements the Russian statement with the phrase about «abrogation of the ABM Treaty.»[13] The language used at the 2000 NPT Review Conference (but forgotten since then) irritated the head of the U.S. delegation, who addressed Vladimir Yelchenko with the comment that Washington legally with-

drew from the ABM Treaty and did not undermine at. However, such battles around wording left indifferent most of the delegates and even the Russian officials were not willing too much to revive the argument on the ABM Treaty, as it was buried long ago.

Particular attention of the PrepCom participants was paid to the negative security assurances. In fact, the Ukrainian chairmanship contributed a lot to this discussion. For instance, Ukraine set forth the following proposal – the 2010 NPT Review Conference should insist on holding the international conference on security assurances under the UN auspices.[14]

While many have already forgotten the provisions of the Trilateral Statement made by the Presidents of Russia, Ukraine and the United States on January 14, 2004, which made the basis of the current Ukrainian non-nuclear status, Kyiv is still very much concerned about this document. It is a short paper – two pages of the main text and a one-page addendum. However, it has enough space to state that in exchange for Ukrainian's refusal to seek, possess and control nuclear weapons, Russia provides extensive security assurances to its neighbor. For instance, Russia reaffirms that «border changes can be made only by peaceful and consensual means,» that it will «refrain from the threat or use of force against the territorial integrity or political independence of any state», and «refrain from economic coercion.»[15]

In the process of reading the Trilateral Statement today, one can only wonder what a fragile basis exists for the Ukrainian non-nuclear-weapon status. Let me remind the readers that the guarantors of the Trilateral Statement, beside Russia, are two other NPT depositaries – the United States and the U.K.

A great success of the recent PrepCom was the joint statement by the *nuclear five* – for the first time in the last eight years.

The document was prepared in painful discussions. The work was launched by the Russian delegation and every day it met additional impediments – other members of the *nuclear club*, especially the United States, could not agree with this or that paragraph. Due to American objections, the parties had to cast away the initial wording on the CTBT and confined to the promise to maintain the moratorium on nuclear tests. However, this two-page document with all the reservations is an important sign – its emergence was noted by experienced diplomats from different nations (from New Zealand to Egypt), who praised most of its wording in this or that form. Some officials in the lobby asked astonishingly how the Americans could agree to sign such a joint statement, as it contained the following phrase: «We wish to address the proliferation challenges through Treaty-based multilateralism»;[16] or with respect to the Middle East, the document restated support to the 1995 NPT resolution on the region.[17]

Of course, a micro-scandal could not be avoided. The *nuclear five* statement argued that «the proliferation risks presented by the Iranian nuclear program continue to be a matter of ongoing serious concern to us.»[18] At the same time, a few days before senior diplomats from the United States, Great Britain, France, Russia, China and Germany had met in London to discuss the Iranian issue. After the meeting the British Secretary of State for Foreign and Commonwealth Affairs spoke about the Iranian «threat».

In the course of the PrepCom Russia reacted to this political statements arguing that the Foreign Secretary did not reflect the position of the *Iran Six* and was only entitled to make technical comments. And long linguistic (and political) battles started in the corridors of the PrepCom, as everyone was trying to defend his understanding of *threats, risks* and *challenges*.

PARALLEL WORLDS OF NONPROLIFERATION

And here comes one of the key controversial issues of the PrepCom in Geneva, which is typical of many NPT-related events. What to do with the breach of commitments under the NPT? How to identify and fix such violations?

The Iranian issue was deliberately disguised at the 1995 NPT Review Conference. The Clinton administration then was pursuing arms-twisting policy with respect to Russia, and Moscow was doing the same with respect to Iran, as the Kremlin was thinking more about indefinite exten-

sion of the treaty than of filling the Iranian nuclear program with substance. However, the issue of Iran did not disappear, on the contrary, it pops up every time – at the review conferences, at the PrepComs. It was Iran and the United States (along with Egypt) that torpedoed the 2005 Review Conference. Since then the UN Security Council have been approving one anti-Iranian resolution after another. The United States is happy that such documents are signed by Russia and China. However, nothing really changes – Iran continues to follow its credo, and the number of centrifuges and their quality are growing.

NPT delegates have got accustomed to the U.S.-Iranian stand-up fight; it is regarded as some sort of ritual already. Such clashes make the discussions at the NPT-related events livelier; they cheer up like good espresso in the Palais de Nations cafeteria, especially after a lullaby of thirty or forty official statements read by the delegations of countries that are not apparently the major nonproliferation actors.

This time Iranians woke up the conference hall again. Their offensive tactics brilliantly trained during the 2005 NPT Review Conference was used on the very first day of the PrepCom when they attacked quite pale official statement of the European Union. The Iranian delegation found a disproportion in it – the document said a lot about Iran and nothing about Israel. Then the Iranians started the all-front offensive – from accusing Australia of collaborating with the non-NPT state (i.e. Israel) and supplying it with uranium to condemning the United States and NATO for nuclear sharing (this matter had repeatedly been mentioned before by European NGOs).

Ambassador Ali Soltanieh in his long and arduous speech tried to convey the following idea – nonproliferation regimes should be strengthened and not undermined as the United States did. If the situation did not change to the better, states parties of the NPT and the Chemical Weapons Convention (CWC) might call into question their commitments and withdraw.

The Ukrainian chairman in his working paper treated Iran quite delicately and referred several times to Tehran's readiness for cooperation with the IAEA. He pointed out the need of maximizing the efforts to find diplomatic solutions in order to ensure confidence building among all states parties to the NPT.[19] The chairman was nearly taken apart for his stand – Dr. Ford argued that the situation with the Iranian nuclear program was characterized in softer terms than a year ago, while, in the U.S. opinion, the situation had only aggravated in the last 12 months.

And suddenly Syria appeared on the stage. It was not in the spotlights during the session and the working paper by the chairman mentions Damascus in passing, as it was not the key point of the discussion. However, Dr. Ford assumed that the Syrian ambassador owed to his Ukrainian colleague for shadowing down the issue. According to him, the working paper should have condemned Syria for violation of the NPT commitments. The United States was sure that in fall 2007 Israel bombed the nuclear reactor being constructed with the assistance of the D.P.R.K. Meanwhile, the document spoke about the need to hand this issue to the IAEA and not to make strikes.

Unlike the Iranians, the Syrian delegation at the PrepCom was not active. They did not attack, did not defend, their line was vague and sometimes it seemed that they deliberately laid themselves open to ridicule by making non-systemic and ill-thought-out harsh statements. I had an impression that Damascus feared that its dossier might be transferred to the IAEA and violations would be made public *post factum*. So the appeals of the third nations (such as South Korea) to condemn Israel and give the IAEA inspectors the opportunity of unbiased investigation (including alleged contacts between Syria and North Korea) were not met with enthusiasm in the ranks of Syrian diplomats. They must have been happy that the facility was destroyed and might have even cleaned the mess after the Israeli bombing, I thought.

Thus, Iran was much spoken about, Syria was mentioned and there was not a single word said about Libya.

Discussions concerning compliance with the NPT commitments make me think that there are two parallel worlds existing in the area of nonproliferation.

One world is the planet of heated debate at the rostrum, where roles have been rehearsed many times – some countries blame Iran, others blame Israel, and the third group blames North Korea. But this is not a real world, this is some virtual reality.

The parallel world is full of *Realpolitik*. It does not require noisy discussions about new data on the Iranian nuclear program retrieved from another laptop; there is no argument whether such information is serious or just a well-fabricated disinformation. In this real world even a non-NPT state can easily hold court over its neighbor and ruin its (alleged, clandestine) nuclear facility. Even though Syria was not obliged to declare this facility before the construction was completed. So IAEA, PrepComs and all other institutions find themselves quite far away from the concrete clash around the specific nonproliferation issue.

Another story which goes beyond the PrepCom discussions is the behavior of a nuclear weapon state (the United States) when it renders assistance to a non-NPT country (Pakistan) in tightening safety and security of its nuclear arsenal. And it is clear why such things happen. As far as the Muslim world with its extensive representation at the NPT-related events is concerned, the issue of Pakistan is better not spoken about, China and the United States share this position, while India... – well, New Delhi is not present at the NPT events and does not plan to join the treaty in the foreseeable future.

The case of India is even more interesting – many have learned to neglect the fact that some nuclear suppliers (not only the United States) are on the threshold of starting large-scale nuclear cooperation with India. These issues are discussed in the corridors of the PrepCom, where, frankly speaking, there are many lobbyists of nuclear cooperation with India, as well as many proponents of moratorium on such collaboration. But the PrepCom documents are so round in nature that they use the standard formula about the importance of universal accession to the NPT. Life goes on, and the NPT debates exist in their comfortable parallel vacuum. It is much more convenient for the delegates to argue on traditional topics that are talked about for years. So when in one corner of hall someone shouts «Israel!», another corner echoes – «Iran!»

LIFE IN THE ERA OF *RENAISSANCE*

The Ukrainian chairman and, hence, inevitable associations with Chernobyl did not prevent the PrepCom participants from stating that Article IV of the NPT (peaceful nuclear energy uses) was still topical. After all, the international community is facing a *nuclear renaissance.*

In the course of the PrepCom debate it turned out that many delegations already agree with this concept. So the issues of non-discriminatory access to nuclear energy development and prevention of diversion were at the top of the list.

As the chairman notes, «In view of climate change and the growing demand for nuclear energy and sustainable development, a call was also made to fully ensure the free, unimpeded and non-discriminatory transfer of nuclear technology for peaceful purposes. The proliferation risks associated with the growing global energy demand were noted.»[20]

It may be curious to analyze the Russian position on this matter, since the statement of the Russian delegation opened with peaceful nuclear energy uses, leaving behind two other NPT pillars. Such inversion spoke for itself.

> «We can see today that countries are increasingly interested in developing nuclear energy as a reliable resource ensuring their energy security. This is a natural process. It gives ample opportunities for international cooperation. First of all those should be taken to supply countries developing their own atomic energy with nuclear fuel in a reliable and assured manner. One way is that every country can establish its own facilities to enrich uranium, produce fuel and further reprocess it. Yet, it is a very complicated process not only in terms of funds, but also in terms of intellectual, scientific, physical and technical resources. Is moving along this path justified when the world market is capable of meeting both current and future needs in this area? It is unlikely so. Moreover, such an option would delay for many years implementation of national atomic energy projects given the time needed to build such facilities. It would be appropriate to remind here the opinion voiced by Mohamed ElBaradei, Director General of the IAEA, that there are no reasons at the moment to build new facilities for uranium enrichment or irradiated nuclear fuel processing.»[21]

Here one has to note that Russia is against the development of uranium enrichment plants or spent fuel reprocessing in those countries that only start their nuclear path and do not have

such facilities. This logic implies that the Russian support in constructing the uranium enrichment plant in China is not a problem in this context.

Russia knows well that the primary argument in response to such initiatives is that a country cannot be dependent on the market situation or political will of other states. «These are legitimate fears,» said Anatoly Antonov. «We think they can be allayed on the basis of multilateral approaches to the nuclear fuel cycle, intended to provide an economically reasonable and feasible alternative to establishing all its elements at a national level.»[22] And Russia points out that «we do not question the unalienable right of the Parties to the NPT to develop research, production and uses of nuclear energy for peaceful purposes. It is up to each country to decide on its own how to exercise this sovereign right.»[23]

Speaking at the PrepCom, Anatoly Antonov reminded of the Russian initiative concerning the development of global nuclear energy infrastructure and establishment of international centers that would provide nuclear fuel cycle services. As the first step in this direction, Russia set up the International Uranium Enrichment Center (IUEC) in Angarsk.

Despite substantial efforts undertaken by the Russian delegation to promote Angarsk in Geneva, including special briefing, most of the participants argued in the lobby that the concept of IUEC was rather vague. So the Russian side will have to work hard to make the IUEC plans more transparent and attractive to other NPT states parties. My colleague Anton Khlopkov in his article in this issue of the journal asks whether the initiative may be interesting for Iran.[24] I would like to get the answer from the Iranian colleagues. At the PrepCom session they kept silence, in the corridors they were skeptical – perhaps it is time they clarified their position in an article for the *Security Index* journal, isn't it?

«Russia has proposed to stockpile low-enriched uranium in the Center under the IAEA management. Materials from this stockpile are to be supplied to third countries by the decision of the Agency if they are denied fuel for political reasons. Any country honoring its nonproliferation obligations can take advantage of this guaranteed stockpile,» maintained Amb. Antonov.[25]

The working paper by the chairman points out that many delegations backed the multilateral approach towards nuclear fuel cycle or, at least, welcomed the discussion on this matter.[26] At the same time, there is still a lot of reluctance in responding to specific proposals – be it the IUEC or the fuel bank – on the part of the states that are or will be directly affected by these issues in the near future. They ignore such initiatives instead of adhering to them. It is noteworthy that the Gulf states, which demonstrate in public their interest in developing nuclear energy capabilities, were not at all visible at the PrepCom session.

ARTICLE X – ETERNITY IN DISCUSSION

Yes, yes, as in 1995, Article X was again in the focus of everyone's attention. And there is no doubt that it will be the matter of serious discussion at the 2010 NPT Review Conference.

In the mid-1990s the major issue was paragraph 2 of the article, i.e. extension of the treaty. These days this paragraph is an atavism and, logically speaking, should be eradicated, since the parties agreed to the indefinite extension of the NPT.

However, there is paragraph 1 which is devoted to the right of withdrawal from the treaty. So far this right was applied only once by North Korea (and the country still wanders around the idea of quiet return to the NPT, so even the PrepCom materials mention three initial non-NPT countries and the D.P.R.K in separate groups).

Will there be other precedents? Whatever the answer to such hypothetical question is, it is clear that the NPT authors were not quite scrupulous in composing this article. The state has the right to leave the treaty, already possessing a long track record of its violations. Such situation is hardly fair and does not contribute much to international security.

Nobody suggested rewriting Article X at the PrepCom. What are other options then?

Scenario 1: yes, the withdrawal from the treaty is a sovereign right but it cannot be carried out legitimately if the state breaches the NPT; so it becomes possible only after investigation of the IAEA and the international community (the EU, the United States, Australia, Canada).

Scenario 2: this matter should be discussed at the extraordinary meeting of the NPT states parties (Indonesia).

Scenario 3: such state should get rid of its sensitive technologies and materials before withdrawing from the NPT (Japan).

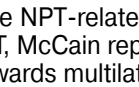
It is clear that such options may complement each other. And it is obvious that the issue is raw, the discussion has just started. It is noteworthy that taking into account the potential extraordinary meeting of the NPT states parties, some countries propose to strengthen further the bureaucratic component and form some sort of permanent secretariat or office – in Vienna, or under the IAEA aegis.[27] Perhaps, for some prominent diplomats it's time to return to their capitals from Vienna or even retire, so such secretariat could be a good opportunity for them to stay in pretty Austria.

In 1995 it was decided to strengthen the NPT review mechanism – the proposal was set forth by South Africa, lobbied and supported by many others. The PrepCom session in Geneva (nine days) and the next PrepCom in New York (10 days) must be strengthening the NPT review mechanism, but even more they help the diplomats to plan nice spring holidays. What is the real efficiency of such extended PrepComs? It will become clear only in spring 2010.

The PrepCom in Geneva, which was held on the 40th anniversary of the NPT, was not disappointing, but was not sensational either. Anyway nobody expected breakthrough, so no news is good news in this case.

The question that was not mentioned at the rostrum was broadly discussed with the cup of espresso in the Palais des Nations cafeteria. Who will win the U.S. elections – Obama or McCain? It would be risky to use the black and white picture with respect to the NPT-related talks, but most of the participants agreed informally that for the sake of the NPT, McCain represents the *evil*, while Obama is the *virtue*. The latter means open approach towards multilateral diplomacy, revival of the Conference on Disarmament, slow progress of the *Hoover Four* initiative, a sign for the U.S. Senate to ratify the CTBT and its potential entry into force in the foreseeable future, and finally, the solution to the Iranian issue without use of force or further pressure. But when the delegates were trying to evaluate the chances of two candidates and made their bets, Obama was not always the favorite participant of the race.

The diplomats were sure of one thing – next spring in New York it will 100 percent clear who won and who lost in that betting. So far they preferred time out and regarded the PrepCom in Geneva as some warm-up exercise. Real battles are one or two years ahead...



Notes

[1] The second session of the Preparatory Committee for the 2010 NPT Review Conference took place in Geneva on April 28–May 9, 2008. It took nine working days.

[2] Statement by H.E. Ambassador Anatoly Antonov, Head of the Delegation of the Russian Federation at the Second Session of the Preparatory Committee for the 2010 Review Conference of the Parties to the Treaty on the Non-Proliferation of Nuclear Weapons, Geneva, April 28, 2008, p.5.

[3] Ibid., pp.5-6.

[4] Ibid., p.7

[5] The document by the chair is a factual summary of the discussions. However, it is not an official document of the PrepCom, since such summary was objected by a few delegations. For instance, Iran and the United States made public criticism of the document. Some other delegations also voiced their concerns, even though many greeted Ambassador Yelchenko for accomplishing a difficult task – summarizing so many various positions of the states, including some erroneous but declared positions, which, hence, could not but be integrated in the working paper.

[6] Working Paper by the Chair. May 9, 2008. Preparatory Committee for the 2010 Review Conference of the Parties to the Treaty on the Non-Proliferation of Nuclear Weapons, Second Session, Geneva, April 28–May 9, 2008, para.13.

[7] Ibid., para.19.

[8] Ibid., para.24.

[9] Ibid.

[10] George Shultz, William Perry, Henry Kissinger, and Sam Nunn, «A World Free of Nuclear Weapons,» *The Wall Street Journal*, January 4, 2007; George Shultz, William Perry, Henry Kissinger, and Sam Nunn, «Toward a Nuclear-Free World,» *The Wall Street Journal*, January 15, 2008.

[11] Working Paper by the Chair...., para.28. A representative of the PIR Center participated in the conference in Oslo on invitation of Norway. Within the framework of its projects, the PIR Center plans to follow the response to the initiative of the Four.

[12] Statement by H.E. Ambassador Anatoly Antonov..., p.6.

[13] Working Paper by the Chair..., para.23.

[14] Ukraine dwells on this topic in: Preparing for a Successful Review Conference 2010. Working Paper submitted by Ukraine. NPT/CONF.2010, PC.II/WP.36, May 8, 2008, pp.7-8. This nine-page document is noteworthy as it sometimes repeats word by word (without reference though) the provisions of the papers by a number of NGO nonproliferation forums, e.g. the Luxemburg Forum.

[15] Trilateral Statement by the Presidents of the U.S., Russia, and Ukraine, Moscow, January 14, 1994.

[16] Statement by the Delegations of China, France, the Russian Federation, the United Kingdom of Great Britain and Northern Ireland and the United States of America delivered by UK Ambassador John Duncan to the 2008 NPT PrepCom, Geneva, May 9, 2008, para.3, http://www.acronym.org.uk/npt/08p5.htm (last accessed on June 23, 2008).

[17] Ibid., para.7.

[18] Ibid., para.5.

[19] Working Paper by the Chair..., para.32.

[20] Ibid., para.49.

[21] Statement by H.E. Ambassador Anatoly Antonov..., p..2.

[22] Ibid., p.3.

[23] Ibid., p.3.

[24] Anton Khlopkov, «The Angarsk project: enrichment vs. proliferation», *Security Index*, No. 3 (Summer 2008).

[25] Statement by H.E. Ambassador Anatoly Antonov..., p.3.

[26] Working Paper by the Chair..., para.57.

[27] See for example, Preparing for a Successful Review Conference 2010..., p.9. The section is called «Institutional Reform».

Anna Belova

RUSSIA'S NUCLEAR SECTOR REFORM: FIRST RESULTS[1]

In December 2005, President Vladimir Putin and the leadership of the nuclear industry decided to develop the ideology and methodology of reform in the sector. It was necessary to ensure the breakthrough of the nuclear sector and assess (by devising model scenarios) the optimal ways of restructuring, enabling the industry to be efficient and goal-oriented.

It is known that the Russian Ministry of Medium Machine-Building *(Minsredmash)* made the basis of the Russian atomic military and energy complex. It was one of the most technologically advanced and influential entities – it encompassed the institutions that formulated research, technical and industrial policy in the nuclear sphere.

At the same time, in all leading nations of the world peaceful nuclear energy uses had their origins in the nuclear weapons complex. The latter was thriving due to the arms race, which involved immense resources of the U.K. and the United States, the Soviet Union and France.

Fortunately and thanks to the historic decisions curtailing the arms race, in the last 20 years we have been living in a new situation. And many so called civilized countries started to reconsider the structure and configuration of their nuclear industries.

I regret to say that Russia launched this process at the government level only in 2005. Thus, we lagged behind other states, which had passed appropriate legislation, pursued structural reforms to separate nuclear weapons and energy complex, and transformed civilian components into corporations.

LOOKING FOR WAY OUT

By that time Russia, as many European countries, faced the decline in nuclear industry. Since the late 1990s until 2005, Russia was completing the construction of two reactors. The structure of the sector was not transparent at all, its major resources no longer met new challenges.

It was impossible to introduce new modern management schemes, to enhance efficiency, to raise profits and cut costs, to bring innovative technologies and optimize the supplies and the quality of production – all nuclear enterprises had a number of regime restrictions.

It was difficult to make research planning, to develop and make operational new technologies for civilian nuclear projects, since the industry did not have a clear development program with evident goals and tasks.

On the other hand, two key events occurred at that time – these were new fundamental challenges which boosted the change in the Russian nuclear energy sphere.

First of all, the real electricity demand was growing – by 2005 it exceeded the 2020 forecasts on the Russian market. Obviously, electricity assessments of the government were miscalcu-

lated and did not take into account a number of factors that exploded the demand in the regions. Thus, the demand ran ahead of supply and there was a realistic threat of energy limitations for economic growth.

The second challenge was the changing attitude towards nuclear energy and its increasing expansion in the world. According to some estimates, the share of nuclear energy in the global energy balance by 2030 may double and about 300 new plants will be built (including replacement of the old ones).

Naturally, the international market with its 300 reactors was a lucrative target for strategic and economic interests of any state. Russia has historically been an active player on the market, so to stay and to win, it had to restructure the assets and management and provide for hi-tech, high-quality, effective and timely supply of services.

Even modest assessments ($1.5 billion per reactor) imply that this market may bring up to $500 billion for construction only (even without fuel supplies for the next 50 years).

Thus, the challenges were quite serious. The president and the government were more concerned about their domestic elements. So it was decided to set up the interagency commission and to create the development program for the Russian nuclear industry. The program had to take into account three factors – the place of nuclear energy sector in the Russian energy system; required amount of new construction to cover the shortage of energy by 2030; and the way to separate state programs and actions related to the maintenance of nuclear radiation complex, military component and civilian nuclear energy sector. The latter had to be transformed into a corporation, so that it might compete on equal terms at international tenders.

ACTING QUICKLY

When the priorities were set, the events started to develop quickly. Early 2006 was marked with regular, nearly monthly reports to the president about economic concepts related to the future of Russian nuclear energy sector and its status. As a result, on June 8, 2006, the president signed the program setting goals, tasks and prospects for the development of nuclear sector until 2012.

It contained three elements: plan of action for the nuclear weapons sector; plan of nuclear and radiation safety and spent nuclear fuel management; activities in the area of nuclear energy and industrial complex.

There were several development scenarios implying that by 2030 the civilian nuclear energy sector should account for 23 percent, 25.5 percent and 28 percent of electrical generation. At first, even 23 percent seemed unrealistic. But when the program was approved by the president and got federal funding, even the Ministry of Industry and Energy began to say that 23–25.5 percent would not be enough to replace the decommissioned energy facilities and the program implementation should focus on 28 percent as a goal.

The amount of energy consumption changed significantly already in 2006. The growth moved from 15 percent to 20 percent. In March 2007, the government approved the energy strategy (a roadmap for the development of energy facilities), which implied coordination for the development of different types of generation and electricity grids in the Russian regions.

FROM THEORY TO PRACTICE

To reach the level of 23 percent by 2030, the Russian nuclear sector had to construct two new reactors per year starting from 2008. The construction cycle is 60 months, so to implement the optimistic scenario of 28 percent, it is necessary to build three new blocks per annum starting from 2014, and four new plants with 1.2 GW capacity – from 2018. To carry out such ambitious mission, we had to reconfigure the management system and check the availability of huge financial and human resources. So from strategic plans we had to move to operational and investment planning.

On February 25, 2005, Sergey Kiriyenko who headed the industry signed a decree establishing the commission for restructuring and development of nuclear industry. The commission had three sub-commissions in accordance with the aforementioned sections of the program.

I was appointed to chair the commission on nuclear energy complex and was charged with the elaboration of a detailed program. We also had a number of working groups that provided for operational planning of restructuring.

Our primary task was the evaluation of assets and their transformation into shares. At that time the industry made a single complex, so all enterprises had to be separated into groups. We had to identify legal entities and staff to be merged within *Atomenergoprom* joint stock company. We had to ensure that the company would bring together the production chains, i.e. uranium production, enrichment, engineering, design, nuclear machine-building, electrical generation, and domestic and international sales.

Each internal department had to get a clear set of tasks to be competitive on the market. To ensure maximum profits, at the final stage of this chain – electricity sales – we had to define the market products and internal products. And it was also necessary to identify weak points and constraints to be overcome for successful implementation of the program.

NEW PROGRAMS

Seven working groups (from uranium production to electrical generation) analyzed the situation and launched a series of programs under the guidance of Sergey Kiriyenko. One of such programs was devoted to the design and manufacturing of new reactors (*NPP-2006* and then *NPP-2009*). For the sake of our competitiveness, there was a need to have new types of reactors with appropriate price and construction schedule characteristics. There were many such programs – upgrade of the Russian uranium production industry, modernization of the enrichment facilities, and so on. It was understood that the increase in construction would mean the increase in demand for fuel and this would result in the need for new components and requirements to nuclear machine-building.

So we had to evaluate all resources, including psychological analysis of personnel and availability of staff for the positions, where shortage of professionals could jeopardize our growth. We made a matrix of human resources, which mentioned both working and engineering positions, for which people should be actively educated and trained on commercial basis.

An important element of our assessments was the financial part. People, technology and money make the success. The lack of energy facilities in Russia along with maintenance of basic infrastructure could not be overcome by the industry itself. The state should participate in such projects. So, in October 2006 the government approved the federal program of nuclear energy sector development until 2012, which allocated 1.4 trillion rubles for that purpose. One should take into account that half of this money is an internal resource of the industry and does not come from the federal budget.

General economic model enabled us to predict that thanks to large-scale construction, the sector will be able to pay for itself starting from 2015. Federal funding was asked for only at the initial stage.

Therefore, all plans, tasks, resources were structured and the next step (in fact, in parallel) was to ensure the activities of functional working groups which made the second part of the commission. These groups were making business – their task was to move the industry from stage A into stage B, i.e. to make all the plans operational and provide for changes.

Particular attention was paid to the legal part of the reform. We had to pass the law that would amend 16 legal acts of the Russian Federation and create a new model of the industry. Special judicial task force was set up, along with the working groups dealing with property and preparations for privatization of the federal state-run unitary enterprises. One of our units together with the trade unions was analyzing the social sphere and collective contract with the labor.

Finally, we established a group charged with elaborating a corporate model and the process of transformation.

It is incredible how we could make substantial restructuring in such an effective and proper way. Much was done on the spot and from the scratch, but people who were seeking changes could turn their enthusiasm into immense work. Many things failed, which is a normal situation in the process of dramatic reforms. At the top level it all seemed very logical, but eventually the pace of transformation depends on the appropriate circumstances and motivation and the degree of involvement of people and enterprises. There is some room for improvement here.

To sum it up, one has to mention that after the approval of the program by the president, the appropriate bill was elaborated very quickly, within three months. It was devoted to the particularities of asset management in the nuclear industry and contained amendments to existing legislation. The bill consisted of two parts, beside amendments.

The first part changed the model of asset management. For the first time in the history of nuclear energy sector it was maintained that nuclear materials and plants could not only be the federal property. This helped to incorporate all enterprises in the civilian sector. The second part of the law determined the procedure and specifics of merging over 100 enterprises of different ownership within *Atomenergoprom* state-run holding company.

In September 2006, the president submitted the bill to the State Duma. It was approved on January 25, 2007 by the Federation Council and signed by the president on February 6, 2007.

FROM ROSATOM TO *ROSATOM*

After the change of legal framework, it was necessary to amend the legal acts at the level of government resolutions and presidential decrees, to make the full list of enterprises, the shares of which should be transferred to *Atomenergoprom*, to reorganize federal state-run unitary enterprises into joint stock companies and merge them with *Atomenergoprom*. The presidential decree that defined the list of enterprises and a number of regulating mechanisms for the industry was signed in April 2007.

In May the government issued the resolution which set the procedure of *Atomenergoprom*'s establishment. In July the corporation was founded and in August 2007 it consolidated the shares of state-owned enterprises and existing joint stock companies.

A topical issue was how to maintain the coherence of nuclear industry management system. Could it happen that *Atomenergoprom* would live its own life, nuclear and radiation safety issues would be neglected and the lack of unified coordination mechanisms would have negative impact on the development of all segments of nuclear industry?

The presidential decree argued that the transformation of the management system should combine the control over commercialized civilian sector and other elements of nuclear industry. As a result, the model of state corporation emerged and it was approved by the president. In June 2007 another bill was elaborated – *On Rosatom state corporation.* In October 2007 it was submitted to the Duma, considered and adopted. Hence, the state corporation was established and Sergey Kiriyenko was appointed its head. Thus, within two years we managed to conduct restructuring of the industry and separate it into civilian and military sectors. The fully-fledged and comprehensive management system was also created.

Note

[1] The commentary is based on the speech by Anna Belova, ex-chair of the sub-commission on restructuring of nuclear energy sector, advisor to the head of Rosatom. The speech was delivered at the meeting of the *Trialogue Club International* held by the PIR Center on December 13, 2007.

Angelica Matveeva

GERMAN NUCLEAR POWER: AHEAD TO THE PAST OR BACK TO THE FUTURE?

Global nuclear energy market is booming. Paris, London, New Delhi, Beijing, Moscow, and even Brussels see nuclear power as an ideal solution. For New Delhi and Beijing placing their bet on the nuclear sector is driven by internal industrial and economic growth, while for Europe it is needed to cover energy deficit caused by global warming counter-measures. This *nuclear renaissance* picture does not feature the largest energy market in Europe, the EU country with most population and energy capacity for 600 TWh.[1] Careless enough to set all hopes on a joint gas pipeline project with Russia, implementation of which is still questionable, it bluntly refuses to deal with nuclear energy. They even have a plan to stop operation of all reactors before 2021, though media sometimes feature dubious headlines like «Merkel Calls to Reconsider Nuclear Phase-Out»[2] and «Atomic Energy is Yesterday's Technology–It Has No Future.»[3] What is the reasoning behind this decision, and these different positions even after the decision has been made? What are the consequences for various actors in Germany and in Russia? Can the decision be reviewed? What impact would the example of Germany have over other European states?

WHAT, WHEN AND HOW TO PHASE OUT?

In Germany there are 17 reactors, while the share of nuclear energy in total production for 2007 was 22.1 percent.[4] Comparative figures: in 2006 it was 26 percent, while in 2004–29 percent. In Sweden, which has also decided to phase-out, its share in the total production for 2006 was 48 percent, in France–78 percent, in Russia–16 percent.[5] Operation time for all reactors is limited at 2,623 billion kWh (which makes an average of 32 years). Thus, each reactor can work until that limit before the shutdown.[6] The last one is to be discontinued around 2021. It is impossible to have a precise year as generating companies use various tricks to extend operation of one or another block. The most frequent one consists in an arrangement when a certain reactor, usually commissioned at a later stage, gives some of its time to an older reactor to be shut down sooner. E.g.: *EnBw*, owning and operating Neckarwestheim 1 nuclear reactor, decided to extend its operation by setting it to an extremely low power, just enough to stay within the generation time limited by the fuel. A different situation is at Biblis A reactor, still in operation. Due to a manufacturing defect the station was out of operation for the recent 18 months and thus has preserved some generation time for the reactor.[7] Did the regulators expect the phase-out to take that long?

Table 1. **German Nuclear Reactors Used for Commercial Power Generation**[8]

Operating stations	Reactor type	Electrical capacity (gross), MW	Commissioned	Expected shutdown
Biblis A	PWR	1,225	1974	2007
Biblis B	PWR	1,300	1976	2009
Brokdorf	PWR	1,440	1986	2018
Brunsbüttel	BWR	806	1976	2009
Emsland	PWR	1,400	1988	2020
Grafenrheinfeld	PWR	1,345	1982	2014
Grohnde	PWR	1,430	1984	2017
Gundremmingen B	BWR	1,344	1984	2016
Gundremmingen C	BWR	1,344	1984	2017
Isar 1	BWR	912	1977	2011
Isar 2	PWR	1,475	1988	2020
Krümmel	BWR	1,402	1983	2016
Neckarwestheim 1	PWR	840	1976	2008
Neckarwestheim 2	PWR	1,400	1988	2021
Philippsburg 1	BWR	926	1979	2012
Philippsburg 2	PWR	1,458	1984	2017
Unterweser	PWR	1,410	1978	2011

POLITICAL ASPECTS OF THE GERMAN CHOICE

The German choice, as we call it, is eventually implemented through the internal political and party arrangements of that state. Understanding how these elements work, also in relation to the nuclear discussion, it is possible to get most of the reasons behind Germany's strive for the phase-out.

In 1998 the German government was formed by a coalition between *Alliance'90/The Greens* and *SPD* (social democrats), officially declaring it would pursue a gradual phase-out of nuclear power plants. In 2002 Jürgen Trittin, who at the time was minister for the environment, nature, conservation and nuclear safety, managed to make an agreement with four major generating companies of the country *(E.ON, RWE, EnBw, Vattenfall),* which entered into force in 2002 as a legislative act providing for a shutdown of all nuclear power stations (19 at the time) by 2020. The same document set the generation limits for all German reactors.

However, it was still a compromise, as the government originally insisted on tougher terms. It expected to have a strict shutdown schedule for all reactors or *The Greens* would discontinue some operation licenses for nuclear power plants, even without any financial compensation if the agreement hadn't been achieved.

In November 2003 and May 2005 nuclear power plants in Stade and Obrigheim were stopped. The phase-out plan seemed to be working. However, the plant in Stade was second oldest in the country (its reactor was in operation for 32 years), while the one in Obrigheim was even the oldest one (37 years). These important details hardly allow to regard the accomplishment as an achievement, especially given that the operator in Stade said it would have shut it down anyway even without pressure from the government as its operating life was over.

The agreement was also criticized by antinuclear activists: not only did it fail to cover work of existing and construction of new research reactors, it also overlooked uranium enrichment facilities. It only banned construction of new commercial nuclear power plants. Moreover, fuel reprocessing was allowed until mid-2005. So, believed the activists, the schedule was dragged out, the government under the thumb of generation and distribution companies offering them financial compensations.

However, neither the preliminary plan nor the mildly negative attitude of Merkel's coalition[9] could stop German energy companies. Trying to get the nuclear issue back on the agenda, however finalized it might seem, they try to press on tensions within the coalition. Time reallocation mentioned above serves as an example here, too. It should be noted that such actions do not violate the law of 2002, however, the mechanism was originally designed to be used in the opposite way, i.e. to reallocate time from an older reactor to a newer one, which would mean a safer facility. Otherwise government approval is required complementing the one of the Ministry of Environment and the Ministry of Economics and Technology. Again, the procedure was authorized only once, for the plant in Obrigheim, already discontinued. Other requests were denied for safety reasons.

This is the way energy companies use to demonstrate their preference in candidate parties for the 2009 national elections. Looking at their colleagues in Spain and the Netherlands they too hope to see conservative parties winning the 2009 vote in Germany. After winning the elections, conservatives in Spain extended the *nuclear phase-out* until 2024, in the Netherlands they even dropped the idea, also extending the operation time of their only reactor until 2033, when it turns 60.[10] Could energy companies in Germany hope it will happen like that all by itself?

At first glance it may seem that energy companies are waiting for a miracle. The *nuclear phase-out* has been formalized down to a shutdown schedule! However, history of nuclear energy policy of the reunited Germany proves the opposite.

Here it is: all parties on the German political landscape simply took their positions from the heated nuclear debate of the 1970s, which was long before the Chernobyl disaster, to retain them in the new century. Back then, very much like today, those positions were often undermined by internal contradictions inside the parties, as well as external relations between parties and trade unions, voters, and the business community. The latter kept very close contact with parties in states with nuclear power plants.[11] In 1977 the traditionally antinuclear *SPD* had to maneuver between its split electorate: antinuclear activists (discontent with the environmental threat, safety issues, and quasi-monopolistic nature of the industry) and the working class of the nuclear industry wishing to keep their jobs. Some allowances were even made by the traditionally pro-nuclear *CDU/CSU.* Shocking Helmut Kohl, some of his fellow party-members formed *CDU Working Group on Nuclear Energy,* which, very much like the traditionally antinuclear *SPD*, called back in 1988 for a gradual phase-out before 2010.[12] The Group also proposes to establish a research center on renewable sources. Eventually, the document containing all these ideas was *adjusted* by Helmut Kohl just a few minutes before it was presented at a *CDU/CSU* meeting as he could not accept the aspiration of his colleagues to «build future without nuclear energy».[13]

An important structural feature of German political system, limiting it to a certain degree, is its consensual nature. In fact, parties cannot shape their own position without priority consideration for other key players, i.e. lobbyists and elites.[14] That explains why both *CDU/CSU* and *SPD* have retained their positions, as well as state administrations with industrial lobby for nuclear power plants.

So, long-time pressure of the business lobby and weak internal party positions regarding the nuclear issue make it possible to suggest that despite all plans to phase-out the industry still has a real opportunity to turn back or at least postpone the disadvantageous processes.

NEXT STEP…?

The phase-out option brings certain consequences not only for the business community, but also for actors and environments it can affect indirectly. So, authorities, society, energy sector,

experts, and those in charge of safety issues will have to face a number of challenges and even threats. At the same time, the option has its sometimes unexpected positive sides.

The most serious issue is about covering of future energy deficit, resulting from the phase-out, without damaging the environment and following EU and Kyoto commitments.[15] A notable January 2007 report by *Deutsche Bank* warned that Germany will miss its carbon dioxide emission targets by a wide margin, face higher electricity prices, suffer more blackouts and dramatically increase its dependence on gas imports from Russia as a result of its nuclear phase-out policy, if it is followed through.[16]

Covering the deficit from alternative energy sources (wind, solar power, hydro/tidal plants, biomass, etc.) is criticized by many experts as an inconsiderate, expensive, and unreliable solution. Low reliability of alternative energy sources means they cannot produce energy in a sustainable and predictable way. However, it does not seem to affect Germany's unshaken choice to develop this sector actively.

Firstly, alternative energy, as an economic sector and as a service provider, has promising future. Germany's Federal Environment Ministry, for example, says that the policy to develop alternative energy created 214,000 new jobs in 2006, and in the future the figure will go up at least to 235,000,[17] while phasing out nuclear plant would cut the jobs by only... 38,000[18] (let's look at that later on). The jobs will be open not only to experts with their expertise limited to the energy sector, but also to experts in marketing, advertisement, finance, etc. For a country with unemployment of 8.4 percent,[19] this achievement may be the one the Government promised to have when campaigning for votes and in their coalition agreement.

Secondly, the government policy to develop alternative energy is also fully in line with EU plans of early 2008 to make a Directive, binding for all Member States, increasing the share of renewable energy in the energy consumption to 20 percent by 2020.[20] Today its share in Germany's consumption is already 14.2 percent,[21] which gives the country the second place after the United States in all renewable energy attractiveness indices.[22]

Another option would be the joint German-Russian *Nord Stream* gas pipeline project, which has recently started to feature a Dutch partner too. However, the project also causes some concern of the neighbors. It is mainly about an increased environmental threat caused by the gas pipeline routed across the Baltic Sea bed. Besides, it is not quite clear how the pipeline would be related to EU policy of diversification of energy sources and what impact it might have over EU Common Foreign and Security Policy in the long run. At the same time, *Cambridge Energy Research Associates,* influential consultants helping many from both private and public sector around the world, believe that the pipeline might help the European Union to cut emissions of greenhouse gases by 20 percent.[23]

Finally, two key elements that Germany is planning to resort to in order to ensure energy supply: new technologies and related energy efficiency. Experts of the Federal Environment Ministry are convinced that new combustion technologies developed for coal and gas by 2020 would allow zero-emission coal and gas thermal power plants. Modern plants of this type allow up to 40 percent reduction.[24]

Safety may be affected due to several reasons. Firstly, since decision to phase out has already been made, fewer students chose to specialize in that area. Moreover, every year most experienced operators and experts leave nuclear industry for retirement.[25] Still, internal demand is the same as the shutdown of all plants is going to take an immense amount of time and trained labor force, hence the *loss* of 38,000 jobs will not come as a shock. Besides, the figure of *lost* jobs is not adjusted for the ones created in the alternative energy sector.[26]

Obviously, government decision to phase out of 2000 is based on public opinion. Throughout the 1990s German society stood against nuclear energy. Some reports argue that up to 80 percent of respondents said they were against. However, after the phase-out decision was actually made, discussions in society started to mention negative consequences for the country's economy and the world's climate. Surveys reflected these particular topics: in June 2005 and in January 2007 there were quite enough people saying the government should reconsider. In the latter case 61 percent opted against the phase-out, while 34 percent voted

for that decision of the government.[27] So, generating companies can expect people to vote for the conservatives, who could at least postpone the phase-out.

BUSINESS PROSPECTS AND THE FUEL CYCLE

Indeed, the phase-out decision of the government spells huge losses for generating companies. No one expects a disaster, though. More than that: in addition to solutions minimizing or even fully compensating the losses, the business community in fact gets some interesting tools to generate profit. How come?

Firstly, the share of nuclear energy in total generation of each company does not exceed one third. With *EnBw* and *E.ON* it is 33 percent, with *RWE*–19 percent, with *Vattenfall*–13 percent.[28]

Secondly, the decision will bring negative consequences not for all links of the fuel cycle chain. The agreement between generating companies and the government prohibits construction of new commercial nuclear power plants, and since 2005 includes a ban on fuel reprocessing. However, uranium enrichment is still allowed, which means the German part of *Urenco* is not affected. Hence, enrichment will be continued at two plants in Germany, though not for the internal market, but for export, say, to the United Kingdom, which is going to need large volumes of nuclear fuel, and not only it, and soon. Recently *E.ON* and *RWE,* Germany's largest power generating companies and nuclear power plant operators, welcomed enthusiastically the invitation by Gordon Brown, the U.K. prime minister, «to express an interest in building a new generation of power stations.»[29] Production and enrichment of uranium are also in *status quo:* all uranium is imported, mostly from Australia and Canada, being enriched in Russia.[30] Two fuel plants in Germany are still in operation, new ones cannot be opened. Temporary on-site storage is still in effect as it is not clear yet where to bury the waste. Funding for these two ends is originally in plant costs, hence it does not mean a contingency or a loss. So, only two links of the fuel cycle remain unprofitable: power generation itself and fuel enrichment and production.

Generating companies might also be unhappy about government plans to split energy generation and distribution markets to add competition on the internal market. This may result in losses for the four largest generating and distribution companies controlling about 70 percent of the German energy market.

Thirdly, these generation companies are not only playing on many other European markets (particularly, *E.ON* and *Vattenfall* are active in Scandinavia and in the United Kingdom), but are also active in penetrating their nuclear sectors. For instance, *RWE* has partnered with *Westinghouse* from the States to build a nuclear power plant in the United Kingdom, while *EnBw* has close ties with *EDF* from France, planning to open one in that country.[31]

Fourthly, on the German energy market these generating companies are already designing new energy efficient coal and gas thermal plants.[32]

Finally, all the four colossuses of the German energy market are more or less active in the new sector.[33]

THE GERMAN CHOICE: RELEVANCE FOR RUSSIA

Russia's most prominent EU partner might impact Russian nuclear sector, too.

The nuclear sector of Germany might try to keep major human and material resources even if the internal market shrinks. Hence, it is possible that German nuclear enterprises go transnational, with M&As or enhanced cooperation with similar enterprises from other countries, i. e. France, the United Kingdom, or the Netherlands. Can Russia get on the list, too? It is probable should Russia decide to open its internal market under the Energy Charter it has signed with the European Union. Russian nuclear energy industry could gain a lot from such cooperation.

Firstly, it would bring investments to Russian economy. Secondly, it would give to Russian nuclear industry technologies and know-how yet unavailable. Thirdly, such a cooperation

would have a positive influence over the security image of the industry, which is indispensable for Russia to integrate fully into European markets. Finally, *Nord Stream* experience could be used in the nuclear energy sector. Politically, Russian-German cooperation in the nuclear sphere would look more attractive for importers and potential customers than Russia's sole domination. However, resulting from the German phase-out, Russia might even lose the fuel market in Germany.[34]

IN SUMMARY…

What are the reasons behind the choice, what consequences will it bring and how probable is a review?

It is mostly explained by internal policy factors, then security, then climate change. Surprisingly, EU regulations seem to be affecting Germany's opinion, too. Even further down the list are global energy market trends and example of other European and world countries. In the mid-term perspective consumer electric energy prices may rise, which would stop after generation and distribution markets are split, and some new generation companies appear. The mid-term perspective may see higher dependence on Russian gas, but active government-sponsored development of the alternative energy sector will mitigate it. Besides, the latter will create at least 235,000 jobs, and former nuclear enterprises may join in. Moreover, thanks to European and Asian nuclear boom they will not suffer that much from possible disappearing of the German nuclear market, which may not be that probable should the conservatives win at 2009 national elections. Economic reasons are very likely to stream people's votes to *CDU/CSU*.

How likely are other European countries to follow Germany down that path?

At least in the mid-term perspective, other European states regard Germany's example as nothing but some weird move. How true would it be in the long run? A global split of countries into pro- and antinuclear groups might shape energy policy of the future and international relation in general. Russia, China, the United States, France, the United Kingdom, and Finland might be opposed to Germany, Sweden, and Spain, whose internal regulations ban nuclear energy. This could be detrimental for the EU Common Foreign and Security Policy, since energy has recently become adopted as its part.

Finally, what impact will the choice made by Germany have over Russia?

On the one hand, it may lead to stronger competition as German enterprises would turn to building nuclear power plants and offering operation and maintenance services in Asia, and Europe, which are in the sphere of Russian interests. Alternatively, it is possible that capital in Russian and German nuclear industries might go transnational through M&As to establish quasi-monopolistic groups on the nuclear market to satisfy a growing demand on the European, as well as Asian markets.

Notes

[1] *OECD Nuclear Energy Data 2007*, p.18.

[2] «Merkel will Ausstieg aus Kernenergie Überdenken,» *Focus*, November 6, 2007, http://www.focus.de/politik/deutschland/klimaschutz_aid_138249.html (last accessed on June 16, 2008).

[3] Michael Müller, «Atomenergie ist von gestern. Sie hat keine Zukunft,» Bundesministerium für Umwelt, Naturschutz und Reaktorsicherheit, February 7, 2008, http://www.bmu.de/pressemitteilungen/aktuelle_pressemitteilungen/pm/40842.php (last accessed on June 16, 2008).

[4] Data for 2007, see Uwe Massen, «Braunkohle führt Stromerzeugung an,» Presseportal, May 6, 2008, http://www.presseportal.de/pm/9341/1149188/debriv_dt_braunkohlen_industr_verein (last accessed on June 16, 2008).

[5] Anteil der Kernenergie an der Stromerzeugung nach Ländern Bundesministerium für Wirtschaft und Technologie, http://www.bmwi.de/BMWi/Redaktion/Binaer/Energiedaten/internationaler-energiemarkt9-anteil-gernenergie-an-stromerzeugung, property=blob, bereich=bmwi, sprache=de, rwb=true.xls (last accessed on June 16, 2008).

[6] Though the absolute figure never changes, time may vary depending on the power capacity of each individual reactor. See absolute figures as of 2006 year end at *Reststromengen*, Bundesamt für Strahlenschutz, http://www.bfs.de/en/kerntechnik/Jahresabschluss_Tab_2003_bis_2006.pdf (last accessed on June 16, 2008).

[7] «Atomausstieg? Im nächsten Jahrzehnt,» *Wir Klimaretter*, February 27, 2008, http://www.wir-klimaretter.de/index.php? option=com_content&task=view&id=603&Itemid=256 (last accessed on June 16, 2008).

[8] *Atomenergie in Deutschland. Energiemix der Zukunft*. http://www.energiemix-zukunft.de/fileadmin/user_upload/energiepolitik/Atomkraft_Deutschland.PDF; Bundesamt für Strahlenschutz, September 2007, http://www.bfs.de/en/kerntechnik/Kernanlagen_Betrieb_Mai2008_engl.pdf (last accessed on June 16, 2008).

[9] The Coalition Agreement carefully says: «The *CDU, CSU* and *SPD* do not share the same opinion on the use of nuclear energy for power generation. For that reason, we cannot change the agreement between the Federal Government and power supply companies of 14 June 2000 or the procedures contained therein or the corresponding regulations of the amended Atomic Energy Act (Atomgesetz).» See Coalition Agreement between *CDU, CSU,* and *SPD,* November 11, 2005, http://www.bundesregierung.de/Content/EN/StatischeSeiten/breg/koalitionsvertrag-1.html#doc47548bodyText5 (last accessed on June 16, 2008).

[10] «Nuclear power in the Netherlands,» *Nuclear Issues Briefing Paper,* No. 107, Uranium Information Centre, March 2008, http://www.uic.com.au/nip107.htm.

[11] See Dorothy Nelkin and Michael Pollak, «Political parties and the nuclear debate in France and in Germany,» *Comparative Politics,* Vol. 12, No. 2, January 1980, pp. 127–141; and Alexander Kelle, «Germany» in Harald Müller, eds., *European non-proliferation policy 1988–1992* (Brussels: European Interuniversity Press, 1993), pp. 111–139.

[12] Ibid.

[13] Ibid.

[14] Kurt Sontheimer, *Grundzüge des Politischen Systems der Bundesrepublik Deutschland* (München: Piper Verlag, 1971), 272 p.; Thomas Ellwein, *Das Regierungssystem der BRD* (Köln: Westdeutscher Verlag, 1977), 4th ed., quoted as in Dorothy Nelkin and Michael Pollak, «Political Parties...», p.138.

[15] Under Kyoto Protocol Germany is to cut emissions in 2008–2012 for six types of greenhouse gases 5.2 percent below the 1990 baseline. In this case nuclear energy is indispensable. The very idea to phase-out nuclear power plants is not in line with pro-nuclear European Energy Strategy adopted in January 2007. Though all EU Member States are allowed to finalize that decision internally, union policy exercises direct and indirect influence over their internal decisionmaking.

[16] «Nuclear power in Germany», *Nuclear Issues Briefing Paper*, Uranium Information Centre, January 2008, http://www.uic.com.au/nip46.htm (last accessed on June 16, 2008).

[17] Bundesministerium für Umwelt, Naturschutz und Reaktorsicherheit. *Atomkraft: teurer Irrweg*, May 2007, p. 9, http://www.bmu.de/files/pdfs/allgemein/application/pdf/broschuere_atomkraft_irrweg.pdf (last accessed on June 16, 2008).

[18] Ibid.

[19] «Arbeitslosigkeit in Deutschland im März 2008,» *Spiegel*, http://www.spiegel.de/flash/0,5532,12125,00.html (last accessed on June 16, 2008).

[20] European Union, Press releases, January 23, 2008, «Boosting growth and jobs by meeting our climate change commitments,» http://europa.eu/rapid/pressReleasesAction.do? reference=IP/08/80&format=HTML&aged=0&language=EN&guiLanguage=en (last accessed on June 16, 2008).

[21] «Renewable Energies Grow Strongly Again in 2007,» Federal Ministry for the Environment, Nature Conservation and Nuclear Safety, May 14, 2008, http://www.bmu.de/english/ current_press_releases/pm/41027.php (last accessed on June 13, 2008).

[22] *Ernst & Young Renewable Energy Country Attractiveness Indices, Q4 2007*, http://www.ey.com/Global/assets.nsf/International/Industry_Utilities_RenewableIndices-Q4–07/$file/Industry_Utilities_Attractiveness_Q42007.pdf (last accessed on June 16, 2008).

[23] "Diversity and Security in European Energy: The Case of the *Nord Stream* Pipeline,» Cambridge Energy Research Associates, March 20, 2008, http://www.cera.com/aspx/cda/public1/news/researchHighlights/researchHighlights.aspx?CID=9200#9200 (last accessed on June 16, 2008).

[24] *Atomkraft: teurer Irrweg*...., pp. 6–7. (last accessed on June 16, 2008).

[25] Adolf Birkhofer, «Kompetenz und Sicherheit beim Ausstieg aus der Kernkraft,» *Trend,* http://www.trend-zeitschrift.de/trend78/7867.html (last accessed on June 16, 2008).

[26] Ibid, p. 9.

[27] See for example: «Befragung. Deutsche zweifeln an schnellen Atomausstieg,» *Spiegel*, March 14, 2007, http://www.spiegel.de/politik/deutschland/0,1518,459606,00.html; «Nuclear power in Germany...».

[28] Figures as of 2006, except Vattenfall (2005). See «Uranium is energy. The nuclear power plants of *EnBw*,» *EnBw*. pp. 19–20, http://www.enbw.com/content/en/group/_media/_pdf/kernenergiebrosch__re_englisch.pdf; «Was wir brauchen,» *Das Energie-Heft Fluter*, No.19, March 2006, p.4, http://www.fluter.de/heftpdf/issue50/artikel5192/pdf_article5192.pdf; «Facts and Figures 2007,» *RWE*, p. 158, http://www.rwe.com/generator.aspx/investor-relations/inhalte-de/language=en/id=227214/factbook-extlink.html; «Nuclear power», *E.ON,* http://www.eon.com/en/unternehmen/12161.jsp. (last accessed on April 11, 2008).

[29] «German nuclear industry welcomes Britain's atomic renaissance,» *Deutsche Welle*, January 11, 2008, http://www.dw-world.de/dw/article/0,2144,3052595,00.html (last accessed on June 16, 2008).

[30] «Nuclear power in Germany...»

[31] «Strahlende» Auslandsgeschäfte für die vier großen Stromkonzerne,» *Atomausstieg selber machen*, April 2007, http://www.atomausstieg-selber-machen.de/216/ (last accessed on June 16, 2008).

[32] Facts and Figures 2007..., pp. 38–40, http://www.rwe.com/generator.aspx/investor-relations/inhalte-de/language=en/id=227214/factbook-extlink.html (last accessed on June 16, 2008).

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Taisuke Abiru

THE TOKYO-MOSCOW-ASTANA TRIANGLE: STRATEGIC PARTNERSHIP IN NUCLEAR ENERGY IS INEVITABLE

At the end of February 2007, the government of Japan expressed its willingness to begin negotiations on entering into a bilateral agreement on cooperation in the area of nuclear energy with Russia. In April, Sergey Kiriyenko, the head of Rosatom, the Russian federal atomic energy agency, announced the agency's intent to complete all procedures in conjunction with the signing of the agreement before the end of 2007.[1] Although an intergovernmental agreement on nuclear energy between Japan and Russia is yet to be signed, all the technical work has been completed, and the agreement has been prepared and is ready for signing in the near future.[2]

Considering the course of Japanese-Russian consultations on nuclear energy issues, it would be useful to analyze the reasons why Japan has proceeded with establishing a partnership with Russia in the atomic sphere and to assess the prospects for developing bilateral cooperation.

URANIUM FROM KAZAKHSTAN

On April 29 and 30, 2007, Akira Amari, Japan's minister of the economy, trade, and industry, together with a delegation of 150 people, including government officials and private-sector representatives, as well as executives from the electrical energy and industrial companies associated with nuclear energy, visited Kazakhstan. As a result of bilateral meetings, 24 agreements and a memorandum of cooperation were signed in seven spheres of nuclear energy, such as the extraction and exporting of uranium, nuclear fuel component fabrication, nuclear technology research and development, and so forth.[3]

Regarding uranium, an agreement was reached in 2006 between *Sumitomo Corp*., *Kansai Electric Power Co., Inc.* and *NAK Kazatomprom* regarding the development of the West Mynkuduk uranium deposit in Kazakhstan (estimated yearly output of 1,000 metric tons of uranium per year).[4] Subsequently, the *Marubeni Corp, Tokyo Electric Power Co., Inń., Chubu Electric Power Co.,* and others, together with *NAK Kazatomprom*, obtained rights to develop the Kharasan-1 and Kharasan-2 uranium deposits (2,000 metric tons per year).[5]

Today, the annual consumption of natural uranium in Japan is 8,000 metric tons. According to data obtained from the Federation of Electric Power Companies of Japan, 94 percent of the uranium consumed in 2005 was imported from four countries: Canada (36 percent), Australia (36 percent), Niger (11 percent), and Namibia (11 percent). Until recently, imports from Kazakhstan accounted for only 1.2 percent of uranium consumption.[6] On the basis of a series

of agreements signed with Astana in 2006–2007, Japan obtained rights to extract uranium that could supply 30–40 percent of the country's total requirements.[7] Japan's active policy to acquire rights to extract uranium in Kazakhstan is a consequence of significant changes in the structure of the global demand for uranium.

The current volume of production of natural uranium (40,000 tons) can meet 50–60 percent of global demand (about 70,000 metric tons). This shortage is currently being covered by existing reserves that were accumulated during the 1990s as a result of low prices and secondary sources of uranium, including uranium obtained by depleting highly enriched uranium (HEU), or removed from nuclear warheads. However, it is predicted that, as a consequence of decreased uranium production from secondary sources, and also in view of the large-scale increase in demand for uranium from India, China, and other countries, its future supply in the market will become insufficient to meet global demand. Hence, an increase in the production of natural uranium will be necessary on a global scale.[8]

In this sense, from the standpoint of the energy security of Japan, the exploitation of new uranium deposits in Kazakhstan is of no small significance.

URANIUM ENRICHMENT SERVICES IN RUSSIA

Another important problem facing Japan's government and nuclear industry is to establish a practical form of cooperation in the area of nuclear energy with Russia. Japan's own uranium enrichment capacity currently provides only 10 percent of the country's total requirements, and in the future, only 30 percent of this demand will be met (1.5 million SWU).[9] For this reason, Japan will remain dependent on obtaining uranium enrichment services from abroad for the foreseeable future.

At present, there are four companies in the world that can export uranium enrichment services. These are the German-British-Dutch consortium *Urenco*; *Eurodif,* which is a wholly-owned subsidiary of the French company *Areva*; the American company *USEC*, and the Russian company *Techsnabexport*. Among these companies, the latter has the largest capacity for supplying uranium enrichment services, estimated to be approximately 20 million SWU, or 40 percent of total world capacity.[10] After a sharp increase in prices for natural uranium, there has also been a gradual increase in the cost of enrichment services.[11] Foreseeing a significant increase in the demand not only for natural uranium but for enrichment services as well, Japan intends to develop close cooperation with Russia as one of the main suppliers of this service to the world market.

Japanese power companies headed by *Tokyo Electric Power Co.* are already acquiring from *Techsnabexport* 12 percent of Japan's total requirement for uranium enrichment services. This, however, is a result of secondary contracts derived from the U.S.-Russian HEU-LEU agreement. This is why, for instance, when it is necessary to place an order with *Techsnabexport* to enrich a portion of 6,400 metric tons of reprocessed uranium stored in Great Britain and France, Japan must sign a bilateral agreement in the area of nuclear energy with Russia. With respect to uranium that will be extracted on Kazakh territory that is geographically and economically in close proximity to Russia, it is fully appropriate to rely on *Techsnabexport* as the primary supplier of enrichment services. These are the opportunities that the Japanese government is currently considering.[13]

THE MOSCOW-ASTANA PARTNERSHIP

For its part, Russia is experiencing a shortage of natural uranium deposits on its territory.[14] For this reason, when implementing the International Uranium Enrichment Center (IUEC), the necessity arises to involve, first of all, Kazakhstan, with its significant uranium reserves.

In October 2006, Russia and Kazakhstan established three joint ventures (JV) in the area of nuclear energy: (1) the JV *Nuclear Power Plants* to develop and market power installations with low- and medium-capacity nuclear reactor projects in Russia, Kazakhstan, and third countries;

(2) the JV *Akhbastau* to develop the Yuzhnoe Zarechnoye deposit and parts of the Budennovskoye deposit on the territory of Kazakhstan; (3) the JV Center for Uranium Enrichment[15] for enriching uranium mined in Kazakkstan at the Angarsk Electrochemical Combine (*AEKhK*) enrichment facilities. Moreover, in May 2007, Kazakhstan decided to participate in the IUEC project in Angarsk,[16] acquiring 10 percent of the company's stock.[17]

In total, in the words of Rosatom chief Sergey Kiriyenko, three independent projects will be implemented in Angarsk. First, the combine itself will be constructed, the capacity of which will nearly double by the year 2015. Next will come the formation of the IUEC and, finally, the third project – the Russian-Kazakh JV Center for Uranium Enrichment.

Whether the aforementioned Russian-Kazakh JV will join the IUEC in the future or whether they will operate independently is difficult to say at this time. Nevertheless, it can be said with certainty that, in any case, a significant portion of the uranium obtained by Japan in Kazakhstan will be enriched at Angarsk.

RESTRUCTURING THE NUCLEAR INDUSTRY IN RUSSIA

The world market for nuclear power plants is undergoing an intensive shake-out. The major battle is taking place among three conglomerates – the Japanese-American *Toshiba-Westinghouse*, the Franco-Japanese *Areva-Mitsubishi Heavy Industry,* and the U.S.-Japanese *GE Nuclear Energy-Hitachi.*

In early 2008, the federal agency for nuclear energy, in an attempt to create a vertically integrated holding company that would be competitive outside of Russia, formed *JSC Atomprom*, which integrates key Russian nuclear power concerns and forms part of the state-owned company *Rosatom*. It has fallen to *Atomprom* to meet the ambitious goal of capturing 20 percent of the world market for the construction of new atomic power plants within the next 30 years through the expansion of international cooperation and the formation of JVs with foreign companies.[18]

Russia produces and exports light water reactors (VVER), which, due to their cost, remain competitive on the world market. A great deal of Russian-produced equipment such as turbines and automated process monitoring and control systems, are, however, inferior to their Western equivalents.[19] In particular, until recently, Russia had no facilities capable of manufacturing low-speed turbines for nuclear power plants.[20] To solve this problem, the Russian company *Atomenergomash*, which is now a part of *Atomprom*, and the French company *Alstom* formed a joint venture to produce low-speed turbines in June of 2007.[21]

In the future, it is entirely possible that by expanding international cooperation and by forming JVs with foreign partners, *Atomprom* will be able to offer its partners either a guarantee of long-term uranium enrichment services or a market niche in the production of nuclear power plants in Russia (it is planned to build a total of 40 new nuclear reactors by the year 2030).[22]

A NEW MODEL FOR CONDUCTING NUCLEAR BUSINESS: *TOSHIBA* BETWEEN MOSCOW AND ASTANA

In the meantime, the rules of conducting business in the nuclear power industry are radically changing. Against the background of the growing demand for fuel for nuclear power plants, additional competitive advantages are being gained by those companies which, in addition to building nuclear power plants, can guarantee long-term supplies of nuclear fuel.

The leader in implementing this business model is the French company *Areva,*[23] which offers a *service package* that supports the nuclear fuel cycle (NFC) from developing uranium deposits and enriching uranium to re-processing SNF.[24] One can certainly expect that the shake-out that is now occurring among companies that produce nuclear reactors and equipment for nuclear power plants will, in the near future, affect all aspects of the NFC.

In this sense, *Toshiba*'s attempts to establish strategic relationships with *NAK Kazatomprom* and with *JSC Atomprom* merit special attention.

In April 2007, a joint memorandum on cooperation in the area of nuclear power was signed between Japan and Kazakhstan.[25] On August 12, 2007 *Toshiba* and *Kazatomprom* announced the signing of an agreement by which the Japanese company would transfer $540 million worth of *Westinghouse* shares to the Kazakh holding company (*Toshiba* maintained its controlling interest in *Westinghouse,* keeping 67 percent of the company's stock for itself).[26] On August 20, 2007, *Toshiba* officially confirmed its participation in developing the Kharasan uranium deposit in southern Kazakhstan. As a result of this deal, *Toshiba* obtained the rights to mine 850 metric tons per year.[27]

Finally, on March 20, 2008, *Toshiba* and *Atomprom* signed a framework agreement to develop cooperation in the peaceful use of nuclear energy. On the basis of this agreement, the parties will begin preparing the technical and economic justification for exploring cooperation in various areas, including the design and engineering of nuclear power plant structures, the production and servicing of large equipment, and the production of products and services pertaining to the nuclear fuel cycle.[28]

One can certainly presume that the *Toshiba* company regards the French company *Areva* as its main rival in the global market for nuclear power plants.[29] And, in order to compete successfully, *Toshiba* must establish international cooperation that would guarantee access to uranium enrichment services. In this context, it is completely natural that *Toshiba* would look to *Atomprom* as a potential strategic partner not only on the Russian market for nuclear power plants, but on the global market as well.

Here it is worth noting that *Toshiba*'s active engagement with Kazakhstan and Russia is fully supported by the Japanese government.

SIGNIFICANT PREREQUISITES

At this point, there is no doubt that there are major significant prerequisites that will allow Japan and Russia to establish a strategic partnership in the area of nuclear energy in the near future. Both Japan and Russia have assumed strategic positions in Kazakhstan; thus, the interests of both countries have merged so closely that to let bilateral cooperation weaken is simply impossible.

Here, within the framework of establishing cooperation with Russia, a key role will be played on behalf of Japan by *Toshiba,* which has already succeeded in building strategic relationships with *Kazatomprom* and which has also signed a framework agreement to develop cooperation in the area of nuclear power with *Atomprom*.

To reiterate, *Toshiba*'s highest priority within the framework of its partnership with Russia is to obtain the ability to supply uranium enrichment services to the global market. In this regard, the company's management will look favorably on participating in the work of the IUEC as part of its global business strategy.

And when *Toshiba, Atomprom,* and *Kazatomprom* can find a mutually beneficial formula for cooperation, the door will be open for the formation of a trilateral strategic relationship in the area of nuclear energy among Japan, Russia, and Kazakhstan.

Notes

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Nikolay Sokov

CENTRAL ASIA: S.O.S FOR *NUCLEAR ZERO*

Central Asian Nuclear-Weapon-Free Zone (CANWFZ) Treaty signed by five Central Asian states on September 8, 2006 in Semipalatinsk became a prominent landmark in nuclear disarmament, especially against the background of a complete stagnation, and sometimes even a rollback in this area. Its ratification is well under way (as of May 1, 2008, it has been ratified by Uzbekistan, Kyrgyzstan, and Turkmenistan) and it can be expected to enter into force in foreseeable future.

There is a problem in having the nuclear weapon states (NWS) recognize the zone: traditionally the five *officially* nuclear states (the ones mentioned as such by the Nuclear Non-Proliferation Treaty) are to sign a protocol on security assurances for countries of the zone thus officially recognizing it. Such a protocol is open to be signed within CANWFZ framework too. The new zone has already received support from two NWSs, i. e. Russia and China, while the United States, the United Kingdom, and France did not give their support. Moreover, if members of the new zone comply with conditions of the three Western countries (which are described above) to win their support, they risk losing support of Russia, and most probably China too. A deadlock, in other words.

Theoretically, the deadlock could be ignored, following the advice by Hodja Nasreddin*:* «In ten years a lot might happen: I might die, or Tamerlane might die or surely enough this old donkey might die.» Past example: the Western states took ten years to sign protocols to the Treaty of Rarotonga (South-Pacific nuclear-weapon-free zone). Nuclear states often included covenants like this one: when ratifying Additional Protocol to the Treaty of Tlatelolco (Prohibition of Nuclear Weapons in Latin America and the Caribbean), the Soviet Union was against transit of nuclear weapons through the zone.

However, this approach can hardly work for CANWFZ: controversy around it is becoming part of a multilevel *great game* for influence in the region, of which the good initiative could become a victim. Moreover, it could happen that the controversy would further aggravate ongoing conflicts and cause new ones. There is still some time to come up with a solution, but there isn't much of it.

Here the author would not regard the CANWFZ confrontation (2:3) as unavoidable: a thorough analysis of legal provisions proves it that the Western countries could ratify the protocol without further delay and without undermining their nonproliferation principles. To speed up that process Russia could take some extra unilateral steps, also without sacrificing its practical interests in Central Asia, that would make the *de facto* non-nuclear status of new NATO members even stronger.

CONFRONTATION CORE–COLLECTIVE SECURITY TREATY

A major reason behind the negative attitudes of *the Western NWS troika* towards the new zone is Article 12 of CANWFZ Treaty, more specifically, its first paragraph: «This Treaty does not affect the rights and obligations of the Parties under other international treaties which they may have concluded prior to the date of the entry into force of this Treaty.»[1] This provision can be interpreted in a way that would allow deploying Russian nuclear weapons within the territory of four out of five zone members, meaning those that are also members of Collective Security Treaty Organization (CSTO), i. e. all of them except Turkmenistan. This might mean a controversy: on the one hand, the zone is free from nuclear weapons, while on the other hand, such weapons could be deployed: some *fuzzy logic.*

Several options are proposed. The most radical solution supported by *the Western troika* would consist in dropping Article 12 either before the Treaty enters into force or as an amendment. This option looks very much improbable since the treaty has already been ratified by three parties. Any change could lead to a break in their relations, and if Article 12 is indeed dropped, it would eventually weaken or even disband CSTO, as proved below, and would also lead to increased opposition in relations between Russia and the West. Even now the controversy around CANWFZ is regarded by Russia in the context or even as an effort to undermine CSTO. As far as the zone recognition is concerned, negative attitudes of *the Western troika* might be exchanged for the same of Russia, which again means that support of all the five NWSs cannot be secured in any case.

A milder option would mean reinterpreting CST in a joint statement of CANWFZ members (or in another form), stating that it does not provide for nuclear weapons to be deployed within the territory on non-nuclear CSTO members. Under this scenario consequences would be less dramatic, but generally similar to option one: a conflict within CSTO related to the interpretation of commitments, a potential conflict between Central Asian State Parties to CSTO, Russia withdrawing its support of the zone, aggravated relations between Russia and the West.

Nevertheless, first analysis of decisions adopted by the Preparatory Committee for the 2010 NPT Review Conference during its 2008 session indicates that they are more or less focused on dropping Article 12. The working paper presented by its Chairman Ambassador Vladimir Yelchenko, Permanent Representative of Ukraine to the International Organizations in Vienna, mentions «the need for further consultations» among concerned countries in accordance with the 1999 United Nations Disarmament Commission guidelines.[2] Those guidelines of 1999[3] mention two very relevant recommendations. One provides for consultations with NWSs when negotiating a nuclear-weapon-free zone to secure their support. This doesn't change much as it remains unclear what to do if they fail to agree. The other provision says that the nuclear-weapon-free zone treaty should prevent its parties from allowing other states to deploy nuclear weapons within the zone.

However, the question is not that clear and simple. Before looking at these solution options regarding Article 12 and coming up with new ones, let's see whether or not nuclear weapons are indeed a collective security measure under CST. There has never been any need to consider this question, hence totally opposite opinions exist today. And another thing: let's see how provisions of the two treaties, CST and CANWFZ, correlate.

CST AND NUCLEAR WEAPONS

To answer the first question it is important to remember that CST was drafted to resemble the North Atlantic Treaty (signed in Washington in 1949), which laid the foundation of NATO. Close resemblance between the two papers is no accident: in 1992 the treaty signed in Tashkent was planned to become a large-scale politico-military union, very much like NATO. CSTO was to save or supersede (opinions varied) CIS Joint Armed Forces (JAF), which at the time were promptly dividing into national armies (besides, political leaders were not comfortable with a *de facto* uncontrolled supranational entity). Real life was no close to the plans. When drafting the Treaty and later on, the question of nuclear weapons was never seriously considered, just

because there was no real need. Hence, when looking into the situation we should proceed from the letter of the Treaty. Especially given the Roman saying: *pacta sunt servanda*.

Collective Security Treaty 1992[4]	**North Atlantic Treaty 1949**[5]
Article 2 Member States shall hold consultations between themselves on all significant issues of international security related to their interests and agree on their positions thereto. Should there be a threat to national security, territorial integrity, or sovereignty of one or several Member States, or a threat to the international peace and security, Member States shall start without delay mutual consultations to coordinate their positions and take measures to counter the treat.	Article 4 The Parties will consult together whenever, in the opinion of any of them, the territorial integrity, political independence or security of any of the Parties is threatened.
Article 4 If a Member State becomes a victim of aggression of a state or a group of states, that aggression shall be treated as if it were against all Member States of this Treaty. In case of an aggression against any Member State all other Member States shall provide it with all the necessary assistance, including military aid, and will use available means to render support exercising the right of self-defence under Article 51 of the UN Charter.	Article 5 The Parties agree that an armed attack against one or more of them in Europe or North America shall be considered an attack against them all and consequently they agree that, if such an armed attack occurs, each of them, in exercise of the right of individual or collective self-defence recognised by Article 51 of the Charter of the United Nations, will assist the Party or Parties so attacked by taking forthwith, individually and in concert with the other Parties, such action as it deems necessary, including the use of armed force, to restore and maintain the security of the North Atlantic area.

Conclusions are obvious. Firstly, there is nothing in CST that would mean nuclear weapons are excluded from «all the necessary assistance, including military aid». Secondly, even if the North Atlantic Treaty allows for nuclear weapons to be deployed in non-nuclear members of the alliance, CST allows the same and to the same extent.

Practical steps in nuclear weapons deployment within NATO framework were governed not by the treaty itself, but by special agreements, whereas the treaty only served as a legal foundation for them. It seems that should a similar issue be raised within CSTO, deployment of nuclear weapons would be governed by special agreements within the framework of Collective Security Treaty. The procedure defined in it does not mean, however, that should there emerge a threat, it would be possible to deploy nuclear weapons at the discretion of a Member State. In such a situation the parties hold consultations and define political, military, and other measures to counter the treat. So, nuclear weapons can be deployed by mutual consent, and, obviously, the status of such forces and weapons should be governed by a special agreement.

In this context it is important to look at the second paragraph of Article 12 of CANWFZ Treaty: «The Parties shall take all necessary measures for effective implementation of the purposes and objectives of this Treaty in accordance with the main principles contained therein.»[6] It can be understood that the Parties would refrain from requesting deployment of nuclear weapons within their territory. This paragraph does not question their rights and commitments under

Article 2 and Article 4 of CST, but rather defines some practical aspects of their implementation.

In other words, there should be, in fact, no issue around Article 12: though its first paragraph provides for nuclear weapons deployment under certain conditions and procedure, the second paragraph indicates that the legal right would not be implemented in practice (obviously, except some extraordinary circumstances). It means that in fact even when negotiating the Treaty CANWFZ members followed 1999 United Nations Disarmament Commission guidelines: the Treaty contains a provision guaranteeing that no third country would deploy nuclear weapons in the zone.

A logical question: what is then the purpose of Article 12? Its meaning becomes more clear when looking at Article 8 of CST: «Member States undertake never to enter into treaties that would contradict this Treaty». If Article 4 implies that nuclear weapons are part of «all the necessary assistance», then without Article 12 CANWFZ Treaty would mean a violation of commitments under Article 8 of CST. At the same time, a combination of the two paragraphs in Article 12 allows to keep CST as it is, and ensure a non-nuclear status for the region.

Thus, dropping Article 12 is not as easy as it may seem: before removing it from CANWFZ Treaty its Member States are to withdraw from CSTO or al least amend CST. Obviously, that would be a very serious decision. To take it they first have to ponder whether dropping Article 12 (to be more precise: whether their readiness to meet *the Western troika* halfway) is more important for them than consequences of withdrawing from CSTO and severance of relations with Russia, the latter including not only politico-military relations, but politico-economic as well.

The same question is for *the Western troika,* which seems not to have analyzed the situation in full, and does not completely understand the political and economic price to be paid by the four Central Asian states. It is hardly an evil plan, but rather lack of understanding of the legal provisions. It is a frequent case in policies of Western countries, it is especially true for the United States: decisions are based only on factors directly related to the parties concerned, and all by itself such a decision is considered the best one. Consequences for other countries are often overlooked, while attempts to explain that interests of Western partners could be met in a different fashion are perceived as unconstructive cooperation.

WHAT ARE THE STAKES?

Even though Article 12 in its current wording generally solves the issue between CST and CANWFZ Treaty, it would be beneficial to look for extra measures to secure the non-nuclear status of the zone in a more reliable form, as well as to remove the opposition of *the Western troika.* Unquestioned status of the zone would ensure its role as a step forward in nuclear disarmament and would thus make a contribution in supporting the nuclear nonproliferation regime.

As it was said before, the most apparent option of removing Article 12 or reinterpreting commitments under CST is far from being the best solution.

Dropping Article 12 or a new CST interpretation would imminently cause an emotional response of Russia, which would rather mean a strong opposition to such a solution. The blame will be mostly on *the Western troika,* mainly on the United States. Regardless of the motivation behind it, the proposal would be interpreted as a hostile move in the context of trying to gain influence in Central Asia.

The consequence would at least mean longer time to ratify the zone as Russia would most probably refuse to sign Additional Protocol to CANWFZ Treaty, China might do that too.

Moreover, the Central Asian countries are not inclined to alter the Treaty, as was proved by its ratification in Turkmenistan, hence the solution Western countries see as the best one is simply impossible. Thus, complete ratification of the zone is still indefinitely postponed.

Even if it happened so that some of the four CSTO countries in the zone change their minds in favor of dropping Article 12 or reinterpreting CST, then the negative consequences for relations between Russia and the United States, Russia and the West, would be complemented by

polarization inside Central Asia: countries having ratified the Treaty and those that do the bidding of *the Western troika* are sure to be in disagreement. If amendment is considered, it may prevent the Treaty from entering into force for quite a long time.

Considering the above, it becomes clear that the solution should be a compromise rather than a confrontation. It should strengthen the status of the nuclear-weapon-free zone, not undermine existing security mechanisms. It is hard to find, mostly for psychological reasons, as each side would have to abandon the option it prefers most. However, only such approach can ensure a sustainable and lasting solution to avoid political and other downsides connected with preventing the treaty from entering into force, and also a potential confrontation, which would be much worse. Hence, *the Western troika* is to establish how important it is for them to see Article 12 removed. And namely, are they ready to aggravate relations with Russia, are they ready to make countries of Central Asia pay their price for such a decision?

As to Russia it is primarily to decide, what *the stakes* are. For Russia it is even more important than for the other nuclear weapon states. For *the Western troika* the issue of Article 12 is more of a relatively abstract principle (removing uncertainty about status of the zone). For Russia it means survival of CSTO, which makes the stake enormously higher. For both sides the issue is also about Russia's influence in Central Asia. However, for Western countries it would be important, but not crucial to undermine that influence, whereas for Russia the stake is again tremendous. In other words it is Russia that should be interested in resolving the issue around Article 12 so that it does not become part of *the great game,* but the solution should not mean giving up Russia's core interests.

It is important to consider, however, that even raising the question of nuclear weapons deployment in Central Asia would undermine a well-known Russian position that nuclear weapons can only be placed within countries having them in their possession (which in practice would mean removing American nuclear weapons from Europe). If Russia openly pushes for its right to have nuclear weapons in Central Asia, it would be hard to insist on removing American nuclear weapons from Europe. Here the current position of Russia that consists of deploying nuclear weapons only in territories of nations possessing them is of principal importance as even the minor probability of American nuclear weapons being moved into Eastern Europe should not be overlooked. After all, a commitment not to do so is not legally binding.

So, Russia's long-term interests would be met if the region remains free from nuclear weapons, any nuclear weapons in the long run. It is not only about whether or not Russia will deploy its nuclear weapons in Central Asia. It is more important to ensure the region remains free from nuclear weapons controlled by any other state. Eventually, CANWFZ really meets Russian interests, and is something to fight for.

For Russia it is not about an abstract right to deploy nuclear weapons in Central Asia, but rather about the status of CSTO, strength of its positions and other similarly important issues. Here the most controversial issue–whether Russia has and will have the right to deploy nuclear weapons in Central Asia–seems to be rather theoretical. It is hard to imagine a situation for this option to appear on the agenda. It is only possible in case of an exceptionally drastic aggravation of the situation in the region with a significant external threat, which would be a *force majeure* anyway. This could be, fancy it, Iran making nuclear weapons and threatening Central Asia. But in practically any scenario nuclear deterrence of such external threat aiming at Central Asia can be done from Russian territory. An open discussion of whether or not nuclear weapons can be placed in another CSTO member–Belarus–can only provoke the United States to deploy such weapons in Poland and, possibly, other new NATO members.

POTENTIAL SOLUTION

Given the above, the best solution to strengthen Central Asia as a nuclear-weapon-free zone without touching CST would be a political commitment not to deploy nuclear weapons in the zone, very much like NATO has undertaken for the territories of its new members.

In 1997, when Russia and NATO were negotiating the first stage of NATO enlargement, Russia requested that no nuclear weapons should be deployed in the territory of new Member

Countries. Moscow insisted it should be made in a legally binding form. On its part, NATO said a binding provision would violate the Treaty of Washington, which it cannot accept: two kinds of Member States would appear, *old* ones, where nuclear weapons can be deployed, and *new* ones, where it would be impossible to do so. Instead of a legally binding provision NATO opted for a political commitment incorporated in the Founding Act on Mutual Relations, Cooperation and Security between NATO and the Russian Federation (Paris, May 27, 1997), which reads as follows:

> «The member States of NATO... have no intention, no plan and no reason to deploy nuclear weapons on the territory of new members, nor any need to change any aspect of NATO's nuclear posture or nuclear policy – and do not foresee any future need to do so. This subsumes the fact that NATO has decided that it has no intention, no plan, and no reason to establish nuclear weapon storage sites on the territory of those members, whether through the construction of new nuclear storage facilities or the adaptation of old nuclear storage facilities. Nuclear storage sites are understood to be facilities specifically designed for the stationing of nuclear weapons, and include all types of hardened above or below ground facilities (storage bunkers or vaults) designed for storing nuclear weapons.»[6]

Making a similar–even in its wording–commitment by Russia in relation to CANWFZ could contribute to resolving the issue around Article 12. Such a commitment could be made together with signing the Protocol to CANWFZ Treaty. Such a solution has some advantages.

Firstly, legal, political, and organizational basis of CSTO remain unchanged, the issue is resolved via a stand-alone statement made within a different framework and in a different context. It allows avoiding a discussion (which can occur despite a clear sense of CST), whether or not it is theoretically possible to deploy nuclear weapons under CSTO. Such a discussion is not needed and would even be harmful.

Secondly, the initiative to resolve remains with Russia, not imposed externally. It is always harder to respond, and it requires many more concessions, than to shape an own agenda.

Thirdly, there will be parallel commitments of Russia towards CANWFZ and NATO towards its new Member Countries, which would make the latter more reliable. That is to be facilitated by copying NATO wording. So, if NATO (though in a very much improbable scenario, but still...) decided to withdraw its commitments not to deploy nuclear weapons and infrastructure within the territory of its new members, it would automatically remove Russia's commitments towards CANWFZ. That would mean a higher price to pay for NATO to withdraw its commitments of 1997. It would be a small win, since NATO really doesn't seem to have such plans, but it really would make the situation more predictable.

Obviously, there is a difference: new NATO members never chose to be an nuclear-free zone. Some would even welcome nuclear weapons in their territory. But if NATO in general and *the Western troika* in particular would really like to see Central Asia as a non-nuclear zone, it would mean some positive impact in Europe too.

Fourthly, there is no sacrifice on the part of Russia, it is a political commitment to reaffirm the actual state of things: deployment of nuclear weapons in Central Asia is really not on the agenda.

It remains an open question, whether such political commitments of Russia would satisfy *the Western troika* or they would still insist on a legally binding solution. The latter is a probable scenario, but then comes a counter-question: if NATO believes its political commitment would suffice for Russia, why would a Russian political commitment not suffice for NATO? The form of a politically binding commitment was proposed by NATO mainly as a means to acknowledge the actual state of things without changing the legal framework: the Treaty of Washington remains untouched, while Russia gets its guarantees. The same arguments apply to the proposed solution: CST remains untouched, but *the Western troika* gets its guarantees for the nuclear-weapon-free zone. This can be argued, but can hardly be repelled.

Opposition may be expected inside Russia as well: they would say there is nothing to discuss, and there is no point in making concessions in a region of Russia's vitally important interests. Such a position looks exceptionally good rhetorically and as a populist stance, but may spell losses in real politics. A reminder: in the late 1980s similar calls «do not let Eastern Germany

go» were rendered as practically no clear position of the Soviet Union regarding the reunification of Germany. The initiative was with the West, until the very last moment, when it was impossible to change the matter in principle. There was a point in time, though, when it was possible to secure a neutral and non-aligned status for the united Germany, then NATO enlargement would be impossible. It isn't about regrets regarding NATO membership for the united Germany, this decision has its positive and negative sides, but this old story shows that pseudo-patriotic propaganda would normally bring a result opposite to the one anticipated.

In conclusion, let's get back to the idea expressed early in this article. Establishing a nuclear-weapon-free zone in Central Asia meets the interests of international security, as well as those of Russia. Delaying its complete entry into force is not just counter-productive, but may even lead to failure of the whole project. That's why CANWF Treaty is something to fight for, also through finding mutually acceptable solutions for issues that are yet controversial.

Notes

[1] Central Asian Nuclear-Weapon-Free Zone Treaty, Semipalatinsk, Kazakhstan, September 8, 2006, http://www.cns.miis.edu/pubs/week/pdf_support/060905_canwfz.pdf (last accessed on June 12, 2008).

[2] NPT PrepCom 2008. Chair's Factual Summary, May 9, 2008, Paragraph 41. *Acronym Institute,* http://www.acronym.org.uk/npt/08chair.htm (last accessed on June 12, 2008).

[3] United Nations. Disarmament Commission Adopts Guidelines on Nuclear-Weapon-Free Zones, Conventional Arms, as It Concludes Three-Week Session. Press Release DC/2641 231st Meeting (PM), April 30, 1999, http://www.un.org/News/Press/docs/1999/19990430.DC2641.html (last accessed on June 12, 2008).

[4] Central Asian Nuclear-Weapon-Free Zone Treaty...

[5] Collective Security Treaty, Tashkent, Uzbekistan, May 15, 1992, http://www.pircenter.org/kosdata/page_doc/p1494_1.pdf (Russian text only) (last accessed on June 12, 2008).

[6] Founding Act on Mutual Relations, Cooperation and Security between NATO and the Russian Federation, Paris, France, May 27, 1997, http://www.nato.int/docu/basictxt/fndact-a.htm (last accessed on June 12, 2008).

ABACC Additional Protocol Anti-Ballistic Missile Treaty Atomenergoprom Atoms for Peace Ballistic missile Bushehr nuclear power plant Comprehensive Test-Ban Treaty Cooperative Threat Reduction Core Dimona Dirty bomb Euratom Fissile materials Highly enriched uranium International Atomic Energy Agency Intermediate-Range Nuclear Forces Treaty

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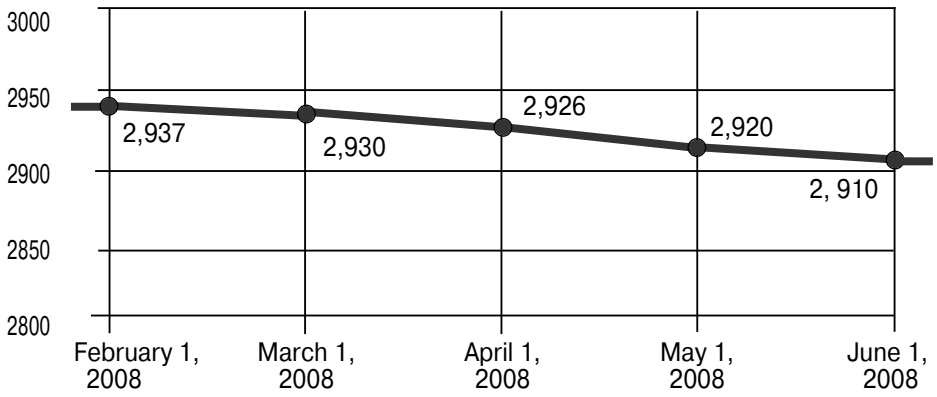
Limited Test Ban Treaty Non-nuclear weapon state Nuclear energy Nuclear power plant Nuclear-powered submarine Nuclear Suppliers Group Nuclear-weapon-free zone Nuclear weapon state Opacity policy Pelindaba Rarotonga Rosatom Safeguards Semipalatinsk Strategic Offensive Reductions Treaty Separative work unit START Warhead Weapons of mass destruction

Figure 1. **The *iSi* International Security Index (May–June 2008)**



THE iSi INDEX IN MAY–JUNE 2008: DOWNWARD TREND CONTINUES

The life, health, and wellbeing of people living on Earth, *citizens of the planet*, is the main criterion for assessing the state of the military, political, terrorist, environmental, and economic components of security, which form the basis of the universal ***iSi*** Index.[1] The success or failure of military action, diplomatic games, political campaigns, and economic projects is assessed precisely from the point of view of its effect on the safety of life and creative activity of people living in a specific region or the world as a whole. Military clashes, tests or deployment of new weapons, border closures or any other crises in international relations, economic destabilization – all result in a reduction of the Index, whereas any step towards resolving these issues or even just a proposal of a positive initiative improve the *iSi* by one or several points.

Growing food prices, an increased threat of hunger for millions of people, and the tragic consequences of the natural disasters in Myanmar and the Chinese province of Sichuan have if not overshadowed then considerably exacerbated political problems that normally contribute the most to the *iSi* figure. In the end of March the Index stood at **2,926** points, in April it dropped to **2,920** and by June 1 fell still further, down to **2,910**.

- **China**. The earthquake on May 12, whose epicenter was located 90 km from the capital city of the Sichuan province, killed over 62,000 people, with a further 23,000 people missing and over 350,000 injured. More than 14 million people have been evacuated from the affected area. Tremors continued for two weeks more after the quake. The situation was further complicated by torrential rains on May 27 and the danger of flooding posed by new lakes created by rivers clogged by landslides. Another problem that hit China was an enterovirus outbreak that affected over 27,500 children.

Despite these large-scale natural disasters, there has been no reduction in political activity in China and around it. At a meeting between the Dalai Lama and the Chinese authorities an agreement was reached to continue consultations. For the first time in the last 10 years the chairman of the People's Republic of China visited Japan, while on May 28 Chinese leader Hu Jintao had the first ever meeting with the chairman of the Taiwanese *Kuomintang* party, Wu Po-hsiung, who was visiting mainland China.

- **Myanmar**. On May 2 Maynmar was hit by a powerful tropical cyclone *Nargis*. Over 133,000 people were killed or went missing, with a total of 2.5 million people affected by the disaster. For the first two weeks the military authorities prevented foreign and international organizations from delivering relief aid to the affected population. One of the reasons for that was that they were wary of foreign influence over the referendum on the country's new constitution. Only on May 23 UN Secretary General Ban Ki-moon, on a visit to Myanmar, managed to reach an agreement with the country's authorities to allow representatives of international humanitarian organizations access to the affected parts of the country. The referendum was held in two stages: on May 14 and May 24. Under the new constitution that came into effect on May 29, the country will hold a general election in 2010.
- **North Korea**. Following compromises reached at the April and May talks between North Korea and the United States in Singapore and Pyongyang, tension surrounding the North Korean nuclear program has reduced. North Korea supplied the U.S. side with documents on its plutonium production. The issue of resuming the six-way talks in July 2008 is continued to be discussed.
- **Iran.** No way out of the deadlock of the Iranian nuclear problem has yet been found. Tehran agreed to hold talks with the six countries without any preconditions, invited Japan to cooperate in the nuclear sphere but failed to agree with the IAEA over its assessment of Iran's nuclear activity. According to a report by IAEA Director General Mohamed ElBaradei released in late May and presented at a session of the organization's board of governors on June 2, Iran did not disclose full information on its nuclear research.

- **Middle East.** At a meeting in Doha on May 21, Lebanese political forces reached a long-awaited compromise that resulted in the formation of a government of national unity, comprised of 30 ministers, including 11 representatives of the opposition *Hezbollah* movement. The opposition was given veto rights in the new government. After eight months of failed attempts to vote for a new president, on May 25 the country's parliament elected the former army chief, Michel Suleiman, as the new president. The country's population greeted the news of the political truce with celebrations. Fuad Siniora retained his post of prime minister.

The celebrations of the 60th anniversary of the establishment of the state of Israel in mid-May passed without any significant incidents, however Prime Minister Ehud Olmert is facing possible resignation over a corruption scandal. On May 21, peace talks between Israel and Syria resumed–under Turkish sponsorship–after an eight-year break.

- The signing on April 27 in Luxembourg of the **Serbia**-EU Stabilization and Association Agreement, marking Belgrade's first step towards EU membership, and the convincing victory in the parliamentary election of the *Boris Tadic–For European Serbia* coalition, with 38.4 percent of the vote over the 29.45 percent won by the *Serbian Radical Party* brought clarity as to the prevailing mood in Serbian society and reduced the risk of a possible escalation of tension over Kosovo. NATO built up its KFOR presence in the province ahead of the expected adoption on June 15 of the constitution of the self-proclaimed state.
- The crisis in relations between **Georgia** and Russia is becoming more tense. The UN observation mission in Georgia has concluded that it was a Russian fighter that on April 20 downed a Georgian UAV. Without casting doubt on the competence of UN experts, Moscow accused Tbilisi and *independent* experts of supplying «tendentious and biased materials».
- The problem of **growing food prices** is becoming more acute. On April 18, the head of the UN World Food Program, Josette Sheeran, announced that there was a shortage of humanitarian food aid, while on April 20 UN Secretary General Ban Ki-moon said that the current situation was threatening efforts to reduce poverty in the world.

Albert Zulkharneev

Note

[1] The index shows how much the current situation is different from *the ideal condition*, which in *iSi* terms stands at **4,210** points. The higher the threats to human life and activities are, the lower the Index is and vice versa. The chronology of events that have influenced the *iSi* Index, *the methodology for calculating the Index,* monthly *iSi* calculations, and experts' comments are published on the PIR-Center website at http://isi.pircenter.org. The publication of each *iSi* Index is accompanied by a survey among the International Expert Group that includes representatives from Russia, Kazakhstan, India, China, United States, France, Saudi Arabia, and other countries. The experts' comments, in no way affecting the calculated Index value, make it possible to see how changes in security are perceived in different parts of the world.

A VIEW BY A *RUSSIAN LIBERAL*: UNCERTAINTY GROWS

The last two months of spring 2008 did not see any dramatic international events of global scope, fierce confrontation on the world arena, or an unexpected truce between previously irreconcilable opponents. And yet it was a very interesting and important period. In May 2008 senior political leadership in Russia changed. However, by the beginning of summer neither competent analysts nor *professional coffee cup readers*, telling fortunes on coffee grounds stolen from Kremlin cafeterias, were able to come to a definitive conclusion as to the consequences of the handover of power in the Kremlin. Questions remain: will it be possible to

avoid a devastating conflict in the bureaucratic system created by dual power and what effect will the change of power have on Russia's foreign policy; will the increasingly confrontational trend in Russia's actions on the international arena be stopped? This probably reflects the current state of affairs in Russian politics, which in the course of the next several months may follow different paths, including very risky ones.

The U.S. presidential race entered its crucial phase, however nobody would venture to predict its outcome. One thing is clear: no matter who of the three, or rather two, main contenders for the presidential post–John McCain or Barack Obama–wins the election, the foreign policy of the modern world's most powerful country will undergo interesting transformations. So it is understandable why analysts all over the world were following the twists and turns of the U.S. *primaries*, in which the presidential candidate from the Democratic Party was to be decided, with bated breath.

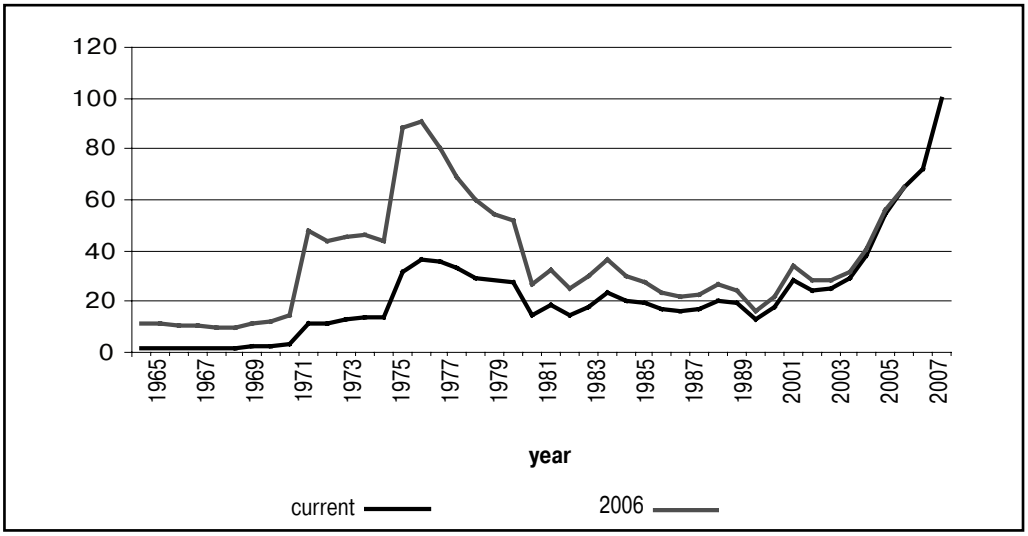
Oil prices continued to grow and in spring 2008 reached an absolute maximum for the past 150 years, not only in current but also in constant price terms. That, naturally, triggered a flow of forecasts and comments, mostly alarmist, on how the rising prices of oil and gas will affect international relations. On the whole, in early summer 2008 one could–with a fair degree of certainty–predict that by the end of the year, or even earlier, the global politics picture would develop new, exciting shades and nuances. At least, the degree of uncertainty in the international system has become much higher.

MYTHS OF OIL GEOPOLITICS

Average annual prices of oil (and, consequently, natural gas) have been consistently growing over the past 10 years, with the exception of a small and relatively brief fall in 2000–2001. In May 2008 futures prices for *Brent* crude oil (admittedly, one of the most expensive oils) went above $130 per barrel.[1]

The oil price rise has encouraged the revival of seemingly long-forgotten concepts, according to which the main driving force behind international relations at present and in the future is the struggle between countries for control over oil and gas reserves, which, according to the proponents of this theory, are depleting, and over their transportation routes. Frightening pictures of future *wars over resources* are being painted not only by popular TV shows but also by serious academic papers. Recently the Arctic has most frequently been suggested as the future epicenter of those wars since it is believed that there are huge hydrocarbon reserves under the Arctic Ocean seabed, which however–with few exceptions–has not yet been proven.

Figure 1. **Oil Prices in 1965–2008, $ barrel**



According to the followers of this theory, against the backdrop of a looming global energy deficit, Russia with its enormous oil and gas reserves has become an *energy superpower* of sorts. By manipulating energy supplies it can secure its sovereignty on the world arena and impose its will on importers. At the same time Russia is inevitably becoming a target for power pressure from Western states, which have no oil and gas reserves of their own, and is therefore forced to upgrade and build up its military potential. This concept has in effect become part of the official Russian ideological doctrine known under the rather strange name of *sovereign democracy*.

The Kremlin's leading ideologist, Vladislav Surkov, once wrote: «Some people believe that no one is interested in the desovereignization of our state (or that it is not realistic). But the universal and everyday need for raw materials and security is so enormous and the reserves of nuclear weapons, oil, gas, timber, and water are so abundant here that it is hardly appropriate to feel too contented. Especially if we take into account the degree to which the possibility of recognizing, protecting and promoting our national interests has been diminished by the avalanche of corruption, the disproportions in the economy, and simple slow thinking.»[2]

As for slow thinking and widespread corruption, Mr. Surkov is of course right. It is also clear that the concept of *wars over resources* and the exaggerated threat of the *desovereignization* of Russia as a result of actions by certain forces that are interested in Russian oil, gas, forests, and even water and so on are in the interests of some quite influential Russian ministries. For example, the Russian Foreign Ministry can attribute constant failures in foreign policy, especially in relations with the Newly Independent States (NIS), to intrigues by *external forces* that are squeezing Russia out of zones of its vital interests, mainly linked to the production and transportation of energy resources. The General Staff can excitedly plan future operations in the Arctic, for example, the formation of mobile brigades of combat armored sledges driven by polar bears and bid for funding to build superheavy aircraft-carrying icebreakers.

Yet the key question is how well justified the concept of *wars over resources* is? Up to the mid-20th century it provided more or less adequate explanation of some of the processes taking place in international relations. However, in the early 1970s, during the first oil price hike caused by the Arab-Israeli war, several important circumstances came to light. First, the Arab countries' use of the *oil weapon* did not prevent Israel from yet again defeating the Arab armies. Second, oil-exporting countries can successfully manipulate oil prices but, themselves utterly depending on oil export revenues, cannot suspend oil exports for any lengthy period of time. Third, technologically advanced oil-importing countries partially compensate oil price rises with raising the price of industrial products they manufacture and also by the fact that oil exporters usually prefer to keep their money in Western banks. Last but not least, rising prices for oil and, consequently, natural gas, encourage developed oil-importing countries to develop and implement energy-saving technologies, optimize their energy balance, in other words, promote technological modernization. Whereas large revenues generated by the export of oil (or any other natural resources) block social, political, and technological modernization. This is the well-known effect of the *oil curse*.

The widely held opinion that oil and gas reserves are depleting in absolute terms is also not true. The ratio of the world's proved reserves to annual production for oil has remained practically unchanged for the last 15–17 years, at 40 years with minor variations, which is much higher than it was in the 1980s. That means that if the current level of oil production remains the same and no new oilfields are put in operation, the existing reserves will last some 40 years.

It is unlikely that the oil price growth, as is often done, can be attributed to the prospects of an unprecedented rise in demand in China and India. According to U.S. Energy Department forecasts, by 2020–any longer-term forecasting is practically pointless–total oil consumption in these two countries will reach 16 million barrels a day, which is 5–6 million barrels more than in late 2007-early 2008. The increase is of course quite substantial but not high enough to threaten the stability of the world oil and gas market. Given the above, the traditional *gunboat policy* becomes simply unnecessary.

Yegor Gaidar wrote: «What was an acceptable practice a century ago is becoming impossible in the modern world. The transfer of Iranian oil resources back under the control of *British Petroleum*, which had to share part of the profit with the Americans, is an echo of an era that is becoming history. After the failed Franco-British operation in the Suez in 1956 it becomes clear that the threat of the use of force against oil-producing nations that want to increase their share of oil revenues or to nationalize oil production is minimal.»[3]

Yevgeny **Satanovsky (Russia),** President of the Institute of the Middle East, – by e-mail from **Moscow**: «I think, we can predict conflict escalation in the Middle East this summer. The main problem zones are Pakistan, Gaza, which fears *cleansing*, and the areas where confrontation between Iran and Arab countries is under way. Above all, this is Lebanon. The exacerbation of the situation in Lebanon can be compensated by its improvement in Gaza, if the Israeli army conducts a long and tough operation to ensure the disarmament of the local militants.»

However, military action, including armed intervention in oil and gas producing areas or in key spots on oil and gas transportation routes may become inevitable if the production or transport infrastructure come under threat of destruction from extremist forces or regimes. For example, Iran's possession of nuclear weapons would significantly increase the risk of a nuclear conflict in the Gulf, which would have catastrophic consequences for the world petroleum market.

All this has an immediate bearing on Russia. The fuel and energy complex is a major component of its economy. According to the Russian Industry and Energy Ministry, in 2006 the fuel and energy complex accounted for almost 30 percent of GDP, for 66 percent of export revenues, including almost 50 percent of the export revenues of the oil sector and 15 percent, of the gas industry. Its share in the 2006 tax revenues exceeded 50 percent, including 40.7 percent for the oil sector and 7.4 percent for the gas industry.[4] In 2007 these figures were even higher.

Such–one could call it catastrophic–dependence of the economy on oil and gas exports makes any statements on Russia's energy might look absurd. Any significant attempt to reduce the export of oil or gas in order to exert political pressure on a group of importers, mainly European countries, would result not only in a drop in export revenues but also in a reduction of the imports of goods that are essential for Russia, including foodstuffs. That would make any military and political pressure on Russia aimed to impose external control over Russian oil and gas fields and pipelines simply pointless. It is another matter that Russia itself may be interested in retaining and imposing its control over oil and gas reserves and their transportation routes from Central Asia and the Caspian since the prospect of a decrease in oil and gas production in Russia looks very probable.

SUPERHIGH ENERGY PRICES: WHAT WILL THEY LEAD TO?

The question of what has been driving oil price rises for the past 10 years remains open. One of the most competent Russian experts, Vladimir Milov, attributes the oil price rise to speculative investment in oil futures.

«The current oil market is a bubble that formed as a result of an inflow of speculative capital into oil futures. This inflow became even stronger after the crisis on the high-risk mortgage market in the United States in summer 2007, when falling share prices generated additional interest in alternative investment, mainly commodity derivatives,» Milov wrote.[5]

Milov may be right, although speculation on futures contracts does not explain why oil prices have been going up for almost 10 years. Yet, the most important issue is the consequences of this price rise, especially if it is set to continue further.

Apart from everything else the *Dutch Disease* of the Russian economy will become only worse. The inflow of oil dollars makes it possible to ensure the loyalty of elite groups, alleviate social problems and finance state expenditure irrespective of the effectiveness of the bureaucratic

system and all those sectors of the economy that are not related to the production and export of oil, gas, and several other natural resources. Consequently, there are no incentives for developing and introducing promising new high technologies, for modernizing the economy, social and political institutions. Not only the authorities but society as a whole has no interest in establishing democratic procedures. As a result, the technological gap between Russia and the advanced countries will grow wider and may in the next few years become irreversible. This was as good as admitted by Vladimir Putin, who in early 2008 raised the issue of creating an innovation economy, in other words, achieving a profound technological modernization in Russia as a vital necessity.

The effect the growing oil prices have on technologically advanced oil importing countries is exactly the opposite. In addition to making their industrial production and transport less energy intensive, which in turn requires modernization of a wide range of technological processes, they are pushing those countries towards an *energy transition*, i.e. large-scale changes in the structure of the energy balance by reducing the share of oil and gas in it. A whole range of new, alternative, technologies not based on oil and gas are either ready or are nearing completion. Their downside is that they are rather expensive to implement. However superhigh oil and gas prices will make the mass use of alternative technologies economically feasible rather sooner than later. As a result, the unique role of oil and gas in the world energy balance will be significantly reduced. Consequently, the geopolitical significance of hydrocarbon exporting countries will also reduce. Those of them who will not manage to adapt to these changes quickly will be pushed to the periphery of world politics. Other deep structural changes in the international system are inevitable.

Another factor contributing to the *energy transition* is the fact that nearly 80 percent of proved oil reserves are concentrated in countries and regions associated with high and very high political risks: the Middle East, Africa, and the former Soviet Union.[6]

Table 1. **Breakdown of Proved Oil Reserves by Region**

	1980		2006	
	billion barrels	**%**	**billion barrels**	**%**
North America	92.50	14	59.60	5
Central and South America	26.70	4	103.50	9
Europe (without FSU)	14.00	2	17.00	1
Former Soviet Union	84.40	13	127.40	11
Middle East	362.40	54	742.70	61
Africa	53.30	8	117.20	10
Asia	33.80	5	40.50	3
Total	667.1	100	1,207.90	100

This consideration translates into the strategic necessity to thoroughly readjust the structure of the world energy balance. Otherwise political turmoil, social instability, armed conflicts, etc. in oil and gas producing regions may and are very likely to lead to extremely unpleasant problems for the global economy.

MOSCOW ECHO OF THE BUCHAREST SUMMIT

In spring 2008 Russian foreign policy suffered yet another bout of confrontation towards two of its neighbors, Ukraine and Georgia. It is not surprising that threatening rhetoric, which at

times transformed into practical action, complicated Russia's relations with leading Western powers and, on the whole, noticeably damaged Russia's image internationally.

The immediate reason behind that was, most likely, NATO's officially announced decision to accept the above two countries into the alliance, albeit without specifying a timeframe for that. The declaration adopted at the April 2008 NATO summit in Bucharest states quite clearly: «NATO welcomes Ukraine's and Georgia's Euro-Atlantic aspirations for membership in NATO. We agreed today that these countries will become members of NATO.... Today we make clear that we support these countries' applications for MAP. Therefore we will now begin a period of intensive engagement with both at a high political level to address the questions still outstanding pertaining to their MAP applications.»[7]

The officially announced intention to accept Ukraine and Georgia into NATO plunged Moscow, as one could imagine, into extreme irritation and at the same time panic. Indeed, for the past several years Russia's top political circles have had the aspiration of having Russian position and interests–as the current ruling circles see them–taken into account when any important issues of world politics are decided. In fact, that was the main message of Vladimir Putin's well-known Munich speech in February 2007. However in reality it turned out that an issue which Moscow sees as a vital one for Russia was decided contrary to Russia's numerous statements and demands. In other words, there is a danger of a large-scale foreign policy defeat. Those members of the political and military elite in Russia who still see NATO as a material emanation of *the world evil* and a source of constant military threat to Russia consider Ukraine's and Georgia's joining NATO as a real threat to Russia's military security. They imagine U.S., German, Ukrainian, and Georgian tank armadas deploying along the Russian-Ukrainian and Russian-Georgian borders, ready for a flash-like advance on Moscow or, more likely, on oil producing areas in West Siberia or gas fields in Yamal. Another section of the foreign policy and defense establishment is in a panic, fearing responsibility for a looming strategic defeat. Yet another is preparing to use these events in the struggle for power, influence, and budget funding.

Konstantin **Eggert (Russia**), Editor-in-chief of the Moscow Bureau, BBC Russian Service – by e-mail from **Moscow**: «Among negative factors which have an impact on security in the Eurasian region I would mention the aggravation of the Russian-Georgian and Russian-Ukrainian relations, the failure of admitting Macedonia to NATO and continuing debate on Kyiv's and Tbilisi's plans to join the Alliance. However there is a growth of instability in Georgia and in summer it can trigger the flame of confrontation in Abkhazia and South Ossetia.»

Irritation and panic practically inevitably lead to an irrationally tough and aggressive reaction. In addition to adopting certain measures to expand economic ties with the unrecognized Abkhaz government, Russia deployed to Abkhazia an additional *peacekeeping* contingent armed with heavy artillery. In addition, Russian Air Force commander Col.-Gen. Aleksandr Zelin said that the establishment of a military base on the territory of Abkhazia, if a political decision to that effect is taken, would improve the quality of security and defense of the Russian state border. «If a political decision to that effect is taken, that would be for the benefit of fulfilling the task of air defense,» Zelin said.[8] Although if a military air base like that is to house not only interceptor aircraft but also other types of combat aircraft, such as strike fighters and fighter bombers, then the decision to set up the base would be for the benefit of not only the task of air defense but also for the benefit of achieving some other military and political tasks, too.

There was a sharp deterioration in Russia's relations with Ukraine. On a visit to Sevastopol on May 11, 2008, Yury Luzhkov announced that the issue of the status of Sevastopol «remained unresolved», that Sevastopol had never been handed over to Ukraine and should be returned to Russia. Kyiv responded by declaring the Moscow mayor *persona non grata* and banning him from entering Ukraine. The fact that Yury Luzhkov's statement was not just a personal outburst is further supported by a commentary released by the Russian Foreign Ministry. This is a truly impressive document. It says, literally, the following: «The Ukrainian authorities' decision to ban Moscow mayor Yury Mikhaylovich Luzhkov from entering Ukraine was met in Moscow with

bewilderment. The Moscow mayor is unjustifiably incriminated in some kind of encroachment on Ukraine's territorial integrity. Yury Mikhaylovich Luzhkov has never allowed himself to make unfriendly statements regarding Ukraine.... Yury Mikhaylovich Luzhkov just expressed an opinion that, by the way, coincides with the point of view of the majority of Russians.... We view the said decision of the Ukrainian authorities as an unfriendly step that goes against bilateral efforts to build an atmosphere of trust and mutual understanding in Russian-Ukrainian relations.»[9]

In other words, in Russian diplomats' bewildered opinion, the statement from one of the most prominent and influential Russian politicians that a part of Ukrainian territory does not belong to Ukraine and should be returned to Russia is not an encroachment on Ukraine's territorial integrity but is something else, for example, an attempt to restore historical justice. Still more interesting is the notion that Luzhkov's opinion coincides with that of the majority of Russians and that the ban on him to enter Ukraine goes against efforts to build an atmosphere of trust in Russian-Ukrainian relations. One could wonder how the Russian Foreign Ministry would comment on, say, the arrival in Kaliningrad of the burgomaster of a large German city who would say that East Prussia does not belong to Russia and should be returned to Germany? Does the Russian Foreign Ministry believe that its above quoted commentary contributes to creating an atmosphere of trust in Russian-Ukrainian relations? Answers to these are probably obvious.

THE ISSUE OF THE BLACK SEA FLEET

The scandal that unfolded following Yury Luzhkov's statement highlighted a far more important in the practical sense and a rather explosive in the military and political sense question of when the Russian Black Sea Fleet will be withdrawn from Sevastopol. According to the agreements signed on May 28, 1997 on the division of the fleet and the presence of its Russian part on the territory of Ukraine, Russia was given the right to keep its warships in Sevastopol and several other locations on the Ukrainian Black Sea coast for a period of 20 years. These agreements will be automatically extended for another five years unless any party not later than a year before the term of the agreements is due to expire notifies the other party in writing of the termination of the agreements. The Ukrainian side back in 2007 warned that the agreement would not be extended and suggested starting a discussion on the schedule for the withdrawal of the Russian fleet from Sevastopol.

It must have been Yury Luzhkov's statement in Sevastopol that prompted the Ukrainian authorities to adopt a law according to which the Russian-Ukrainian agreement on the Russian Black Sea Fleet's presence on Ukrainian territory is terminated from 2017. The Ukrainian Foreign Ministry yet again invited Moscow to start talks on the schedule and procedure for the fleet's withdrawal. The Russian Foreign Ministry yet again, with arrogance which has recently become its trademark, rejected that proposal. At first, in a rather aggressive tone, it said that the issue of the duration of the fleet's presence was too premature to discuss and that one should better focus on resolving practical matters related to ensuring the necessary conditions for the Russian Black Sea Fleet's normal operation and presence on Ukrainian territory. Later this position was toned down somewhat. A Russian Foreign Ministry spokesman announced that Moscow was prepared to consider increasing lease payments for the naval base in Sevastopol and also to start negotiations on the future of the agreements on the fleet's presence in the Crimea but only in several years' time, approximately three to four years before the current agreements are due to expire. At the same time it was said that Russia was interested in extending its Black Sea Fleet's presence in Sevastopol beyond 2017.

The position of Russian diplomacy is shortsighted, to say the least. One can of course flatter oneself with the hope that in several years' time Ukraine would undergo certain political changes and Kyiv would give up its current demand for the Russian fleet to withdraw completely by May 2017 and would agree to extend its presence in the Crimea indefinitely. However, hopes like these are typical *wishful thinking* and are not based on reality, especially given the tone of Russian official and unofficial rhetoric and Kyiv's hardly reversible intention to join NATO. And since such is the case then common sense demands that Russia not only starts negotiations about the fleet's withdrawal but conducts them in as polite and friendly manner as possible so as to fully defend its national interests by prompting its negotiation partners to adopt a similar tone.

It is also necessary to start preparing in advance the locations where the Black Sea Fleet will be based in the future since this is a very expensive and, which is more important, a very laborious and lengthy process. If that is not done, then the extremely complex and serious political and technical questions will need to be decided in a hurry, which naturally will result in the fleet's relocation to poorly prepared bases. The later the establishment of Russia's future main naval base near Novorossyisk begins, the more probably it is that the only thing built in time will be just the harbor. As a result the fleet will for a long time lose its combat readiness since the latter is largely defined by the effectiveness of the complex set of coastal facilities, including airfields, hydrographic infrastructure, command posts, communications stations, warehouses, barracks, accommodation for officers, and many other things.

There is of course another option: Moscow may try to keep putting off the practical discussion till 2017 and then say that the fleet will remain in Sevastopol until a schedule for its withdrawal is agreed, all the other issues resolved and all the necessary components of the coastal infrastructure are built. Clearly, these talks and construction may drag for years. It is equally clear that in that case Russia would oppose not just Ukraine but a large group of countries and would find itself involved in a serious international conflict without having any chances of success.

GAP BETWEEN WISHES AND REALITY

The current bout of belligerence in Russian foreign policy appears to be born out of a widening gap between the pretensions of the political elite and the country's real capabilities. Indeed, today the economic situation in Russia is very much different from what it was during the previous decade. The fantastic inflow of oil dollars has made it possible to alleviate many social problems, remove the threat of a financial crisis that has been haunting the Russian establishment, and to increase political stability. At the same time there has appeared and widely spread the illusion that Russia has *risen from its knees*, has restored its past might and has entered the narrow circle of countries that determine the world's destiny. In terms of concepts, these sentiments have been shaped into the ideological myths of *real sovereignty* and *sovereign democracy*. However Moscow has not developed any real leverage over international politics not only globally, but regionally either. It cannot in any significant way cut the amount of its oil and gas exports; its dependency on high-tech imports, including for its raw materials industry, is growing, while its nuclear weapons are good for deterring potential aggression but are absolutely useless as a means of achieving any other strategic goals.

Hence the temptation to bang one's fist on the table. Over the past 18 months that happened on several occasions and each time with counterproductive consequences for Russian national interests. Russia has in effect destroyed the Treaty on Conventional Armed Forces in Europe (CFE). That had no effect on the vital interests of Western countries' security but eliminated the only legal instrument preventing the potential military build-up by NATO member states next to Russian borders. An attempt to prevent Kosovo's independence failed, and Serbia's nationalist circles did not win the parliamentary election. The threats of *adequate measures* in the event U.S. missile defense elements are deployed in Poland and the Czech Republic and if Georgia and Ukraine join NATO only serve to convince the West of the need to deploy missile defense and to admit Ukraine and Georgia into the North Atlantic Alliance. However, instead of realistically assessing Russia's true interests and ways of achieving them, it would seem that Moscow is trying to further exacerbate the situation by putting more military and political pressure on Georgia and building up tension around the Crimea and Sevastopol.

Most probably, Russia would be able to annex Abkhazia without provoking a military conflict with Georgia and its possible NATO allies. Georgia's military potential is incompatible with that of Russia, while for NATO member states Abkhazia does not present any significant strategic interest. However, politically, Russia, would find itself not only in practically complete international isolation but also in a partial blockade, whereas Georgia will be admitted into NATO at double speed. Europe would of course continue buying Russian gas, in exchange supplying foodstuffs for the masses and top-quality cars for the elite. As for importing high technologies, Russia would have to kiss those good-bye. Also Russian officials may suddenly encounter problems with their accounts in Western banks and holidays in Courchevel.

The situation with Ukraine would develop differently. Russia would not be in a position to impose its Black Sea Fleet decision on Ukraine with use of force. If, in defiance of Kyiv's position, the fleet remains in the Crimea beyond May 2017, it may find itself in a tight blockade. One is left to wonder how Russia would break that hypothetical blockade. Ukraine's army and navy, especially if over the next few years they adopt NATO standards, would be quite capable of resisting military pressure from Moscow. If by that time Ukraine joins NATO, then military pressure against it could provoke a very serious international conflict, comparable in terms of its scope and consequences with Cold War confrontation. Back then the situation was very dangerous. Documents that have been gradually released in recent years show that there were several occasions when a nuclear war was averted all but by miracle.

Apart from everything else, further military action against Georgia and pressure on Ukraine would hit a final blow to the Commonwealth of Independent States (CIS) and would considerably complicate Russia's relations with all NIS. The peacekeeping operation in Abkhazia is carried out by mandate from the CIS supreme bodies. However Russian peacekeepers in Abkhazia act exclusively on orders from Russian commanders, without any sanction from the CIS Council of Heads of State, who in a situation like that may very well wonder why they should continue to preserve the CIS.

There is also something else that is even more important. The annexation of Abkhazia would set, say, Kazakhstan leaders thinking whether a similar thing may happen to the areas in the north of Kazakhstan that are largely populated by Slavs. Baku would immediately recall that its border with Russia runs along lands populated by Lezgins, who have been from time to time contemplating unification with Russia's Lezgins from across the border. The president of Belarus, Alexander Lukashenka, let alone his successors would get a convincing argument in favor of restoring relations with the West rather than creating a union state with Russia. If Minsk is prepared to end its military cooperation with Russia, the West may well reconcile with the Belarusian regime.

Good politicians and diplomats should be capable, like chess players, of foreseeing the consequences of their actions at least two to three moves ahead. Therefore either officials in the Russian Foreign Affairs and Defense ministries are simply incapable of forecasting or, which is the worst of all, both ministries are for some reason satisfied with the consequences Russia's current foreign policy moves may yield.

TURKMEN MARCH

A new and very dynamic player has appeared in Central Asia: the new president of Turkmenistan, Gurbanguly Berdymukhammedov, is capable of causing a serious shift in the static international landscape of that region. This however would have nothing to do with domestic reforms. As was expected, the arrival of a new leader in Turkmenistan did not lead to any significant changes in the country's political regime. It remains to be extremely authoritarian, there is no movement, or indication of a future movement, towards democratic changes. Moreover, in May 2008 the country's parliament proposed extending the presidential term from five to seven years. The proposal does make sense. Indeed, what is the point of spending money on more frequent elections when their outcome is known in advance? The proposal would allow the incumbent president, Gurbanguly Berdymukhammedov, to remain in power till 2014, which, according to Turkmen parliamentarian circles, would increase stability in the country.

However, another thing springs to attention. A sweeping personnel reshuffle is continuing in Turkmenistan. Over the 18 months since the death of Saparmurat Niyazov, several ministries have had their heads replaced two to three times. On the one hand, that can be attributed to a quite natural desire of the new president to fill senior posts with people who are profoundly loyal to him and at the same time at least relatively competent. After the previous leader's 15 years in office this is a rather challenging task. On the other hand, continued reshuffles may indicate a fierce struggle for power between various clan and subclan groupings and the presence in the Turkmen nomenklatura of a serious opposition to Berdymukhammedov, who–despite all efforts–has so far been unable to gather a more or less considerable team of reliable supporters.

At the same time the country's new leadership is clearly trying to get rid of the most notorious and ridiculous elements of the past, to improve the life of ordinary people and to make governance more effective. Some ideological changes are also of note. In early 2008 the Turkmenistan state news agency solemnly announced that President Berdymukhammedov «had put forward the national idea of universal wellbeing and prosperity through peace, progress, achievements of human civilization, of which centuries' old history and culture of the Turkmen people is an integral part.» Speaking at a meeting with the country's cultural figures, Berdymukhammedov said that «Turkmen society needs a completely new ideology based on the realities and demands of modern time and centered around the slogan 'the state is for the people'.» In other words, the ideological doctrine of the recent past, a Turkmen version of the *sovereign democracy* theory as it were, based on the teaching of Turkmenbashi outlined in his seminal book *Ruhnama* has in effect been renounced.

One can assume that the new ideology is aimed to ensure mass support for President Berdymukhammedov's foreign policy. It is here that truly dramatic changes are taking place. To begin with, the country's new leader began taking active steps to improve Turkmenistan's rather strained relations with Uzbekistan and Azerbaijan. For example, the president of Uzbekistan, Islam Karimov, was awarded with the title of an Honorary Elder of the People for «services for the good of developing friendly relations between Turkmenistan and the Republic of Uzbekistan, strengthening the unity and solidarity between the two brotherly nations that are traditionally linked by ties of friendship, good neighborly relations and spiritual affinity» and also «for special contribution to raising the level of political, economic and cultural relations» between the two countries.

Still more impressive has been progress in relations with Azerbaijan. Diplomatic relations between the two countries have been resumed. In May 2008 Gurbanguly Berdymukhammedov paid an official visit to Baku, where a number of agreements on developing bilateral relations in various areas were signed. This visit is believed to have opened a path for resolving a number of acute problems that have so far been blocking practical cooperation between the two countries, including settling the issue of sea borders in the Caspian and ending disputes over several offshore oil and gas fields.

The improvement of relations with Azerbaijan and Uzbekistan is important, among other things, for implementing a strategic project to diversify export routes for Turkmen gas in order to end the monopoly of Russia's *Gazprom* on transporting gas from Turkmenistan to Europe. One of the possible new routes is expected to run across the Caspian Sea and to link Turkmen gas fields to Azeri terminals to later be linked into the EU-lobbied *Nabucco* gas pipeline. For its part, the construction of the Trans-Caspian gas pipeline may prompt the construction of a similar oil pipeline from Kazakhstan to Baku.

Its policy towards diversifying gas export routes has enabled Ashgabat to considerably improve its relations with the West. In May 2008 the president of Turkmenistan and the European commissioner for energy, Andris Piebalgs, signed an agreement on cooperation in the oil and gas sector between the EU and Turkmenistan. In particular, it envisages expanded cooperation in this sphere and European investment in the development of the Turkmen oil and gas industry. It looks like Gurbanguly Berdymukhammedov may be capable of meeting his promise to supply 10 billion cubic meters of gas to Europe every year, starting in 2009. It is understandable that under these circumstances European leaders are prepared to overlook some of the less attractive features of the Turkmen political regime.

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Thus, spring 2008 saw the emergence of three main factors of a growing uncertainty in world politics.

First, the increasingly confrontational nature of Russia's strategic course. It may have been caused by various reasons but if this course is not changed, the result will be only one: a new serious conflict with the West, in which Russia will have no allies or even friends. It is practically impossible at this stage to predict the consequences of such a conflict, both domestically and internationally, but one thing is clear: Moscow's chances of winning it are practically nil.

Second, the active, one could even say assertive, foreign policy pursued by Turkmenistan. This country cannot claim for leadership in Central Asia but it can eliminate the region's transport dependency on Russia and consequently considerably change its role in the Eurasian international system.

Third, the U.S. presidential campaign. Whoever makes it to the White House, John McCain or Barack Obama, foreign policy changes are inevitable. However, none of the candidates probably knows what exactly these changes will be.

Yury Fedorov

Notes

[1] Futures prices are usually higher than delivery prices (both FOB and CIF). In May 2008 futures prices went above $130 per barrel, whereas the average monthly delivery price in January-April 2008, shown in the chart, stood at approximately $100 per barrel. Source: *British Petroleum* and Energy Information Administration, U.S. Department of Energy.

[2] Vladislav Surkov, «Nationalization of the Future», *Expert,* № 43 (537), November 20–27, 2006, http://www.expert.ru/printissues/expert/2006/43/nacionalizaciaya_buduschego (last accessed May 29, 2008).

[3] Yegor Gaidar, *Collapse of an Empire: Lessons for Modern Russia* (Moscow: ROSPEN, 2007), p. 109.

[4] Ministry of Industry and Energy, «On the current situation in industrial production development (January-December 2006)», http://www.minprom.gov.ru/ministry/dep/eapp/stat/9 (last accessed May 29, 2008).

[5] Presentation by Vladimir Milov, Institute of Energy Policy, February 28, 2008, http://www.energypolicy.ru/files/milov Feb-2008.ppt (last accessed May 29, 2008).

[6] *BP Statistical Review of World Energy 2007*, June 2007, p. 6.

[7] Bucharest Summit Declaration. Issued by the Heads of State and Government participating in the meeting of the North Atlantic Council in Bucharest on April 3, 2008, para 23.

[8] «Navy commander: Creation of a Russian military base in Abkhazia will strengthen Russian air defense,» RIA Novosti, May 15, 2008, http://www.rian.ru/politics/20080515/107438618.html (last accessed May 29, 2008).

[9] Russian Foreign Ministry, «Commentary by the Information and Press Department of the Russian Ministry of Foreign Affairs in connection with Ukraine's decision to ban Moscow mayor Yury Mikhaylovich Luzhkov from entering Ukraine», May 12, 2008.

A VIEW BY A *RUSSIAN CONSERVATIVE*: ELECTRICITY TRICKS, OR MAGIC EXPOSED

Foreign politics does not allow for constant pretence and *make believe*. There comes a time when veils around a country or an organization that were created by clever PR or even by its partners' and opponents' illusions fall and reveal an unpleasant truth that some have been determined to hide, while others have been equally determined to ignore. And then a faint murmur ripples across the serried ranks of *progressive* and not so very much so *public*: «who would have thought...» This is only natural: foreign politics indeed is very much an area of illusion and deceit, however sooner or later there comes a moment when this or that political leader or country as a whole is asked the famous question from the old Soviet film *Cinderella*: «Excuse me, what it is that you've got to show for yourself?» Once this question is asked, spin doctors' and PR professionals' skills and ability cease to have any significance whatsoever.

The past two and a half months have probably been exactly that moment in history when many, although of course not all, masks came off and a very useful exposure of many illusions and

misconceptions took place. And this is for the benefit of Russia and the whole system of international relations since the disappearance of illusions and misconceptions ultimately makes it possible to pursue a sensible strategic course that is rooted in reality.

Of course, new illusions and misconceptions will appear and sometimes not in good faith: such is the nature of international relations. They will even be created and developed on purpose. However, despite all that, the experience of exposing *foreign policy magic* will forever remain in the consciousness of both the political elite and society as a whole. That means that we are moving forward.

ON THE FOREIGN POLICY VALUE OF THE RUSSIAN ELECTION

The main foreign policy value of the Russian election and the subsequent period of *interregnum* consists in that they reveal as openly as possible what our Western and Eastern partners are trying to hide in the course of normal contacts and talks. Over the past several months we have learnt more about ourselves, about what we should do and what should be done to us than over the past three to four years. We have discovered what our Western as well as Eastern partners expect from us, what causes their concern, what kind of Russia they would like to see. It would not be accurate to say that we have learnt something completely new about ourselves and about our partners' attitude to us but there are certain things worth mentioning.

First, foreign commentators on the Russian election are very much concerned by the possibility that Russia may continue its practice of strengthening state influence in the sectors producing raw materials. Our Western partners are little interested in small business or the environmental and energy-saving credentials of the Russian economy. Equally, they are little concerned over welfare standards at Russian enterprises. Their only concern revolves around foreign companies' chances of once again being given almost unlimited access to Russian oil and gas. This is what the majority of discussions in the foreign media ahead of and immediately after the election focused on. This is what politicians and analysts were busy discussing, too.

Second, our Western partners are very much worried about who Russia's current bodies of power are made up of and they would very much like to see certain individuals leave the ranks of the Russian political elite. Their expectations on that account must have been rather high, judging by the sigh of disappointment that rippled across Western capitals and press after appointments to the new Russian bodies of power were made public. It turned out that the *Putin consensus* of the political elite and bureaucracy had not only remained intact but had even become stronger, albeit at the expense of the effectiveness of governance. This also came as a huge disappointment for our Western partners.

Andrey **Kortunov (Russia),** President, New Eurasia Foundation – by email from **Moscow:** «The first positive factor is the smooth change of command in the Russian leadership. Secondary, one would note the early speeches of the new Russian president that characterize him as a young, educated and liberal rather than conservative politician, though it is early to make any far-going conclusions. It means the rise of expectations about Russia's rapprochement with the world and positive impact on security. For example, new agenda for relations with the EU is being elaborated.»

Third, our Western partners are doing their utmost to warn the new president of Russia against *flirting* with what they consider *nationalist sentiments* in Russian society. In other words, the appreciation of one's strength and dignity–albeit not always fully justified–that Russians now have is becoming a factor that the West, and partially the East too, perceives as a threat and a far more significant one at that than Russia's military activism.

Fourth, note the enthusiasm with which our Western partners welcomed the fact that the newly elected Russian president gave his first interview to Western media (which was far from the wisest decision) and the disappointment with which their increasingly more serried ranks reacted to the fact that the new president's first foreign visits were to Kazakhstan and China. There is a reason for that: Russia's move towards the East is being perceived as one of the most significant foreign

policy issues for modern Russia because it reduces Russia's dependency on Western markets for the distribution of its raw materials, control over which has in recent years been an important tool of the West's influence over Russia.

Interestingly, our partners were not particularly concerned on the subject of Russia's position on the Anti-Ballistic Missile (ABM) Treaty, which only recently caused such heated arguments and was considered to be nearly the core of the whole foreign policy process. U.S. and European politicians were equally little perturbed as regards the future of the CFE Treaty, withdrawal from which was only recently painted as a universal tragedy. There was a little bit more interest in the matter of Kosovo and the Kosovo precedent, which is understandable, given modern Europe's ethnic issues, but it was far from dominating their agenda either. In other words, all key Russian actions, military and political by form, which outwardly provoked a passionate reaction and were interpreted as a monstrous manifestation of Russian imperialism, in fact do not worry our partners too much. What they are truly worried about is the opportunity (or lack of it) to reconfigure domestic economic relations in Russia in the interests of major transnational companies. From that point of view, our Western partners' utmost ambition is the return of the economic regime that existed in Russia under the late Boris Yeltsin and that has led to a systemic collapse of Russian statehood.

Our Western partners' approach to Russia, which was revealed with alarming clarity during the election and the subsequent *interregnum* period, is as simple as can be: economic changes will result in political changes. This leads one to a simple and almost banal conclusion: main issues in relations between Russia and the West are not about military or foreign policy but about the economy. And it is Russia's ability to defend its independence in the economy that will define Russia's future as that of a foreign policy player to be reckoned with. And God forbid us from ending up in the company of those whom ruthless history will *unmask* at its next lap.

ON THE FOREIGN POLICY VALUE OF THE U.S. ELECTION

The main foreign policy value of the U.S. election is that it is only during an election campaign that a top-ranking U.S. politician is allowed to say what they really think. At all other times the U.S. leader and senior politicians, unless of course they are an *enfant terrible* of the likes of Tom Lantos or Pat Buchanan, have to temper their thoughts in accordance with the foreign policy obligations and conventions and say what they are expected to say rather than what they want. Whereas, during an election campaign, especially in the period of *primaries*, an American politician has the right and the opportunity to openly express their views. From that point of view, the recent period has been extremely useful for Russia and the whole international community. So, what have we heard about how our U.S. partners view the situation in the world and future U.S. foreign policy?

The main thing that the U.S. presidential *candidate hopefuls* have in common is the painful realization that America is beginning to lose the battle for the *hearts and minds* of the international community and this is gradually diminishing America's standing in the world. In effect, the only difference between the candidates is that Hillary Clinton thought that America's prestige could be restored with the help of a smile, i.e. that it was possible to go back to the *good old times* of the ideological supremacy of the world's *only superpower*. For his part, Barack Obama focused on the stomach, first and foremost the stomachs of Americans themselves, who are beginning to doubt that each new generation in America will live better than the previous one. Whereas John McCain seems to have resigned to America's loss of spiritual leadership and seeks to compensate it with *fire and sword*, possibly rightly thinking that the best way to improve a country's international standing is to win *a short victorious war*. For the outside world, these options do not offer much of a variety. One should of course realize that the last thing that would interest American voters is the future U.S. president's views on foreign policy. Yet, the options to choose from are most telling as they show that for the U.S. elite, unlike the U.S. public, the issue of America's influence in the world is far from purely theoretical or idle.

At the same time a number of interesting details spring to attention.

First, the state of the U.S. economy is of course an important issue, but not important enough to dominate the election campaign, at least not in its initial phase. Of course, all the candidates

Dayan **Jayatilleka (Sri Lanka)**, Permanent Representative of Sri Lanka to the United Nations Office at Geneva – by e-mail from **Geneva**: «There is a possibility that adventurist rightwing elements in the USA would try to create situations of tension internationally, mainly in the Middle East but perhaps also in Latin America this summer, so as to damage candidate Barack Obama's credibility on security issues and boost the credentials of Senator John McCain.»

exchanged statements on the subject of *restoring America's economic might* but it seemed their *hearts* were not in it and they were doing it more for the sake of putting voters' minds at rest. That of course may mean either that things are not so bad or that things are so bad that it is better not to touch the economy at all. But in any event, it would be naïve to expect that the future American president would be dealing with economic issues. It is all the more sensible to remember that for the United States the main recipe for stabilizing the economy is a superactive foreign policy. Sometimes, even a war.

Second, it has turned out that not only in Europe but in the United States too the time when *Euro-Atlantic partnership* was considered secondary, with priority given to strengthening positions in the Asia-Pacific region and distancing away from former European partners, is over. The primaries debates have shown that the U.S. elite are on the whole focused on the further development of Euro-Atlantic relations, albeit in the *Sarkozy format*, i.e. involving open geopolitical humiliation of European partners, mainly from *old Europe*, but without pushing them away from the United States altogether. America of course needs a weak Europe, but a Europe that at least at the political level would be together with the U.S.A.

Third, although compared with abortion or human cloning, the topic of Russia was secondary in the campaign, all the presidential candidates considered it necessary to speak on the subject of Russia. Which is interesting, especially given that four, let alone eight, years ago Russia hardly featured in U.S. primaries. This is a sign, and not a bad sign, which shows that the U.S. elite has a relatively realistic understanding of what is happening in the modern world.

In other words, the overall conclusion is quite simple: even if the U.S. presidential post goes to Barack Obama, which is relatively unlikely, the United States will have to pursue an active, to a certain degree an aggressive, foreign policy. And Russia will have a far from minor part to play in that foreign policy. Which should make us feel concerned since despite some periods of tension that have from time to time appeared in recent years, Russia was enjoying a comfortable position on the periphery of U.S. attention. Whereas now, having dealt with their internal problems, our U.S. partners may deal with us in earnest. One should not give way to illusions: rumors of the collapse of the U.S. economy are largely exaggerated and the degree of the future involvement of the American elite in post-election internal political arguments is being clearly overstated. The Americans will have time left to deal with us, too. So instead of comforting ourselves with the talk that the Unites States will be primarily occupied with its own issues, we should prepare ourselves for another serious discussion with our American partners, and a very serious discussion at that.

SMALL KOSOVO AND *GREAT SERBIA*

There was a lot of talk in Russia that the Serbs would never let Kosovo go, that they want to restore their nation's unity, that their patriotic feelings are very strong. However, when the time came, all those theoretical and emotional constructs came up against a quite clear and unequivocal response: despite all the hopes of the latter-day Slavophiles, the Serbian parliamentary election was won by the pro-Western party of President Boris Tadic, which intends to *cede* Kosovo. And not only intends to (this is what all Serbian political forces seem to be ready for) but is already doing it and fairly openly at that. In Russia that victory had the effect of a depth bomb explosion: on the surface there were just minor ripples, however in the depth of the Russian political elite, which on the whole expected the radicals led by Vojislav Seselj to win, there were tectonic changes, almost tragic for Slavophiles' forever elated psyche. It turned out that *Serbian brothers* had voted for the EU and the West, having altogether forgotten not only about the country's greatness but also about its territorial integrity.

This is not so much to do with the Serbian president's pro-Western leanings as with the sentiments of the Serbian public, who are crazy, both literally and figuratively speaking, to join Europe. In that desire, they are ready to cede not only Kosovo but Vojvodina, too (which, incidentally, may become the next step in *Serbia's integration into Europe*). Thus, the regular and surprising for many Russians victories of pro-Western forces in *brotherly Serbia* are based not on the influence of the CIA, George Soros, and local *orange revolutionaries* but on the attitudes of Serbian society itself; the attitudes which up to a certain point are disguised by PR and statements of determination to *fight till the end*, but when the time comes force Serbs to make *the right choice* without giving a thought to *saving face*.

We can draw one truly significant conclusion from all that has been happening in the Balkans: communication with representatives of that region, especially those of them who keep speaking about *historical ties* with Russia (which are a myth too) should be conducted with maximum and almost undisguised cynicism. The task is now not just to stop being more Serbian than Serbs, but to stop being Serbian at all.

On the other hand, it is obvious that Kosovars and the Albanian community are becoming one of the most significant factors in Europe, so far in terms of crime but give it a little more time and that will be true in terms of the economy, too. So instead of pretending that this force in Europe does not exist, we could–of course still preserving our *principled* position and conveying, when possible, to *Serbian brothers* our words of support and sympathy, but this time for a separate fee–start building relations with that new European country. For it is very likely that it will be Kosovars and not fat Bunderburgers or Poles, obsessed with the idea of getting to Heaven on the shoulders of U.S. taxpayers, who will be setting the rules of the game on the European continent. This is a force that sooner or later we shall have to deal with, so instead of waiting till the need to establish contacts with that influential force comes as an unpleasant surprise to us, it would be good to start moving in that direction.

CHINESE COLLAPSE

It would seem that the majority of events that have recently been taking place in the Celestial Empire could hardly be classed as falling under foreign or defense policy issues. All that our Chinese friends have been busy doing is dealing with scandals surrounding the Olympic torch relay, combating yet another outbreak of a mysterious disease, or saving earthquake victims from beneath the rubble. Beijing has not taken any significant foreign policy steps recently. And yet China too has found itself in the company of those whom we have recently seen *unmasked*.

Marian **Abisheva (Kazakhstan),** Deputy Director of the Kazakhstan Institute for Strategic Studies under the President of the Republic of Kazakhstan, – by e-mail from **Almaty**: «I would like to note the following recent event – the UN has published the 2007 list of ten stories the world may wish to hear more about. These issues do not get sufficient press coverage, but they are topical for today's agenda. Well, the natural disasters are in this list. Why do I focus on this? Simply because the natural disasters are the additional cause of the index decrease.»

Surely, modern China is a world apart from the China of the campaign *to catch up with and outstrip England in steel production*, when blast furnaces were built in every backyard, or the campaign to kill sparrows. China now launches people into space; is trying, albeit with doubtful success, to make its own aircraft; it has built several showcase cities. But all that has turned out to be just the tip of an iceberg, hiding the unpleasant reality of an inefficient system of state administration and obvious internal social and national problems.

Actions by the Chinese authorities, confused, incompetent and at times simply panicky, have shown to the rest of the world that the façade of the polished Chinese reality covers a multitude of problems, primarily the inefficiency of the state administrative machine. Which practically rules out China's chances of conducting an aggressive foreign policy, let alone an aggressive foreign policy in relation to a state that has

accumulated massive experience of using foreign policy issues to fight its geopolitical opponents, i.e. the United States. A country that is unable to independently cope with a large-scale natural disaster cannot be considered a global leader. The United States understood it very well when it refused to accept any significant foreign aid after September 11, 2001. That is why the Chinese leaders' dreams of restoring at least a semblance of bipolarity, this time on the strength of China's economic potential, turned literally into *ash* and remained under the rubble of buildings destroyed in the earthquake in the Sichuan province. Or, to be more precise, under the piles of humanitarian aid and tents sent to China from far less prosperous countries, for example, Tajikistan which sent 100,000 dollars' worth humanitarian aid to the country of metropolises and flashy skyscrapers.

Figuratively speaking, in the story with the earthquake China and its leadership suffered a collective *loss of face*, which is unforgivable in the East, both Middle or Far. So Russian *geopoliticians* and political analysts who have forecasted that global competition between China and the United States will start really soon, will have to wait till their forecasts come true.

Wait for some 20 years or so.

GEORGIAN WOES

Why did Mikhail Saakashvili put a brake on a military operation against South Ossetia, and possibly against Abkhazia too, which was expected any day in May? Was it only because he felt a drop in U.S. support? Unlikely. On the contrary, the logic of the situation was pushing him towards starting military confrontation. Saakashvili needed an armed conflict exactly so that the United States could not wriggle out of helping its ally and would have been forced to get involved in a conflict which they did not need. Was it because Russia made it clear that it would also get involved? Also unlikely: the Georgian leader as well as the whole elite of the *small but proud* nation clearly do not believe in the reality of a Russian intervention. Was it because of problems with the opposition? Even less likely: a military operation in the breakaway republics would, unlike anything else, have brought Georgian society together almost to a monolith-like state. Was it because the Europeans had sent a very clear message to the Georgian leader, having granted asylum to the fugitive defense minister, Irakli Okruashvili? Also unlikely, since Saakashvili had long ago made his choice in favor of Washington–indeed, who else?–and was little interested in the Europeans' opinion or signals they were sending.

It seems that there is a far simpler explanation: Saakashvili suddenly realized that the might of his army, which holds frequent parades in central Tbilisi, which was trained by American instructors and which consumes colossal, by Georgian standards, amounts of budget funds, may turn out to no more than just another illusion. At the moment, there is nobody who knows how strong the Georgian army really is: too much time has passed since the last Georgian-Abkhaz conflict. Both sides have changed but even Saakashvili is not too keen to test the theory of the strength of his army at the risk of losing the relative prosperity that has been achieved with so much effort. This goes to prove an assumption that at first glance seems utterly fantastical: Saakashvili is not mad after all. He is just pretending.

Of course, all the above does not rule out the possibility that Mikhail Saakashvili may after all decide on a military operation against the breakaway republics, although the triumph at the election makes this somewhat less probable: the Georgian leader no longer has to prove his right to power by trying his luck in Abkhaz forest and mountains. Now all that he needs to do is to provoke far less dangerous crises in relations with Russia and spend generous American aid.

The increasingly *murkier* story with the Georgian UAV allegedly shot down by a Russian fighter of course raises certain questions but not about the Georgian side, whose behavior is absolutely logical and predictable. The questions are about the position of the United Nations, which without giving it a second thought, practically *without looking,* accepted the Georgian theory of events. Which begs the question: wasn't Russia's support of the U.S. protégé, Ban Ki-moon, who turned out to be not just a protégé but an ordinary puppet whom the United States manipulates almost openly, a result of a–hopefully honest–mistake? And isn't it time to correct it?

As for Russian-Georgian relations, there are hardly any grounds to expect any significant changes there. The illusions that some politicians in Russia had that the victory of the Georgian opposition could have changed anything were not so much dangerous as just empty. There is no real difference between the Georgian opposition and the authorities except that the latter already have access to the trough into which foreign aid arrives, while the former are just struggling to get there too. In this situation, the best option for Russia is to ignore Georgia, be prepared that the Georgian leader may easily provoke tension in the conflict zone but, in the current policy, just ignore Georgia and not react to Saakashvili. And then the lion share of the Georgian president's greatness will evaporate and he will turn out to be no more than yet another U.S. protégé, who has successfully tapped foreign aid and got himself a place on the Caspian oil pipe.

IRAQI ZIGZAG

The fanfare announcing the arrival of a relative calm in Iraq was hardly over when the situation there again deteriorated to its norm and did it in a way that looked frighteningly natural. The number of U.S. soldiers killed there once again began to go up, as did the number of sectarian attacks, once again oil pipelines were blown up and the light at the end of the tunnel that seemed to have appeared in spring 2008 went out. And all that was provoked by just one thing: for financial and political considerations, the United States began to withdraw its additional contingent from Iraq. As a result, militants began to feel more freedom; it once again became clear that the leaders of Iraq have very little in common; that the new Iraqi army and secret services are just a shop front and a cover for corruptionists and sadists of all stripes; and, most importantly, that the current system of power in Iraq is surviving exclusively thanks to U.S. military presence.

Abdulaziz **Sager (United Arab Emirates),** Chairman of the Gulf Research Center – by e-mail from **Dubai**: «Iran and Iraq remain the two main areas of concern while there has also been no forward movement in the Arab-Israeli issues as was to be expected. Meanwhile, the situation in Pakistan, Afghanistan and now also Georgia remain explosive and this could quickly enter the equation in a negative sense. The fact that Iran refuses to engage with its Gulf neighbors to address their security concerns is to the detriment of regional stability. Similarly, the failure to move the political process in Iraq means that potential for a splitting of the country remains part of the agenda. Direct violence may have decreased but this does not mean that the internal situation in Iraq is indeed improving or that a breakthrough has been achieved.»

As a result, the *balloon* under the name of *Iraqi stabilization* that the Republicans, not least for the sake of the election campaign, have been blowing up has *deflated* as if it had never been. So here too politics, both foreign and domestic, has firmly dispelled illusions and misconceptions which the American administration was busy putting up.

The moral of the story is that in a conflict like the one in Iraq, no matter what tactical positive gains and successes are achieved, the main success factor is the creation of firm and effective power, no matter how tough; power that is capable of defending itself and of bringing order into its relations with society by itself, without any intermediaries and–let us reiterate–irrespective of how tough that power is and what ways of suppressing dissent it uses, although it is obvious that in modern Iraq these ways are likely to be rather tough. But power like this, especially in a situation in which modern Iraq is in now, can only be built by strong personalities, personalities who would do anything for the sake of power, who would shed blood and commit crimes for the sake of power, paranoid dictators if you will; not a bunch of political nobodies, who are successfully spending U.S. money under the protection of U.S. tanks in Baghdad's *Green Zone*. Iraq does not have the main stabilization force, i.e. firm power, and–given the current format of the U.S. policy–will not get it, irrespective of who comes to the White House.

In other words, the United States in Iraq is in an even worse situation than the Soviet troops were in Afghanistan. After the Soviet withdrawal, the pro-Soviet regime in Afghanistan remained in power for a relatively lengthy period of time. Whereas the U.S.-sponsored rulers of Iraq, once the so-called *multinational force* is withdrawn, will last for no more than two months, of not less. The moral: what were those hundreds of thousands deaths for if in the end the Americans' mission in Iraq would boil down to a search for yet another dictator who would give them the opportunity to leave Iraq and at least for a while pretend that they have won?

FOREIGN POLICY ILLUSIONS AND FOREIGN POLICY RESPONSIBILITY

The unmasking of foreign policy magic, illusions, and misconceptions is in itself a useful process, while the emergence of those illusions is a natural and normal thing for any society. Any society and any country, as a rule, has a more flattering opinion of its own international prospects than they really are. The question is about the ability to draw the right conclusions from sometimes unpleasant revelations. The most dangerous thing is when foreign policy illusions become a cover for foreign policy irresponsibility, which–there is no point in trying to ignore it since, as the Russian saying goes, a word dropped from a song makes it all wrong–has for the past several years been the hallmark of the Russian political elite. The most striking example of this illusion-driven irresponsibility is the situation around Ukraine. All that has happened in Russian-Ukrainian relations over the last 20 years is partly a result of the dominance of corrupt mechanisms in the economy and partly, of old illusions that have been actively promoted in the Russian political elite.

From the very beginning since the establishment of *independent Ukraine*, many experts said that this territory that had been artificially put together by the Communist regime could only survive on the basis of animosity towards Russia; that sooner or later Ukraine would become a base for NATO and the United States that could be used, among other things, to exert military pressure on Russia; that there would probably be NATO tanks outside Smolensk. Back then those experts were roundly condemned and called extremists; appeals to have them punished could be heard from all quarters; they were accused of undermining the prospects of cooperation between two brotherly nations. In other words, everything was being done to drown their voices in a flow of *constructive* attitude brewed on stolen Russian gas. So what about now, when all of the concerns raised by those *extremists* are becoming an objective reality, which will very soon be given to us in sensation? Nothing. None of those people who, with their irresponsible statements about *Russian-Ukrainian partnership*, have done almost irreparable damage to Russia's security have lost their jobs or been expelled from the expert community. All of them are *keeping themselves busy*, either working as advisors to the authorities or traveling around the world in the uncertain capacity of either a state official or a tourist. And some are still continuing to build *constructive interaction* with Kyiv, naturally, on the basis of gas.

Whereas *the extremists*, whose forecast of how things would progress has turned out to be accurate, are still considered to be extremists. They are still being pointed at and accusations are still being heard that were they given their way, they would wreak havoc on Russian-Ukrainian relations, would destroy the alleged *atmosphere of partnership*. It is clear that *the extremists will never be given their way*; simply out of fear. Which is a pity. Because if *the constructively-minded continue to keep themselves busy*, Russia will be too late to spot yet another dangerous illusion, another misconception and, as was the case with Ukraine, will lose another 10 years in pointless attempts *to find a formula for interaction*. The elite's lack of responsibility makes it less competitive, which is a direct path to foreign policy defeats.

Thus the lesson one could draw from this historical period, from a period of unmasking and exposing illusions, is that it is high time Russians stopped being the world's only nation to step on the same rake thrice.

As Victor Tsoy once sang: «Everybody says, we are united. Everybody says it but few know what we are united in.» It is time we began to understand what it is that we are united in.

Dmitry Evstafiev

KHAN NETWORKS: EYES WIDE SHUT

Corera Gordon. Shopping for Bombs. Nuclear Proliferation, Global Insecurity, and Rise and Fall of the A.Q. Khan Network. Oxford University Press, 2006, 288 p.

Reviewed by Vladimir Orlov

Pal Sidhu, my fellow faculty member in the Geneva Center for Security Policy, never starts his presentations with a statement, but always puts a question first. Like this one: «Please tell me the names of those who created nuclear weapons in each of the nuclear states.» He lectures not to simple students, but to ambitious young diplomats and military officers from 30 different countries ready for a head start promotion. Many lecturers would envy having such listeners, who are always prepared for the class, who in fact do read the complete heap of recommended materials. Those people hush for a while... for a few voices to sound as one: *A. Q. Khan*, proud to boast of their IQ thanks to the *A.Q.* made notorious by the media.

They don't recollect Russian scientists Igor Kurchatov and Andrei Sakharov or, let's say, Otto Frisch and Edward Teller, and they definitely avoid mentioning Homi Bhabha, a fellow-citizen of their professor Pal Sidhu. Instead they name someone who didn't even play a decisive role in creating a bomb for his own country, but managed to have the notoriety of a world-wide scandal, which helped him to obtain the image of *the father of Pakistani bomb* not only with common people, but with experts as well.

FORGET HEROSTRATUS?

Gordon Corera, a British journalist, suggests *trying to understand* him instead of forgetting. Abdul Qadeer Khan, when understood within the context of his story, allows to understand the true story of nonproliferation. Oxford and Harvard did some good for Gordon Corera making him an exquisite narrator and a pernickety investigator (just look at his impressive and streamlined reference matter, or, to make it simple, references to other works, where he turns out to notice more than most observing experts). But they didn't turn his brain making him a sleek Mr. Know-It-All: Gordon Corera likes to put questions, penetrate into them, and doesn't consider wide-spread ideas to be set in stone. His current work for the BBC gave him the experience of *penetrating.*

The writer's talent to intrigue while keeping close to his thorough journalistic investigation, which should be free from speculations, and adding to that an outstanding number of *live* sources in the U.S. and U.K. intelligence community pave the road to success. («It reads like a thriller, but it is true!» exclaims Joseph S. Nye, Jr., while Ambassador Robert L. Gallucci writes the same words without ever seeing the review by the former. By the way, both are quoted in the book. Opinions of these two respected experts in nonproliferation would be enough to for me to finish my review.)

If A. Q. Khan did not exist, it would be necessary to invent him. Just to demonstrate what nuclear *proliferation* is about. It becomes especially prominent in *shopping for bombs*, possibly, one of the most serious and important books in today's literature on the subject.

I am not sure about the opinion of my colleague Pal Sidhu, who is sure to like the idea to de-demonize A. Q. Khan, but I will definitely make it a mandatory reading for my students in Geneva if they want to understand the springs and levers of nonproliferation mechanism as well as its contraposition, proliferation.

What is the common understanding of proliferation of weapons of mass destruction (WMD)? If you never hammered at NPT chapters, you are sure to respond as follows: it is a situation when someone *shares,* proliferates their nuclear weapons and related expertise to others.

At the next level you are going to understand that India and Israel violate the nonproliferation regime, because now you will know that from the perspective of international law they seem to have no nuclear weapons, at least it would be unjustified to call them nuclear powers (it is here that those not in for mechanical learning start to stumble and… think). While A. Q. Khan gives us a seemingly ideal model of classic nuclear proliferation: *veni-vidi*-vanish (after having seen it with *Urenco*), then helping to make the bomb *at home* and then helping *others, the bad guys,* by proliferating his expertise (in fact, blueprints that looked Chinese) and even some of the required components, for which the malicious Dr. Evil finally has to pay: CIA and MI6 daredevils finally unveil his schemes and kick his neck. We also see here a vessel named *BBC China* (and that's quite something), with a German port as its home and an Antigua and Barbuda flag on its mast, a faint image of Muammar Gadaffi, and only miss James Bond sliding down a rope from a helicopter somewhere over Kahuta…

Gordon Corera managed to stand the temptation of following the *Bond scenario.* He doesn't play a role of tamed chronographer for the CIA *success story*, nor does he follow the easy path of *PR-servicing* his sources in the intelligence community («…the U.S. intelligence machinery [was] wrong in Iraq, both underestimating the danger before the 1991 Gulf War and overestimating it afterwards. The buildup of the Indian tests was missed, as was <…> the emergence of a North Korean enrichment program.» (p. 151). Without loading the narration with egghead stipulations, he pushes the reader towards the question: what kind of *international nonproliferation regime* can it be, when its key players always evert it to suit their narrow national needs?

There could have been no A. Q. Khan! Pakistan could have had no bomb! However, the arbiters of international nonproliferation, and here, for one thing, the United States (even though they formed an exotic union with China), decided otherwise. They didn't miss it, but they kept their *eyes wide shut.*

Gordon Corera demonstrates Oxford accuracy in unfolding his story. First, A. Q. Khan's early years to be followed by the customary *rise and fall.*

Gordon Corera's close and a little bit cold look make A. Q. appear to be no exaggerated and typical character, no victim or villain. He is a clever engineer, with passions of his own, love for money and motherland, trying to combine the two.

VANITY IN BULK

Thus, A. Q. Khan starts spying for Pakistan. In the Netherlands, where he works at the time (we are now in early 1970s with an oil crisis, an oil boom, India's *peaceful nuclear* explosion), the protagonist appears to be an equable family man, married to a South-African, often treats his coworkers at the uranium enrichment company to Oriental sweetmeats, and in 1974 starts quietly spying for Pakistan. Americans seem to twig the fact and report it to the Dutch… But *mission impossible* appears to be quite *possible* for A. Q. Khan, and the invaluable *Urenco* data are already in Islamabad (sorry, Zanger Committee, while the London Club isn't there yet).

Next–a combination of his scientific gift and that of a social climber allows A. Q. Khan to force back his rivals at home and step-by-step monopolize his force and his fame, and most importantly, the title of Pakistan's popular nuclear hero. Or, to be brief, the Father. Not that of a nation, then at least that of a bomb designed to defend and pull the nation together.

The book has many pages that could be quoted throughout and that have links to the Pakistani commotion of today, even though the stories they tell are over a quarter century old. Still, the most notable ones are those connected with Blair House, a VIP residence right across the street from the White House. Now (already in 1989) we are stunned together with Benazir Bhutto, the then-prime-minister of Pakistan, whose father has promised to eat his hat if that is needed for the country to have the bomb, as CIA officers deliver a presentation on the military nuclear industry of her country... that has never been shown to her by her own military: «What was truly shocking for Benazir Bhutto was that U.S. intelligence knew more about the nuclear program [of Pakistan] than she did. She had not even seen the bomb herself and she was being shown a model by the CIA.» (p. 51).

And the next day... The next day Benazir Bhutto meets President George H. W. Bush, who tells her that Pakistan would be certified by the U.S. administration as not having nuclear weapons for the purposes of reporting to Congress. Bhutto appears in Congress and says, «we do not possess not do we intend to make a nuclear device. That is our policy.»

«No one mentioned to Congress or the American public,» writes Gordon Corera, «that the CIA actually believed that the prime minister's confident statement was irrelevant and that Pakistan already had the bomb.» (p. 52).

That's the price of the *nonproliferation policy* when it comes to practice. Another analyst from the West would prefer not to take it any further. But Gordon Corera tries to find some cause-effect relationship: «For a crucial decade [for the Pakistani nuclear program], just as the nuclear program was gathering pace, [U.S.] proliferation was to be subordinated to broader priorities,» the main one consisted in «making the Soviets bleed» (pp. 30–31).

In fact, it wasn't about Pakistan itself, but rather about the neighboring Afghanistan. For a long decade Pakistan was made into a key U.S. ally outside NATO. An ally that would help in pushing the Soviet Union away from Central Asia. Now everything can be condoned, not to mention the nuclear program, and who is without sin, after all...

It must be said, the United States wanted some guarantees when it decided to keep a blind eye on the military nuclear program of Pakistan. First, not to build nuclear weapons, and stay at the threshold. Second, not to embarrass the United States. Third, not to transfer its nuclear expertise and technologies. When describing an episode of late 1970s, Robert Gallucci, who negotiated those conditions with the then-leader of Pakistan Zia-ul-Haq (whose strange death in an aircraft crash remains outside of Gordon Corera's scope: «died in an aircraft crash... circumstances unclear, no mechanical damage found on the plane,» that's all he says), adds «Zia clearly understood them. And he broke all three.» (pp. 31–32).

Looking at Pakistan as a stronghold to oppose the Soviet Union in Central and South Asia, the United States was ready to forgive anything. Consequently, officers of U.S. special services *following* the Pakistani military nuclear program would find that the regime in Pakistan, and A. Q. Khan as the driver of that program, were far better protected by the U.S. government than they were (p. 33). Among other things, the United States kept a blind eye on cooperation between A. Q. Khan and China, which Gordon Corera believes to have been «absolutely instrumental in assisting Pakistan's nuclear program» (p. 45).

Gordon Corera clearly understands that only because of double standards in nonproliferation Pakistan finally managed to become a *de facto* nuclear power. In 1990 Pakistan finds itself at the edge of a military conflict with India, while the U.S. Congress still hears the U.S. administration *certifying* Pakistan as not having nuclear weapons: «The notion that the United States could continue to certify there were no weapons when the country had nearly engaged in nuclear war made the whole exercise absurd. What if Pakistan had used the bomb? Whose head would be on the line for giving Congress and the American people the impression it didn't have the capability?» (p. 54).

Gordon Corera goes further, even though he is careful. Indeed, he is on a very unsure ground when elaborating on the role of Pakistan as a U.S. ally against the Soviet Union in Afghanistan. Indeed, there was a Soviet invasion. Indeed, the United States used Pakistan to force the Soviet Union out of Central Asia. Indeed, that was «an extraordinary triumph». What kind of a

triumph was it if it would be followed by September 11, 2001, and then a U.S.-NATO invasion in Afghanistan? Was it that forward-looking to force the Soviet Union out of Afghanistan? What has it led to? What is the nature of Osama bin Laden? And who begat him? «Although the legacy [of U.S. policy towards the Soviet Union in Afghanistan] would be increasingly debated after September 11, 2001,» that is the only comment the author makes (p. 49).

Chapters on proliferation are saturated with facts no less than those on Pakistan. The author consistently looks into all corners of Khan's network: from Iraq to Libya, from North Korea to Iran.

Naturally, I am particularly interested in the part on Iran. Here, as in the rest of the book, Gordon Corera demonstrates admirable knowledge. Thus, he is quite fair in pointing out that a chance to dialogue with Iran was lost in spring 2003, when Iran made a secret approach to the United States (p. 166). Indeed, back then, during the short time span between May and August it was possible to solve that knot over Iran. Iranians were concerned if they would have even a limited possibility to enrich uranium. As for everything else, they were ready to make a concession. Washington responded with a categorical and even frightened *no.*

Gordon Corera is very careful about facts. He tries to avoid sensation where there could be none. In particular, he raises a question: did A. Q. Khan really transfer much important information to Iranians? Today, besides the Iranians themselves, the best answer is known by IAEA experts. However, reserved skepticism of Gordon Corera was very much appropriate back then–a year before IAEA got hold of Iranian reports on Pakistani traces.

Moreover, the author directly speaks about a failure of U.S. intelligence and the Department of State in analyzing sources of Iranian nuclear program. They fall for Russia and China as two countries helping Iran on the nuclear side. However, the focus on *David* led them to overlook *Goliath:* Pakistan and Iranian cooperation with A. Q. Khan (p. 62). «Pakistan was not on our radar screen... It was our assumption that <...> Pakistani-Iranian cooperation was not a significant factor,» the book quotes Robert Einhorn, an expert in diplomacy.

A story about Libya could be developed into a fancy detective story. Here again the author has his reserve, even if it seems to affect the dynamics of his narration. Gordon Corera does not allow any overexposure. His «Bomb shopping» features some most vivid characters, starting with Muammar Gadaffi himself, then his son Saif al-Islam... then Kussa Mussa, the head of intelligence, who opts for blue jeans and leather jackets during secret meetings in Geneva. More than that, the whole chapter «Dealing with Gaddafi» (pp. 176–195) is a fine example of civilized investigation journalism, comprising intrigue, details, references, and... respect to key sources that prefer to stay in the shade.

The author gives vent to his feelings applauding to MI6 and CIA officers, who finalize their lifework: they catch the *malicious proliferator* red-handed. But he cannot help asking a simple question that doesn't sound well together with the trumpets: what was Libya's nuclear program about, if Muammar Gadaffi exchanged it for international recognition of his regime and Tony Blair's handshake? A random set of centrifuges... rotors missing... enriching uranium? Far from that. The way Gordon Corera puts it, Libyan arsenal looks very much like a chaotic set of useless and expensive toys, which the Libyans could never put together for a dedicated military nuclear program, and even didn't intend to do it (but here a question mark should remain at least in the parenthesis). And definitely they were not yet close to the bomb (p. 223). Does it mean they knew they were buying materials from Khan network to exchange them later? Or a more complicated scheme: to frame someone?

And now Gordon Corera begins to outline an equation in one unknown, but what an unknown that is! It must be said, the unknown is *nearly* clear: Saudi Arabia. Some experts, while looking at Khan's network, add with meaning: we seem to see only the tip of an iceberg. And keep silence with the same meaning. Gordon Corera does not make any dramatic pauses, but tries to deal with facts. They are pretty scarce here if compared with other chapters. In 1994 we notice a Saudi diplomat, who later disappears (really disappears, no one has seen him since). He used to have a folder with 14,000 pages on Saudi interest to nuclear weapons. Some say the documents indicated that in the 1980s Saudi Arabia was ready to pay $5 billion to Iraq for taking the trouble of developing nuclear weapons for it. It isn't that unlikely: back in the 1970s

Libya offered twice the amount to the Soviet Union for the same humble service. Others say CIA was aware of the deal. Still others believe the documents were not real (p. 234). The author beats about the bush of Saudi Arabia. He seems to have a certain understanding of tapped telephone contacts between the Pakistanis and the Saudis held via Dubai. He also knows the particulars of the Saudi-Chinese missile deal: indeed, why would the Kingdom purchase relatively inaccurate ballistic missiles *CSS-2*, which only make sense for WMD delivery (p. 97). Finally, he is aware of a possible secret agreement between Saudi Arabia and Pakistan «nuclear weapons for cheap oil» (p. 168), but not ready yet to make a conclusion, thus leaving us lost in conjectures as to Saudi intentions.

Gordon Corera doesn't pay much attention to Pakistani-Iraqi contacts. However, he mentions a notable top secret document of October 6, 1990 discovered at a chicken farm owned by Saddam Hussein's son-in-law Hussein Kamel. I remember, some ten years ago I happened to work with documents from that very chicken farm, they were about gyroscopes, though. The document mentioned by Gordon Corera contains a commercial offer by A. Q. Khan to develop nuclear weapons in Iraq. Saddam Hussein rejected it off hand concerned it could be a provocation by U.S. intelligence.

The author devotes many more pages to cooperation between A. Q. Khan and North Korea. However, after reading those, much remains foggy. Missile cooperation seems to be quite clear, while the while the nuclear one remains a question for me even after I have read the chapter. At some point (p. 93) Gordon Corera even presumes that one of six Pakistani nuclear tests in 1998 could have been done for the North Koreans. Here he really lacks sources that were so generous with particulars about Libya.

Gordon Corera very clearly understands what *A. Q. Khan network* is about. He puts into the limelight all of them: the German, the Swiss, the Ceylonese, and the South African. And he admits they were known not only to him, but to Western intelligence as well: their conversations had been tapped for decades. Still, special services preferred not to arrest them, but to monitor them instead (p. 112). During those decades they did not resort to black schemes, but rather ran a «grey-market» network–working through the holes in the existing export control regime and using a variety of techniques to disguise their activities (p. 118). A tricky question for the author here: how many people indeed worked for A. Q. Khan and how many were paid agents? What is the ratio? For some reason the United States failed to offer legal assistance to Switzerland in its case against a network member Friedrich Tinner living in a valley of Graub?nden canton (p. 227). Could that be because he had been informing them about trade operations of «Khan and Co» distribution network?

The author has to skip a very important part in his streamlined story: Pakistan's own nuclear arsenal. What was A. Q. Khan's real contribution to building up its capacity? And another thing, more topical today: how well is the arsenal protected from unauthorized access and how well are Pakistani nuclear secrets guarded from terrorists?

The author admits (pp. 161–162) that documents found in Kabul made clear that Pakistani nuclear scientists had actually met with *the Taliban* and *Al Qaeda* to discuss the development of nuclear devices. No one has any definite knowledge as to how far the talks have gone. An even more interesting description is given to the paranoia of Pakistani military regarding cooperation with the United States and strengthening the country's military security. The author believes many in the Pakistani military establishment are convinced that the United States used to construe or does construe a clandestine operation to dismantle Pakistani nuclear arsenal. Am I right though when calling it paranoia? There is information that the United States several times considered forced nuclear disarmament of its closest ally outside NATO.

Meanwhile, the situation around the nuclear arsenal of Pakistan is following a totally different scenario. The United States pays tens of millions of dollars under classified budget items, about 100 million up to now,[1] only to keep Pakistani nuclear bombs in securely guarded areas without unauthorized access, while Pakistani military working with nuclear weapons should undergo proper training for and emergency. Seems to be part of the war on terror. But what about nonproliferation regulations? One thing is to ensure nuclear security in other nuclear states under NPT, such as France or Russia. And another thing is to help Pakistan, which

remains outside NPT framework. Double standards again? Again erosion of nonproliferation regime?

WHOSE S.O.B?

The author does not confine to journalistic investigation. He is also interested in the future of nonproliferation, no less than in a specific case of a particular proliferator A. Q. Khan. He sounds pessimistic about it. He believes we are going to see more and more of dual nuclear technologies on the international market–that is what Khan's network has outlined and ignited. On the other hand, the author sees a growing interest towards military nuclear technologies, here again he sees A. Q. Khan's network as a major catalyst of the world trend (p. 241). A description of uranium enrichment program can be fitted onto several CDs, like the ones found in Libya when it was voluntarily *declared open.* Those data can be copied easily. When speaking about *secondary proliferation*, the author recollects, among other things (p. 137), a warning by Lieutenant General (ret.) Gennady Evstafiev, my colleague in the PIR Center, which he made back in the late 1990s in his official capacity regarding military exchanges between Pakistan, Iran, and North Korea. Experts gave due credit to his idea, while U.S. politicians hated hearing «Pakistan» in public. Any lessons learned?

Gordon Corera elaborates on those things by looking at the case of A. Q. Khan and Pakistan in the global context. His keen analytical approach now comes down to commonplace ideas about the threat of *world proliferation chain reaction:* if Iran gets the bomb, Egypt and Saudi Arabia are sure to join in. North Korean bomb proved by a test is believed by Gordon Corera (he wrote those lines before the test) to cause *shock waves* throughout Asia, including Japan, South Korea, and Taiwan. However, North Korea had the test, while no one in the region seems to have followed. To say the least, each regional situation is special. How will the situation in the Middle East develop should it be proven seriously that Iranian nuclear program is military in its nature? Perhaps, here too, there will be no direct dependence, very much talked about by numerous adherents of *chain reaction* theory, which itself is a development of alarmism aimed at calling attention (maybe, exaggerating something, but with good intentions) to the dangers of global proliferation.

It happened so that my personal acquaintance with nuclear nonproliferation occurred 30 years ago, and again it was connected with A. Q. Khan. On a Sunday night there was *International Panorama* on TV with the most famous Soviet political observer Alexander Bovin, who focused on the Pakistani antihero. Soviet journalists tried hard to sound convincing about the double standards of Washington, which kept a blind eye on Pakistan stealing nuclear secrets and using them to quickly advance towards the bomb. They also told about a young Pakistani engineer, who had spent some useful time in the Netherlands, his name was mentioned. It means that even back then, 30 years ago, there was enough information to understand the scale of Pakistani military nuclear project. But if Soviet-American nonproliferation cooperation gave its fruit, however humble, on such tracks as Argentina or South Africa, Pakistan was part of the *big game.* Played by America alone, which saw no reason for Pakistan not to go nuclear: an S.O.B. after all, but it's *their own* S.O.B.

The Cold War is gone now. Some say, so are the dividing lines, and barriers on such issues as terrorism and nonproliferation have long been superseded by cooperation between the United States and Russia. Some say, and it even becomes commonplace, that the two countries will try to prevent any new cases of proliferation as it equally contradicts their core interests. Is it really true? Life is sure to offer new plot lines, and we will try them in practice.

Note

[1] David Sagner, William Broad, "U.S. Aiding Pakistan on Nuclear Security," *International Herald Tribune*, November 19, 2007, p. 8. The article notes, among other things, that most of the money is spent on ensuring physical security.

MISSILES THAT MADE THE HISTORY

Vasily Lata. 32nd Kherson Red Banner Missile Division (They Defended the Motherland). Moscow: 2007, 544 p.

Reviewed by Midykhat Vildanov

This book takes a special place among the published memories and reports related to the Strategic Missile Forces (SMF) and written by the military. Its author is member of the Academy of Military Sciences, Prof. Dr. Vasily Lata. Lt. Gen. (ret.) Lata does not only present his recollections – he has managed to create a unique historical and analytical piece devoted to the development of the SMF, accomplishment of important military-political tasks, and particularities of service in the branch, where the author has passed through all stages, including key positions in the Supreme Staff. The book is based on personal archives of Gen. Lata, reminiscences of his fellow generals and officers from the 32nd missile division stationed in the town of Postava near Vitebsk in Belarus.

The book commemorates 85th anniversary of the first division commander Major General Vyacheslav Frontov, who passed World War II from the first to the last day, and is devoted to other veterans of the division and their families, who survived the hardships of military service.

Speaking about the reasons for writing the book, Vasily Lata points out, «Different memories do not provide for thorough analysis of revolutionary changes that took place in the missile units, when R-12, Pioner and Topol systems became operational. The 32nd division was one of the first to be equipped with such strategic offensive weapons. It may seem from the modern literature that behind this there were no people who passed through the hardships to serve their Motherland. Much has apparently been forgotten – Heroes of the Soviet Union, thousands of orders and medals of our country. But in fact, it was totally different…»

In June 2006 at the regular meeting of the division veterans, Vasily Lata decided to write a book about the mission of the unit, difficulties of service, people who formed the division, studied new weapons and maintained strategic shield of the nation. This book is about people who made history.

BIRTH AND DEVELOPMENT

The division was eventually established by July 1, 1960 – this is the Day of the Unit since then. The period of 1960–1976 was quite difficult for the state and the division – within less than two decades, the country has managed to set up the most powerful armed service of the U.S.S.R with advanced nuclear missiles. The 32nd division was part of the northwestern missile grouping.

As years passed by, the SMF developed smoothly, received new stationary and mobile missile systems. The author specifies five stages in the history of the SMF, all of which were connected with the history of the division. The stages involved the emergence of new tasks and new armament: R-12 – Pioner – Topol.

The author undertook serious efforts to analyze and publish some unique materials that were closed to public for a long time and depict the complexity of the military-political situation in the world and the process of Soviet decisionmaking with respect to development and serial production of nuclear weapons and delivery systems. One may read with great interest Resolution No. 1384–615 of the Soviet Council of Ministers of December 17, 1959 «*On establishing the post of the commander-in-chief of the Missile Forces within the Armed Forces of the U.S.S.R.*» This day is now marked as a day of founding of the Missile Forces. The resolution appointed Deputy Defense Minister, Chief Marshall of Artillery Mitrofan Nedelin to be the first Commander-in-Chief of the Missile Forces. Many documents mentioned in the book are connected with the production of missiles and here many curious facts can be found as well. For instance, the primary plant for the production of R-1 and R-2 missiles was based in Dnepropetrovsk. It manufactured 2,500 missiles per year. Today such amount seems incredible – eight missiles per day were made in the plant! It is worth comparing it with the production of RT-2PM2 (for mobile Topol-M systems) in Votkinsk – the plant can hardly supply one missile regiment per year.

DEFENDING THE REVOLUTION

An important episode in the history of the 32nd division was the participation of the 1st missile battalion of the 428th missile regiment (armed with R-12 systems) in the *Operation Anadyr*. The Cuban crisis is widely discussed in literature, there are opposite views on the advisability and outcome of the aforementioned operation. The conclusions made by the author should be taken into account, as they are still topical today.

First of all, the role of nuclear weapons in solving international conflicts became very clear and many nations began to strive for possessing nuclear weapons – this is still the case today and the situation requires some effective solution.

Secondly, the entire world could see the resoluteness of the parties to employ nuclear weapons in order to protect the interests of the state or its allies.

Thirdly, for the first time in its history Washington found itself in the situation of equal threat with the U.S.S.R. And the United States agreed that its huge nuclear and missile capabilities could hardly protect the people. According to some experts, in case of exchange of nuclear strikes with the Soviet Union, the Americans would lose about 80 million people. Since this damage was unacceptable, the U.S. leadership refrained from a force solution. As a result, the parity of fear emerged and none of the parties could expect to gain a victory.

Fourthly, both nations realized that political and diplomatic means should be more preferable, in order to settle the conflicts among nuclear-weapon states. The eventual settlement of the crisis could be noticed only when the U.S.S.R and the United States showed their readiness to come to an agreement – the compromise was found.

Thus, the SMF accomplished their major mission during the Cuban crisis – they became the key deterrence factor. After the crisis, foreign policy of both superpowers substantially changed. The division had also another experience of being on alert – it was on combat duty during the events in Czechoslovakia in 1968. Let us remind that afterwards the Soviet leadership did not put the SMF on high alert, even though in many cases the international situation would need this.

PIONEER AGAINST BOYSCOUT

Another stage in the development of the 32nd division (1977–1980) was its re-equipment – the personnel had to learn how to operate the Pioner mobile missile system with the medium-range ballistic missiles. On pp. 101–115, one may find a lot of detailed information about the work carried out in the division to select and prepare the field positions, to study new weapons, to train the staff, to provide appropriate combat planning, and to construct social infrastructure. The pace of work of the military-industrial complex and the rate of supplies was higher

than the pace of building infrastructure. In some regiments the combat duty was organized at field positions until the end of construction of the points of permanent deployment. The missile system was, thus, unique and the author points out that such developments were caused by complexity of the military-political situation in Europe and rapid deployment of Pershing II missiles and cruise missiles there. It was necessary to maintain the strategic parity.

Lt. Gen. Lata mentions the preparation for *Zapad-81* strategic exercise, which was attended by defense ministers of the Warsaw Pact and commanded by Marshall Dmitry Ustinov. The exercise was aimed at demonstrating the might of the new generation of Soviet nuclear missiles – this should have been the demonstration not only for the allies, but also for NATO. Missile regiments had to overcome water barriers, move to long distances, camouflage, ensure security of the materiel, do reconnaissance, and provide for adequate logistics. The final stage involved dummy launches of missiles from field positions against an alleged adversary in Europe. The exercise proved high level of training of the personnel, safety and security of nuclear missiles. Gen. Lata assumes that the results of the exercises and combat capabilities of Pioner boosted NATO's decision on deployment of Pershing II in Europe.

MISSILE DIPLOMACY

Gen. Lata's experience of participation in the international negotiations on arms reduction treaties helps him to provide thorough analysis of these agreements. He pays particular attention to START I, which expires on December 5, 2009 – Chapter 7 of the book tells the story of the document.

According to the author, key efforts of the U.S. leadership, as far as the implementation of treaties is concerned, are targeted at the accomplishment of the goals set in the 2001 Nuclear Posture Review. It is a nuclear strategy that maintains, «In the event that U.S. relations with Russia significantly worsen in the future, the U.S. may need to revise its nuclear force levels and posture.»[1] To meet this requirement, the United States pays serious attention to the maintenance and modernization of the strategic offensive arms. Washington takes measures to circumvent or even to lift the restrictions of START I, since they impede the development of the aforementioned forces. The ceilings mentioned in the treaty were achieved by elimination of outdated missile systems (Minuteman and Poseidon), as well as early versions of B-52 heavy bombers.

Russian inspectors have discovered many violations of the START commitments at the U.S. nuclear weapon facilities. For instance, Washington illegally converts silos of the Minuteman III ICBMs into launch pads for new types of missiles at the Western missile range, conducts unverified flight tests of Trident II SLBMs, does not provide full telemetric data on flight tests of ICBMs, stations heavy bombers beyond the national territory without appropriate notice, denies the Russians the opportunity to conduct inspections, etc.

The Russian strategic nuclear forces carried out their commitments by eliminating unique types of strategic weapons, since the START arrangements imposed on Moscow special requirements under paragraph 2–4 of Article VII of START I and related protocols. These provisions envisage only elimination of ICBMs and expensive infrastructure of mobile missile systems under strict control of the U.S. inspectors.

It is known that at present, the parties carry out the Strategic Offensive Reduction (SORT) Treaty which implies the ceiling of 1,700–2,200 nuclear warheads for each country. For the United States such level is not a problem (most probably it will be 2,200), since it discharges the warheads and creates the reverse potential. For Russia, it will be again the elimination of unique and costly weapons.

The key conclusion made by Gen. Lata is that the provisions of START I do not fully comply with Russia's national security interests and this should be taken into account in the course of elaboration of new arms reduction agreements. Moreover, Russian and U.S. experts upon request of the presidents of both countries conduct the implementation review for START I, in order to assess the possibility of its extension and develop new parameters for future treaties.

Unfortunately, the author did not provide full description of the division activities in 1987–1991. I have to note that this was the time of fulfillment of the Soviet commitments under the 1987 Intermediate-Range Nuclear Forces (INF) Treaty, which entered into force on June 1, 1988. This task required accurate planning, to ensure smooth and safe removal from combat duty the Pioner missile systems. It was necessary to ensure security and safety of missiles and warheads during their long-distance transportation to the dismantlement facilities, to prevent any environmental damage. Division commanders also had to take care of key specialists, social infrastructure, and maintenance of order and discipline of the personnel. In general, the treaty was implemented on time and in good faith, as many commissions and U.S. inspections proved.

At the same time, according to the Russian military and politicians, the INF Treaty was not beneficial for the U.S.S.R and has negative impact on Russia's national security as well. The author argues, «If the then leadership of the Soviet Union had been pragmatic in implementation of the INF Treaty and preserved two-three divisions with medium-range missiles in the west of the country, today we would not have had such cheeky deployment of missile defense elements in Poland and the Czech Republic. There would have been no need in the current statements of the Russian military-political leadership about possible withdrawal from the INF Treaty, reproduction of the modified missiles of this class and other asymmetric measures.» This conclusion of the author can be called into question.

By 1991 the division was planning to be rearmed with the new mobile missile systems – Topol. The unit had all preconditions for that – availability of specialists, their high skills, and military and social infrastructure. The first regiment to get new weapons was the 346th missile regiment, which got retraining at the missile range and began its combat duty in 1991.

However, in 1992 after the demise of the Soviet Union, Belarus, Ukraine and Kazakhstan signed the Lisbon Protocol to START I and refused to deploy nuclear weapons on their territory. Therefore, all weapons were to be transferred to the Russian territory. Missile regiments were moved to Russia and included in other missile divisions. As a result, the 32nd division stopped to exist at 10 a.m. on August 13, 1993.

The historical path of the 32nd missile division was going in ups and downs, but the division was always one of the leaders of the SMF. Obviously, such success was the result of hard service of the personnel. Many officers and warrant officers risked their health, did not allocate much of their time to families and did all their best to accomplish the tasks. Did they think about material gains or career when they spent day by day at combat duty, in the field, near the nuclear warheads? Certainly, no. They all believed that their service was needed to the state and to the Soviet people. Practically all soldiers, sergeants, warrant officers and officers of the 32nd missile division enjoy the right to say – they were pioneers in operating nuclear weapons and contributed a lot to the defense of our Motherland. The book commemorates their heroism and excellent service and conveys the story of the division to the young generation of missile officers.

Note

[1] Nuclear Posture Review Report. Submitted to Congress on 31 December 2001. January 8, 2002, http://www.globalsecurity.org/wmd/library/policy/dod/npr.htm (last visited on March 8, 2008).