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**The restructuring of the Russian nuclear industry:
A response to global expansion**

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1. Introduction

Increasing signs of global man-made climate change, growing demand for energy and sky-rocketing prices for organic fuels, their imminent depletion, concerns with energy security resulted in a renewed interest towards nuclear energy in many countries. The UK is no exception. To a large extent this change of attitude was brought about by extensive efforts of the world nuclear industry to learn lessons from its experience and address its known areas for improvement – safety and ecology, economic competitiveness, spent nuclear fuel and radioactive waste management, non-proliferation. The efforts have been also aimed at restoring public confidence after the nuclear accidents in 1979 and in 1986, which put the industry at least quarter of a century behind.

Nuclear utilities – operators of nuclear power plants - came first to realize that to survive and be competitive with other energy sources they need to cooperate globally, and established World Association of Nuclear Operators (WANO). Utilities were followed by the rest of the industry, and WNA was set up in 2001 on the basis of Uranium Institute in London, which unites enterprises working all over the nuclear fuel cycle (NFC), including energy generation. This is a reason why Rosatom and my parent company TENEX¹ decided that to better coordination with the world nuclear industry they needed a representative at WNA on a permanent basis, and sent me to London in early 2007.

¹ TENEX is a lead Russian world supplier of U products and services.

In the 90-ies the need to address stagnation and growing competition for energy sources and markets (both existing and emerging) for nuclear products and services lead to consolidation and integration processes in all countries-nuclear technology holders, but Russia. In Russia, following the break-up of the Soviet Union, quite the opposite was happening: the heirs of formerly powerful Minsredmash (Soviet ministry of medium machine building) were losing grounds, both at home and abroad.

How long could Rosatom enterprises remain competitive under the circumstances, and how Russia was supposed to respond?

2. Consolidation processes in the world nuclear industry were initially brought about by the need for the industry to survive in the aftermath of the 1979 and 1986 accidents. Drastically slashed nuclear power development programmes in one countries, and foregoing of nuclear by many others lead to a reduced demand for nuclear products and services – stagnation of the industry for several decades – with many companies going out of business. Consolidation of assets in an attempt to cut the production costs and secure investments into necessary improvements of existing nuclear technologies (e.g., safety backfitting) and development of the new ones was a way for the industry to stay afloat.

In the very beginning of the XXI century with signs of renewed interest towards nuclear energy getting stronger the consolidation processes were added up by integration across national boundaries (investments and acquisitions) to ensure guaranteed access to mineral resources (natural U in the first place) and competitiveness of the companies' products and services in the well-established and emerging nuclear markets. This required substantial investments into high-tech capital-intensive undertakings with slow return (U exploration and mining, expansion of production capacities, R&D in modernization and innovation of technologies). It also required optimized organization and management corporate structures, allowing consolidation and reallocation of resources on priority areas within the company.

As a result big corporations were growing to operate in one nuclear market segment (BHPB, USEC, Mitsubishi), on several segments (CAMECO, Westinghouse, GE) or almost over entire fuel cycle (AREVA). At the next stage they started to establish joint ventures to develop and market new technologies (URENCO-AREVA (ETC) and trans-national corporations to multiply their

resources and diversify their products (Westinghouse-Toshiba, GE-Hitachi).

The consolidation and integration processes resulted in a few big suppliers dominating each of the nuclear markets and competing between themselves. For instance, just four suppliers (URENCO, AREVA, USEC and TENEX (Rosatom)) provide the lion's share of the world reactor requirements in enrichment services. AREVA, Westinghouse, GE, AECL, Mitsubishi, Atomstroyexport (Rosatom) prevail on the reactor (nuclear island) vendors' market. The situation is not much different in other segments; the names of companies may change, but not necessarily.

New nuclear built and announced plans to build nuclear plants only fuelled the competition between the main nuclear suppliers both in well-established and emerging markets. Asia (China), India, North America, Middle East, Africa and even EU are the regions with a substantial potential for developing nuclear power. It may result in a global expansion of nuclear energy.

Was the Russian nuclear industry prepared to compete?

3. Consequences for the Russian nuclear industry of the Soviet Union break-up in the 90-ies
 - Important components of the industry (U reserves, fuel fabrication, machine building, operating nuclear plants, trained professionals) fell into the ownership of newly-borne states (Kazakhstan, Uzbekistan, Ukraine, Lithuania) leaving the Russian nuclear industry, which had long accustomed to be self-sufficient in everything, vulnerable to a short supply and related risks
 - State management reform substantially degraded the status of Rosatom, which became a Federal agency, the lowest level in the new federal 3-tier hierarchy (ministry (Ministry of energy)-service (Rostekhnadzor)-agency (Rosatom)). That was one of the results of a reduced state support of the industry
 - Economic depression in the country, no new nuclear built and lack of a national programme to develop nuclear power in the country, segmentation of the industry into joint stock companies, federal state unitary enterprises (FSUEs) and other types of organizations with a different level of subordination to the Federal Agency, degradation of their manageability and ability of Rosatom to accumulate and allocate resources on priority tasks resulted in substantial disbalances and a loss of the scientific, technical and production potential of the industry.

Just one example: U enrichment plants – geese laying golden eggs - on the one hand, and starving and aging R&D Institutes on the other

- Introduction of trade barriers (Russian Suspension Agreement in US and quotas in EU) and reduced tariffs on the Russian U products and services
- Search for any opportunity to export the Russian products and services to earn money to support the ailing industry resulted in commercial contracts on terms and conditions far from favourable for Russia (e.g., the US-Russia HEU Agreement). Still the efforts bore fruits: in 2006 the export revenues exceeded \$3.5B.
- Exodus and aging of qualified personnel, degradation of the social status and benefits for people to work in the nuclear industry.

By the end of the century the factors above lead the Russian nuclear industry to a condition with little/if any light in the end of the tunnel. A real threat emerged to lose the hard earned positions not only in the country, but in the world markets as well, which would only worsen the situation.

4. Objectives, current state and perspectives of the Russian nuclear industry restructuring

The restructuring of the Russian nuclear industry, started about two years ago, has become a natural reaction to the changing environment both inside the country and abroad (consolidation and integration processes in the world nuclear industry). It is aimed first and foremost at ensuring the energy security and meeting the energy demand of the fast growing Russian economy, increasing the nuclear share in the country's fuel mix. In particular, the task is set to bring the share of nuclear electricity from the current 16% to 25-30% by 2030. Strengthening of the industry's export capabilities as a self-investment resource is critical to meet the objective and ensure further development of the industry.

The level of state support (including budget financing) has changed dramatically. As you know in 2007 two Federal programmes were signed into law – one on the development of the nuclear power industry in 2007-2015, and the other on the nuclear and radiation safety in 2008-2015. Very soon a “General scheme of siting electricity-generating plants up to 2020” will be approved by the Government (all the clearances received), which assumes construction of 26x1Gwe nuclear power plants (to-day there are 31 in operation (23GWe). A gradual transition from state budget to

self-financing of the industry's development is a clear hallmark of the programme to culminate in 2011, when the country's electricity market is scheduled to become liberal.

Another important element of the increased state support lets itself be felt in the step-by-step elimination of legal and other hurdles on the way of Russian nuclear commerce, scientific and technical cooperation. Signing of the Russia-Australia Intergovernmental nuclear cooperation agreement in 2007, and of an Addendum to the Russian suspension agreement with US (just last Friday), an initialled US-Russia 123 Agreement, joining by Russia of Generation-IV and GNEP initiatives, efforts of the Russian government to do away with the trade barriers in the EU are but few examples of the above.

4.1. JSC "Atomenergoprom"

Presidential Decree "On the restructuring of the Russian nuclear power industry" of 27.04.07. established a vertically integrated holding – a joint stock company (JSC) "Atomenergoprom", 100% of the stocks of which will be owned by the state. The purpose is to divide the civil from the defence sectors of the Russian nuclear industry and let the civil (business) part develop in the market environment, improve its management, preserve, consolidate and develop its scientific, technical and production potential, strengthen competitiveness of its products and services in the world markets.

JSC "Atomenergoprom" will consolidate the assets of all the civil organizations and enterprises of the industry – 31 JSCs and 55 FSUEs (following their transformation into JSCs) – from U mining and milling, electricity generation to spent fuel and radwaste management. All these companies will become Atomenergoprom subsidiaries. The establishment of the holding company must largely complete in the first quarter of 2008. At present, the assets of all JSCs of the industry (incl., TVEL (fuel fabrication), TENEX (conversion and enrichment), Atomredmetzoloto (natural U), Atomstroyexport (construction of nuclear plants abroad) have already been reallocated to the Atomenergoprom balance sheets, and the transformation of FSUEs into JSCs is nearing completion (incl., concern "Rosenergoatom" – the Russian nuclear utility).

Although being fully owned by the state, Atomenergoprom and its subsidiaries will operate as commercial entities by the corporate management laws in the market environment. Its subsidiaries started to invest into and acquire foreign companies. Till recently the Russian domestic nuclear market was closed for

foreign investors, but you can't have failed to notice the door is being slowly but surely opening up. There are JVs being established in Russia (U exploration and enrichment, equipment manufacturing), and the process will continue. Otherwise the attempts of the Russian nuclear industry to integrate into the world market would be impractical. One-way traffic does not work in this case.

4.2. State corporation "Rosatom"

In December 2007 Russian President signed a Federal law "On the state corporation on nuclear energy "ROSATOM". Its purpose – to ensure a unified management of the defence, civil and scientific sectors of the nuclear industry and further consolidation of its production, scientific and technical potential, as well as material, financial and intellectual resources. The state corporation shall restore the unity of the entire industry, will control 100% stocks of Atomenergoprom and directly manage the defence enterprises, fundamental R&D Institutes, nuclear and radiation safety organizations, especially those engaged in addressing the nuclear legacy issues².

ROSATOM will be established by reorganization of the current Federal Agency "Rosatom", and will inherit its legal rights and liabilities. In the main the establishment of ROSATOM shall complete within 2008. As you know very recently the Russian President appointed Sergey Kirienko, the former head of the Federal Agency "Rosatom", the Director General of the state corporation "ROSATOM", as well as members of its policy making body – the Supervisory Board.

Establishment of the state corporation "ROSATOM" is but another example of a growing state support of the nuclear industry: in Russia state corporations are scarce and signify the critical importance of the industry for the country's security and economy.

5. Conclusion

To-day world nuclear markets are battlefields for big players, most of which are trans-national corporations – mega alliances (AREVA, Toshiba-Westinghouse, GE-Hitachi). This is a result of the industry's consolidation during more than 20 years of stagnation, which in anticipation of nuclear renaissance acquired a different meaning – strengthening companies' competitive edge in the contest for emerging markets.

² James Lovelock's Gaia theory of the Earth as a living body, every component of which is important in itself, and has a role to play to support the functionality of the entire system, is fully applicable to a self-sufficient nuclear industry.

It seems logical that the Russian nuclear industry follows the suit. Consolidation of the national assets is the first step. International partnerships (joint ventures, foreign investments and acquisitions) are the second one. The algorithm of the restructuring is to divide “business” from “non-business”, improve the industry’s integrity and manageability, while maintaining high non-proliferation, nuclear and radiation safety records.

JSC “Atomenergoprom” is a result of consolidation of the business (civil) part of the Russian nuclear industry. It includes heavy machine building, and power generation – a key difference, and we believe - advantage in comparison with AREVA. It is wholly owned by the state, but will enjoy corporate business management. When complete, the restructuring is to ensure a due place for Atomenergoprom products and services both at home and in the world nuclear markets.