



NUCLEAR ENERGY: A-Z

A **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 Kiriyyenko, 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 Kiriyyenko.

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

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