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*presents*

**Creation of a nuclear power plant –  
a systemic problem of the national security of Belarus**

**by**

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# **Creation of a nuclear power plant – a systemic problem of the national security of Belarus**

## **INTRODUCTION<sup>1</sup>**

Ensuring the security of energy supply is a key global challenge. Many nations have pinned their hopes of a secure and stable energy supply on nuclear power, declaring their intention to build their own nuclear power plants. Under these circumstances, Belarus is following suit. However, the current nuclear engineering trend and global financial crisis, both call for serious adjustments to the rationale for the creation of a Belarusian nuclear power plant. This study asserts that the creation of a nuclear power plant as a “crisis response instrument” to address the energy security challenge cannot be considered the best option and is in itself a troublesome decision.

Belarus’ first nuclear power plant will create new long-term vulnerabilities for the Belarusian national security system. The construction of such a plant will bring about serious risks on a regional scale, including environmental and economic risks, as well as threats for a further weakening of energy security and heavier dependence on the Russian Federation. Belarus will be forced to establish a new and costly nuclear safety infrastructure, whilst dramatically restructuring its own national security system and subsystems.

The study below outlines the various factors involved in the decision to construct a nuclear power plant in Belarus, with specific focus on the national security angle. The results of this systemic multiple factor analysis suggest that, given recent changes in the strategic setting, all possible alternatives should be analysed to offset any unwanted complications. Options outlined include the following:

- To postpone the commencement of the construction of the nuclear power plant until the global financial environment improves;
- To channel available resources into the implementation and improvement of adopted energy-saving programmes to develop traditional and alternative energy sources;
- To consider the emerging possibilities of regional cooperation with a view to enhancing the energy security of the state;
- To step up the foreign political effort of the state to create a multilateral international mechanism for addressing energy problems, especially in the framework of the Eastern Partnership initiative.

### **1. Transformation of the National Security System: Safety Matters**

By force of circumstance, in the present-day world, nuclear safety is ensured through the joint efforts of both national and international mechanisms. In IAEA safety guides, the term “safety management” is used for the measures required to ensure that an acceptable level of safety is maintained throughout the lifetime of a nuclear power plant, including decommissioning. The IAEA emphasises that it should be clearly understood that safety management is not separate from other business activities of the operating organisation. Safety management should be an integral component of the management of the entire organisation; in effect the safety significance of the operating organisation’s activities should be understood and recognised and

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<sup>1</sup> This study is a result of the project “A System Analysis of the Transformation of the Security System of the Republic of Belarus in the Process of the Development of Nuclear Power Engineering” performed in the framework of the Belarusian Public Policy Fund and Belarusian Institute for Strategic Studies.

the plant's safety given the utmost priority – overriding, if necessary, the demands of production and project schedules.

As is known, national security is a sophisticated system including many subsystems. The current 'National Security Concept of the Republic of Belarus (2001)' encompasses politics, the national economy and environment, military, information and humanitarian spheres, each being guided by a security subsystem – regulatory, organisational, technical, etc.

By the time Belarus made the decision to start building its nuclear power plant, the country had developed a set of nationwide systems and inter-linking elements to ensure nuclear and radiation security. Among others, these systems included a national system of export control; a national environmental monitoring system, which includes radiation monitoring; and a state system of prevention and relief for emergency situations.

The creation of a nuclear power plant and the nuclear power sector in the national energy sector will bring about unavoidable radical transformation of the entire national security system. This implies a considerable additional burden on available organisational, material, technological and human resources, which require not only the adaptation to new conditions, but also establishment of new subsystems. Furthermore, what is crucially important is to ensure their concerted and efficient operation as a whole. The principal number one task is therefore to build a new nuclear safety (sub)system.

## **2. Blueprint for a New Nuclear Safety System**

An integrated approach to nuclear plant safety and security suggests that the state must undertake certain commitments to ensure the power plant's safe operation. These should encompass the following steps:

- To form legislative and organisational instruments to regulate nuclear activities;
- To assess and regularly reassess the "Design Basis Threat"<sup>2</sup>.
- To create, maintain and develop a system of stock record and control of nuclear and radioactive materials, a system of physical protection of nuclear and radioactive materials and nuclear installations and a system of suppression of trafficking in nuclear and radioactive materials;
- To ensure the required degree of readiness of the police, border and customs services;
- To establish a task force specialised in nuclear security with state security agencies;
- To create and develop personnel training and equipment maintenance systems; and form an efficient nuclear safety culture.

Once Belarus builds its first nuclear power plant, the country will have to complete the challenging and demanding task of upgrading the system of stock keeping and control to an entirely new level in order to comply with IAEA recommendations.

This challenge calls for a package of measures including the augmentation of regulatory, organisational and technical frameworks, in addition to the completion of staffing the newly created agencies including the State Nuclear Supervision Committee, or Gosatomnadzor (with the Ministry for Emergencies), and the Nuclear Energy Department (with the Economy Ministry). So far, technical standards for safety assessment have not been developed, and neither have been the technical and financial issues of radioactive waste disposal and ultimate disposal of spent nuclear fuel.

Fostering a nuclear safety culture in Belarus is the most difficult task, as it will have to be developed from scratch alongside the construction of the nuclear plant itself. A system of

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<sup>2</sup> "Design Basis Threat" defines measures of physical protection against unauthorised removal of nuclear material and sabotage at nuclear installations and during transportation of nuclear material.

training and retraining personnel is a crucial step towards nuclear safety culture, but it is just step one.

### **3. The International Factor**

Belarus is a signatory to around twenty international agreements on nuclear and radiation security. In 1995, Belarus and the IAEA signed the Agreement for the Application of Safeguards in connection with the NPT. As part of the Nuclear Suppliers Group since 2000, Belarus has included the guiding principles of the Group in its national regulations. In 2001, Belarus applied for membership in Zangger committee.

Despite the tangible contribution of the Belarusian state to the consolidation of a nonproliferation regime, the country still has a very challenging task ahead of them. According to available information, by 2006, Belarus had fulfilled only 23.4% of its commitments under the Resolution<sup>3</sup>. Nevertheless, this is roughly the average for all the 84 countries included in the study (23.5%). To compare: Sweden has fulfilled 23.8% of its commitments, Russia 28.4%, Lithuania 38.2%, Poland 46.9% and the United States 77.2%. Belarus still needs to ratify the Additional Protocol to the Agreement between the Republic of Belarus and the IAEA for the Application of Safeguards in connection with the NPT, which Belarus signed in November 2005. The document facilitates the Agency's verification activities.

A logical next move would be for Minsk to give its consent to adopt amendments to the Convention on the Physical Protection of Nuclear Material, which broadens the application area of the Convention and obliges member-states to adopt special regulations, meeting IAEA recommendations regarding the organisation of the state system of physical protection of nuclear material and nuclear installations.

### **4. Nuclear Power Plant – “A Superjet with no Landing Runway”**

In May 2009, the International Energy Agency published the background paper “The Impact of the Financial and Economic Crisis on Global Energy Investment”. The paper states that many countries of the world may suspend or give up their plans to construct nuclear power facilities because of the global crisis<sup>4</sup>. The situation in nuclear power engineering and the global economic crisis both bring up questions concerning the very reasoning behind a “nuclear power renaissance”.

Paradoxically, the world seems to be moving away from nuclear power. The contribution from nuclear fission energy to the total amount of produced electric energy decreased from 18% in 1993 to about 14% in 2008. Construction time is getting longer, whereas maintenance and decommissioning costs appear to be getting higher.

According to IAEA and World Nuclear Association (WNA) documents, the dependence on uranium imports is much stronger than that on oil and gas. In the next few years, the supply of “civil” uranium is projected to fall (the current requirement is estimated at about 65,000 tons a year). This is connected, first of all, with the exhaustion of “secondary resources” – the reserves accumulated during the cold war and secondly, with the fact that the operating uranium mines will not be able to cover the projected gap between supply and demand, with the development of new mines requiring considerable financial and time resources.

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<sup>3</sup> See: Crail, P. Implementing UN Security Council Resolution 1540: A Risk-Based Approach // *Nonproliferation Review*. 2006. July. Vol. 13, #2.

<sup>4</sup> The Impact of the Financial and Economic Crisis on Global Energy Investment. IEA Background paper for the G8 Energy Ministers' Meeting 24–25 May 2009.

The increasingly serious uranium supply situation expected in the next three to five years might lead to a forced nuclear shutdown of perhaps 5% of worldwide reactors, most likely in countries without sufficient domestic uranium mining and enrichment facilities<sup>5</sup>. Apparently, given the likely growth in the demand for uranium – if nuclear plant projects are implemented – price hikes and bitter competition will be unavoidable.

However, this is just the tip of the iceberg. Thus far, not a single state has resolved the problem of burial of radioactive waste, and it is for this reason that nuclear power plants are ironically called “superjets without landing runways”<sup>6</sup>. Furthermore, however limited the framework of the “nuclear power renaissance”, it will inevitably entail a new dependence of the countries that develop nuclear power engineering on separate countries or consortiums of countries that act as suppliers of nuclear fuel and/or recipients of radioactive waste. The amount of waste will be growing as nuclear fuel continues to be used in increasing volumes, hence higher storage, treatment and burial costs.

## **5. Problematic Cycles**

Current analysis suggests the medium- and long-term programming aspects of the Belarusian nuclear project are insufficient. The primary reasoning is the unfavourable overlapping of a variety of cycles currently experienced by Belarus. Four cycles have been identified, encompassing various unknowns. These are summarised below.

### *1. The cycle of the global economic crisis*

This encompasses the unknowns of duration, dynamics and consequences.

### *2. The cycle of financing construction, commissioning, operation and decommissioning*

This encompasses the unknowns of volume, stability and security of financing, as well as the degree of potential increase in costs and duration.

### *3. The cycles of energy price fluctuation and exhaustibility of nuclear fuel resources*

This cycle encompasses the unknown of duration.

### *4. The cycle of ageing and renewal of baseline technologies (scientific and technical innovation)*

This encompasses the unknowns of duration and the type and efficiency of new technologies.

Belarus’ efforts to prepare for the construction of the country’s first nuclear power plant are therefore constrained by numerous uncertainty factors, which considerably broadens the range of known “classical” risks of nuclear power engineering and could promote a sort of negative synergetic effect.

The “ideal” life cycle of the Belarusian nuclear power plant without allowance for likely complications looks as follows:

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<sup>5</sup> Dittmar, M. The Future of Nuclear Energy: Facts and Fiction. Chapter I: Nuclear Fission Energy Today. arXiv:0908.0627 (August 2009): [http://arxiv.org/PS\\_cache/arxiv/pdf/0908/0908.0627v1.pdf](http://arxiv.org/PS_cache/arxiv/pdf/0908/0908.0627v1.pdf).

<sup>6</sup> Schimmeck, Tom. “Superjet ohne Landebahn” // *Internationale Politik*. 2008. September-October [http://www.moskau.diplo.de/Vertretung/moskau/ru/04/Internationale\\_\\_Politik/2008/IP-5-2008-9-Schimmeck,property=Daten.pdf](http://www.moskau.diplo.de/Vertretung/moskau/ru/04/Internationale__Politik/2008/IP-5-2008-9-Schimmeck,property=Daten.pdf).

2010 to 2016-2019	Construction
2017 to 2020	Tests and commissioning (estimated to take about 12 months)
Until 2077-2080	Industrial operation (estimated up to 60 years)
2099 to 2140	Complete shutdown of the reactors, decommissioning and dismantling (estimated to take 40 years and more)
Timeframe unknown	Temporary storage of radioactive waste at the site of the nuclear power plant
Timeframe unknown	Disposal of nuclear waste and burial of spent fuel

At the same time, according to the latest estimates of the French Nuclear Safety Authority (ASN), it takes at least five years to set up the legal and regulatory infrastructure for a nuclear power programme, two to ten years to license a new plant, and about five years to build a power plant. That means a “minimum lead time of 15 years” before a new nuclear power plant can be started up in a country that does not already have the required infrastructure<sup>7</sup>.

If we apply the same timeline for Belarus, we will see that the Belarusian first nuclear power plant will start its operation in 2025 at the earliest. However, according to reliable forecasts, in 30 to 50 years, new much safer and more efficient power technologies will appear, including nuclear power know-how<sup>8</sup>. This means the Belarusian plant will have been outdated and failing to comply with brand new safety and efficiency standards not even 50% into its life cycle. But there are further challenges to the argument that a nuclear power plant is the best option for Belarus. The main objections can now be outlined.

## 6. Counter-arguments: Building the Case Against a Nuclear Solution

- In the final count, *financially*, the scale of the Belarusian project to create its own nuclear power plant is comparable to the size of the state budget (plus payments of interests on foreign borrowings) amid a very serious growth in foreign debt. World experience shows that the cost of decommissioning could amount to up to 40% and more of construction costs<sup>9</sup>.
- In terms of *national security*, Belarus will have to create a new, very costly nuclear safety infrastructure and re-design the national security system, its regulatory, organisational and technical components, and establish a special system of training and retraining of personnel. The entire national security system will be subjected to additional pressures, and a significant part of it will be working “exclusively for the nuclear power plant”.
- From the point of view of the *environment*, a new region with a special regime of environmental/radiation security will appear (in addition to the territories contaminated as a result of the Chernobyl accident), becoming a source of potential risk for the country and the whole Central European sub-region.
- *Plant operation* is in itself a quite risky enterprise, which envisages “imports” of some very serious problems, none of which have optimum, and most importantly safe,

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<sup>7</sup> Emerging Nuclear Energy Countries. World Nuclear Association.14 August 2009: <http://www.world-nuclear.org/info/inf102.html>.

<sup>8</sup> See, for example: P. Schedrovitski “Paving the Way to Nuclear Renaissance”, February 18, 2009: <http://www.rosatom.ru/comments/13888>.

<sup>9</sup> “Liquidation” of Russian nuclear power plants: problems and prospects. July 21, 2009: <http://www.atomic-energy.ru/node/4385>.

solutions (methods of reliable and safe ultimate disposal of radioactive waste and spent nuclear fuel). Instead, problems will descend to later generations with hopes that they will have the required know-how to deal with such problems.

- The planned 25% contribution of the nuclear power plant in the Belarusian energy consumption pattern is not panacea. In terms of the *energy security* of the state, the nuclear plant will not enhance it by diversifying energy suppliers, but replace the share of Belarus' dependence on natural gas supplies with a new dependence on Russian nuclear materials and know-how (to say nothing of the dependence on Russian loans), which will inevitably promote political dependence. The exclusiveness of the Russian Federation as a supplier of materials and solutions is also a problem, because the Russian system of nuclear safety has substantial drawbacks and comes short of some quality and efficiency standards, for instance those adopted in the United States<sup>10</sup>.

## 7. Regional Risk of Overproduction

Successful completion of nuclear power programmes in neighboring countries raises questions concerning the benefits to Belarus for its own nuclear project. To enhance the connection with the Polish power grid, it is proposed to build a 400 kilovolt (kV) Ross (Belarus) – Bialystok – Narew (Poland) power line with a DC link and transit and export electric power to Poland with combined annual volumes of up to 6 billion kilowatt-hours (kWh)<sup>11</sup>. However, Poland plans to build its own nuclear power plant (Poland may also have a share in a nuclear power plant in Lithuanian).

In August 2009, the Polish government declared its intention to build the first Polish nuclear power plant. Earlier, state Polish energy group (Polska Grupa Energetyczna – SA PGE) announced that two 3,000 MWe nuclear power plants would be built, with two or three power units each. It is planned that the first one will be commissioned by 2021, roughly the same time Russia plans to launch a Baltic nuclear power plant in the Kaliningrad enclave (2,300 MWe) and Lithuania schedules its new nuclear power plant (3,400 MWe) for commissioning. The expectations that excess electric power generated by the Belarusian nuclear plant will be required by its neighbours may turn out over-optimistic.

## CONCLUSION: Identifying Viable Alternatives

Amid the global economic crisis and actual recession in the global development of nuclear power engineering, the creation of a nuclear power plant as a "crisis response instrument" addressing the energy security challenge simply does not add up.

The hikes in the degree of uncertainty in the regional and global financial, economic and energy systems, aggravation of security issues in supplies of energy resources and resulting threats to stable energy supplies suggest performing a thorough analysis of all pros and cons of the construction of a nuclear power plant in the Republic of Belarus and discussing all *possible alternatives* while factoring in recent developments in order to avoid complications:

- To postpone the commencement of the construction of the nuclear power plant until clear improvements in the global financial and economic environment and appearance of complex favourable tendencies in the country and globally (including price dynamics,

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<sup>10</sup> See A.M. Bukrinski. Nuclear Supervision in the USA: Key Features and Peculiarities // Nuclear and Radiation Safety. 2009 #1

<sup>11</sup> Interview of Belarusian Energy Minister A. V Ozerets with First magazine, April 25, 2009: <http://www.minenergo.gov.by/>.

availability of energy resources, secure financing of the project, geopolitical, innovative and other key factors);

- To channel available resources into the implementation and finalisation of adopted energy-saving programmes and projects to develop traditional and alternative energy sources;
- To consider the emerging possibilities of regional cooperation with a view to enhancing the energy security of the state, which includes the advisability of engagement in regional energy programs, including in the construction and further use of the Lithuanian nuclear power plant (or Baltic nuclear power plant in the Kaliningrad Region);
- To step up the foreign political effort of the state to create a multilateral international mechanism of addressing energy problems (including the development of new energy solutions) and have Belarus involved in emerging initiatives and efficient formats of such cooperation, especially in the framework of the Eastern Partnership initiative.

Overall, it is clear that the nuclear programme in Belarus needs serious examination before it becomes a reality. This is not only true in terms of the financial considerations within the current global economic climate, but also is relevant vis-à-vis the practical factors regarding the technological and environmental feasibilities of embarking on a project which will have consequences on every single citizen of Belarus. The gravity of the safety issue and the requirements for costly and time-consuming upgrades in national security strategies highlight the importance of getting the nuclear decision right.