Mission report

Name: [Redacted]

Date(s): 26 May 2016

Place: DG ENER, Brussels (DM-28-00/S36)

Subject: Meeting between Lithuanian delegation and Commission experts from ENER/DEVCO/JRC on NPP construction in Belarus

Participants: See Annex 1, (JRC F.5)

Objectives: To support DG ENER in the technical discussions on the Ostrovets NPP project in Belarus with a delegation of the Lithuanian government

1. SUMMARY:

The meeting followed the general outline provided in the Room Document in Annex 2. For each topic, a presentation was made by the Lithuanian side (with or without accompanying presentation slides) which was followed up by discussions between all participants.

A short background document was also provided (see Annex 3).

For those presentations supported by slides, the slides are provided in Annexes 4 to 8.

Lithuania has been involved in the trans-boundary Environmental Impact Assessment procedure with Belarus according to the Espoo convention since 2009. Lithuanian review of the preliminary EIA led to 39 comments on site-specific issues from the Lithuanian experts. After more than 50 exchanges of letters, the Belarusian side has not adequately responded to the issues. Lithuania complained to the Espoo committee, which agreed to launch infringement procedures and issued 12 recommendations to the Belarusian authorities. Lithuania claims that these recommendations have not been implemented. The Espoo committee proposed a technical expert meeting between the two parties with Espoo committee mediation, but Belarus rejected the proposal in favour of continued bilateral discussions which are clearly not progressing. The next bilateral meeting will take place on 21/22 June.

A representative of the Lithuanian regulatory authority provided some information on the main concerns regarding the Ostrovets NPP:

Site selection issues

- There is no evidence of a proper site selection process, with analysis of alternative sites and robust process for selecting the preferred site.
• Site evaluation has not been performed according to IAEA NS-R-3. Evaluations of the suitability of the site have not taken into consideration possible effects on the Lithuanian population and territory (the plant is located only 50 km from the Lithuanian capital city, Vilnius, with more than half a million residents and there are almost one million Lithuanian residents within 100 km radius of the plant).

• Belarus has agreed to an IAEA SEED (Site and External Events Design) Review mission, but has requested only partial scope, skipping some of the first steps, including the site selection process review and integrated site evaluation review.

• There are concerns about cross-border cooperation in case of an emergency.

**Design and construction issues**

• It was noted that a number of questions were raised by STUK in during the pre-licensing process for Hanhikivi. These included inadequate physical separation and primary circuit pressure reduction.

• Delays and lack of information regarding the performance of stress tests that Belarus agreed to implement according to the ENSREG methodology.

• Concerns over the capabilities of both regulator and operator. Lack of independence of regulator.

• No strategy for spent fuel and radioactive waste management.

• There are also concerns regarding the conditions for workers on the construction site, theft of materials, poor construction quality, blame culture and non-reporting of errors, violations of on-site regulations.

The Commission provided some clarification on the issue of the stress tests: Performance of the stress tests is agreed by resolution. The national report should be ready end of 2016/ start of 2017. The peer review of the stress test report is in the ENER work programme.

Lithuanian experts presented more details on the concerns regarding geological and seismic aspects of Ostrovets and alternative sites and on radiation protection of the Lithuanian population (see Annexes 5 and 6 for more details).

There followed a presentation, and discussion with ENER experts in the field, on the need for a level playing field with regard to electricity trade in the region.

The Commission side (ENER, DEVCO, JRC) then provided some feedback on the related cooperation with Belarus. Cooperation under the INSC programme has been ongoing for some years with support provided for capacity building of the nuclear regulatory authority. The previous and
Currently ongoing projects have included transfer of expertise and knowledge for reviewing safety analysis reports, joint review of selected safety issues as part of the PSAR review in the framework of the issuing of the construction licence for Ostrovets NPP, development of a strategy for radioactive waste management for Belarus, support for the review of the NPP commissioning licence application and support for the review of the updated PSAR and PSA in the frame of the NPP operating licence application.

2. **CONCLUSION**

Lithuania would like to continue working with the European Commission on this issue and wishes to have EC support for the resolution of its concerns and complaints by:

- bringing attention to nuclear safety issues in high level dialogues with Belarus
- exerting all possible influence to ensure stress tests are carried out
- encouraging Belarus to invite a full scope IAEA SEED review mission
- ensuring a level playing field for electricity trade in the region in the frame of the regular dialogue in the energy sector
- bringing attention to the issues in the frame of EC participation in relevant international conventions, and exerting pressure for Belarussian compliance.

It was also suggested that the IAEA Convention on Nuclear Safety (CNS) review meeting, which is to be held in the first half of 2017, could also be a suitable forum to highlight the Lithuanian concerns. In this context, it was agreed that both Lithuanian and EC experts would jointly review the Belarussian national report submitted for the next CNS review meeting (the reports are due to be issued in August 2016). Both sides agreed to organise a follow-up meeting after the next Lithuania-Belarus bi-lateral meeting scheduled for 21/22 June.
## Annex 1

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<thead>
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Annex 2

Expert meeting with the representatives of European Commission on Belarusian Nuclear Power Plant (NPP) Thursday, May 26, 2016
DG Move, 24, rue De Mot, Brussels
DM24 07/50A
10:00 – 13:00

ROOM DOCUMENT

Introduction of issues by Lithuanian delegation and the EC

I. Foreword
- Welcome address by the EC
- Vice-Minister of Energy of the Republic of Lithuania

II. Presentation by Lithuania of nuclear safety and environmental protection issues regarding the Belarusian NPP

1. Introduction
Nuclear safety and environmental protection issues regarding the Belarusian NPP; issues related to international conventions in the field of nuclear safety and intergovernmental environmental impact assessment.
- Ministry of Foreign Affairs

2. Site selection for the Belarusian NPP; lack of safety measures.
- State Nuclear Power Safety Inspectorate

3. The geological and seismic aspects of Ostrovets and alternative sites: major issues.
- Lithuanian Geological Survey under the Ministry of Environment

4. Belarusian NPP impact on the radiation safety state in Lithuania
- Radiation Protection Centre under the Ministry of Health

III. Issues of electricity trade with third countries taking into account the ongoing or planned nuclear power plant constructions in Belarus and Kaliningrad Region

1. Considerations of measures for electricity import from non-EEA area Countries limitations.
- Ministry of Energy

- Transmission system operator LITGRID

IV. Quick overview of the EC’s tools and planned actions to address the matter

V. General discussion

Annex 3

BELARUS NPP: SAFETY CONCERNS
MAY 2016

Belarus is building its first nuclear power plant (NPP), designed by Russian state corporation Rosatom (design concept AES-2006), in the North-Western part of Belarus, Grodno oblast, near Ostrovets (coordinates 54°45'19.6"N 26°06'28.9"E). The distance from construction site to the Lithuanian capital Vilnius is 50 km.
The NPP will have two units with VVER-1200 reactors (output capacity up to 2x1200 MW, operating lifetime – 60 years). The first unit of the NPP is scheduled for launch in 2018, the second – in 2020. Contractor General of the NPP construction project is Rosatom’s subsidiary company – Atomstroyexport (Russian Federation).

Despite violation of international standards and requirements on nuclear safety, lack of experience in nuclear energy and technologies, Belarus is quickly progressing with the construction of its first NPP. Currently, works on site include construction of the major buildings and structures for reactor Units No 1 and No 2. It is estimated that by the end of 2015, around 40% of the 1st Unit of the NPP was built and the reactor vessel was delivered to the construction site on 24 December 2015. The reactor vessel for Unit No 2 will be delivered in 2017.
The safety culture of the Contractor General and future operator is rather low. In November 2014, integrated inspection mission performed by Belarus authorities in the Belarus NPP have identified violations in the fields of hydro isolation, entry control installation, construction and armature works, load lifting installation, etc. Inspectors noted that violations were found during every inspection. Belarus press constantly reports thefts of concrete, armature and other construction materials from the NPP construction site. Belarus declares that the NPP in Ostrovets will be the cheapest NPP in the world and it will be built in the shortest period of time.

Since 2009, Lithuania has been involved in the Transboundary Environmental Impact Assessment (EIA) procedure with Belarus according to the Espoo Convention and has been raising its concerns bilaterally and through other multilateral instruments. Belarus not only failed to answer Lithuanian questions regarding the nuclear and environmental safety aspects of the NPP, but also violated the main principle of the Espoo Convention – final decisions can be taken and construction works can only be started, when the concerns of the Affected Party (here – Lithuania) are duly considered and the Transboundary Environmental Impact Assessment (EIA) is completed. Neither the sequence of procedures of Espoo Convention were fulfilled (first Belarus made decisions, then attempted to legitimize them formally in reverse order), nor the content of requested actions (e.g. necessary research were not made), main issues to be answered in the process of Espoo procedures were not resolved.

1 Espoo Convention – UNECE Convention on Environmental Impact Assessments in a Transboundary Context
2 The Espoo Convention foresees a chronological order of procedures: (1) notification about the planned activity – (2) preparation of EIA Report – (3) answers to questions and comments from the Affected Party – (4) proper consideration of comments and questions, reflected in the EIA report – (5) public hearings in the Affected Party – (6) experts' consultations – (7) final decision regarding the planned activity.
Belarus is implementing the project in violation to international nuclear safety and environmental standards and requirements, and without respect to the principles of openness, transparency and good neighbourhood. This was confirmed by the international organizations. In 2014, the Ministers' meetings of the Espoo Convention and the Aarhus Convention concluded that Belarus has developing the NPP project in violation to these Conventions. It was acknowledged that Belarus had violated four articles of the Espoo Convention and recommended to take certain steps in order to comply with the Convention. Lithuanian submission against Belarus, presented to the Espoo Convention in June 2011, served as the basis for investigation. Openness and transparency is of utmost importance when developing a NPP project especially for states newcomers in nuclear power programs. However, Lithuania still has not received the answers regarding nuclear, radiological and environmental safety issues of Belarus NPP.

Lithuania considers that Belarus has infringed the rights of Lithuanian society in the development of Ostrovets NPP project and throughout the Transboundary Environmental Impact Assessment process. After continuous fruitless requests to Belarus to provide answers to the key questions of concern to Lithuanian authorities and the public and to arrange public hearings for Lithuanian residents in Lithuania, on 27 March 2015, Lithuania placed a submission to the Aarhus Convention Compliance Committee regarding Belarus actions. The submission is now being considered by the Compliance Committee of the Aarhus Convention.

The main issues related to the nuclear and environmental safety of Belarus NPP project:

- **Site selection and safety of site.** The Espoo Convention requires to assess locational alternatives in the EIA Report and to choose the project site as an outcome of the EIA procedure. Belarus **de facto** selected the site for the NPP construction in Ostrovets district in 2008, i.e. before the commencement of the transboundary EIA in 2009. Site selection criteria were not disclosed for Lithuania in spite of official requests, alternative sites were not evaluated in EIA.

- **Seismological observations.** Territories around the Ostrovets site experienced earthquakes measuring 5-7 on Richter magnitude scale in 1887, 1893, 1896, 1908 and in 1987. Although Belarus declares that the seismological survey of the territory around Ostrovets has been performed, Lithuanian authorities have identified substantial shortcomings of the observations (scope, duration of seismological monitoring, methodology, etc.). Belarus' experts have also admitted that previous seismological researches were based on past conditions. Therefore, the results cannot be considered as reliable for seismic hazard assessment.

- **IAEA SEED mission.** The International Atomic Energy Agency (IAEA) encourages its Member States to request a Site & External Events Design (SEED) Review mission at an early site survey stage (an action that precedes site selection and site assessment). In June 2014, during the Review Meeting of the Convention on Nuclear Safety and the Meeting of Parties of the Espoo Convention, Belarus was recommended to accomplish the SEED mission but it has not been done up until now. Moreover, in April 2016 Belarus declared that it will accomplish only 5th and 6th modules of the SEED mission that are related to construction and design evaluation, and is about to skip the first four modules of the Mission that are scheduled for the evaluation of the selected site suitability for NPP project development. To this end, Belarus is planning to start the SEED Mission only from module 5 that deals with the evaluation of project design. This is absolutely unacceptable for Lithuania. The SEED mission should be performed as soon as possible and in its full scope.

- **"Stress-test" exercise.** In response to the 2011 Fukushima nuclear accident, risk and safety assessments ("stress tests") have been carried out on all EU NPPs – those in operation and under construction. On 23 June 2011, Belarus signed a declaration with the European Commission regarding the performance of the stress-test. Although 5 years have passed, but Belarus still has not fulfilled its commitment. Belarus has announced that the "stress-tests" will be performed by Rosatom subsidiary companies. Lithuania applied to the European Commission with a request to ensure that the stress-tests are performed according to the EU methodology, in a fair manner and with the participation of EU experts.

- **Impact to transboundary waters.** The transboundary river Neris is envisaged as a cooling source for the Belarus NPP. Neris forms a large part of Nemunas river basin, covering 72 percent of Lithuanian territory. Operation of the NPP can cause thermal and radiological pollution of the river that will eventually negatively affect natural ecosystems and Lithuanian population. Lithuanian scientists made a study, which demonstrates that in case of a severe accident in Ostrovets NPP, 57-95 percent of drinking water in Vilnius, Kaunas and Jonava cities might be contaminated.

- **Reliability of NPP cooling system.** The transboundary river Neris (Vilija in Belarus) is envisaged for cooling purposes for the Ostrovets NPP project. The river Neris is ~7-10 km away from the NPP site and ~55-65 meters lower than the NPP, i.e. the conditions for water supply to the cooling system of the NPP are complicated as it will be absolutely dependent on the continuous electricity supply to the water pumps. It is worth to remember that the Fukushima NPP accident has occurred due to the loss of electricity supply to the cooling system of the NPP that, consequently, resulted in reactor-core melt. Belarus has not provided information how they will ensure continuous electricity supply to water pumps, i.e. for cooling of the NPP.

- **Other issues that require close attention:** potential negative impact to the territory and population of Lithuania and the EU; emergency preparedness and response plans, which are extremely important having such a distance from Lithuanian capital Vilnius and potentially covering 1/3 of Lithuanian population; reliability and independence of nuclear safety Regulatory Authority in Belarus; quality (safety culture) of ongoing NPP construction works; management of spent nuclear fuel and radioactive waste; adequate financing for the whole NPP life cycle, especially for the implementation of the nuclear safety measures.

Belarus ignores the recommendations of international conventions and Lithuanian requests, however publicly provides misleading statements that international organizations and other countries approve the NPP project and have no major comments, which is a mere misinterpretation of the actual situation. Belarus is actively looking for political support while disregarding evident technical and legal issues concerning the development of the NPP project and instead of looking for solutions and taking appropriate measures (international experts, researches, etc.) to compensate or minimize effects.

Seeking to avoid devastating transboundary effects (such as Chernoby), nuclear energy has to be developed in the most responsible way, ensuring strict implementation of international requirements. In this respect active involvement of international community in Belarus case is necessary.
POSSIBLE RADIOLOGICAL IMPACT OF THE BELARUS NPP
FOR LITHUANIA AND EUROPE

FOR EUROPE

Belarus authorities agree that there is a possibility for the radiological impact to the environment and people:

1000 km – possible short-term restriction for consumption of locally produced food;
300 km – possible long-term restriction for consumption of certain types of food;
100 km – possible need for iodine therapy.

FOR LITHUANIA

Distance from Belarus NPP:
Lithuanian Capital Vilnius – 50 km;
Lithuanian border – 20 km;
Belarus Capital Minsk – 140 km;
River Neris (Vilija) (cooling source) – 11-13 km.

In Lithuania within the radius of 100 km:
Capital city Vilnius (542 664 residents, major business and governmental institutions); 14 administrative districts (276 516 residents);
A total of ~900 thou residents.

1/3 of Lithuanian population might be affected by Belarus.

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*Based on A.N. Rykov, Director of Belinfenergoprom, presentation, 16-06-2010.*
Lithuanian position

In June 2011 Lithuania submitted a complaint regarding the transboundary EIA for Belarus NPP project.

**Transboundary EIA is in non-compliance with Espoo Convention:**
- EIA of 2010 was recognized as non-compliant;
- Further communication was not adequate; Belarus was repeatedly sending the same EIA of 2010;
- Final Decisions on Ostrovets site have been taken against Espoo Convention:
  - Final Decision No. 1 - Presidential Decree No. 618 of 15 September 2011;
  - Final Decision No. 2 - Presidential Decree No. 499 of 2 November 2013;
- Lithuanian public rights were infringed.

Construction works on Ostrovets site - started on May 2009

Belarus NPP construction site. Source: Naviny.by, 26 May 2010
http://naviny.by/mb/review/17/010118-35.htm_article_5161667065

THE PHOTO CHRONICLE OF THE BELARUSIAN NPP

Final Decision No.2 on construction of Belarus NPP was adopted on 2 November 2013

The reinforcement of the foundation slab. October, 2013
Source: Brochure of Republican Unitary Enterprise „Belarus Nuclear Power Plant“
Construction works on Ostrovets site – December 2013
As Final Decision No. 2 – in November 2013

Reactor building; Source: baltic-course.com, 17 December 2013

Reactor vessel delivered to Ostrovets site
on 24 December 2015

Source: kK.ru
http://www.mk.ru/oeconomics/2015/10/20/ke
sobstvenniki-vysledrov-atomnyh-reactor-dlya-beloruskinskaya.html

Construction works in full swing

Belarus NPP construction site in details (satellite view).
Source: Google/Maps, 2014

Where do we stand with transboundary EIA for the
Belarus NPP?
Belarus NPP vs Espoo Convention

Non-compliance

Provisions of non-compliance – MOP6 Decision VI/2, para 50

In June 2014, Espoo MOP6 endorsed Belarus non-compliance with:

- article 2, paragraph 6;
- article 4, paragraph 2;
- article 5, paragraph (a);
- article 6, paragraphs 1 and 2 of the Espoo Convention.

For the purpose of compliance with the Espoo Convention – specific MOP6 recommendations.

Where do we stand with transboundary EIA for the Belarus NPP?

In March 2017

Belarus in 2017
Licence to build nuclear facility for Unit 1

On 13 September 2013 Belarus issued a license No. 02300/239-4 for building the first NPP Unit in Ostrovets site.

Site Selection made in 2008 – before any procedures started

Ostrovets site for the construction of the Belarus NPP was chosen:

- **de facto** – in 2008 or even earlier*;
- **in practice** – January 2009;
- **de jure** – in 2011 (Final Decision No. 1, September 2011).

*Source:

Ostrovets project site was selected by the Belarusian authorities in 2008. The project was approved by the Belarusian parliament in 2011. The site was chosen based on various criteria, including the need for a new nuclear power plant in Belarus. The site was finally selected in 2011.

Final Decision No. 2 – Decree of 2013


Question: what's the meaning of this Decision, if everything is done BEFORE:

1. Final Decision No. 1 already taken in 2011;
2. Construction license issued in September 2013;
3. Construction works on site started in May 2009.

EIA report – lost in translation

Formal submission of the EIA documentation does not mean documentation compliance with the Espoo Convention. The EIA report presented to Lithuania in 2013:

- was dated as of July 2010 (old report);
- did not contain substance;
- was google-translated into Lithuanian-like language.

EIA report - lost in translation:

- "nuclear power plant" = "nuclear herb" – as the word "plant" translated into Lithuanian as "herb" rather than "factory" or "enterprise";
- "reactor plant" = "Republic of Uzbekistan" – as the Russian abbreviation «РФ» translated into Lithuanian as "Republic of Uzbekistan instead of "reactor plant" (in Russian is «реактор»);
- "Lithuania" = "Uzbekistan" - as the description of the transboundary EIA named Uzbekistan instead of Lithuania;
- meaningless sentences.

Would you trust such a document?
EIA report – lost in translation

Meaningless sentences

Example 1:
Belarus submitted text like this in Lithuanian (Google translation):
"The project is based on national greenhouse gas experience in the design, manufacture and operation of horizontal emission. The service life of greenhouse gas emissions equal to the LPG service period is 60 years." 

In comparison, it should be like (EIA report English version part 1 page 96):
"A GPG project is based on our own experience in development, manufacturing and operating of horizontal SG. Service life of a SG is equal to service life of RP and is 60 years."

Example 2:
Belarus submitted text like this in Lithuanian (Google translation):
"Research all options power herbs accident, including 1st and worst shows that there is no serious danger to the order of the herbs location of the area of the population there. All accident scenarios provide a clear sequence of actions presented in the Safety preventive and protective measures making consequences. It is important that all accident scenarios for a small nuclear real world deployment area station."

In comparison, it should be like (EIA report English version part 1 page 171):
"Researches on all types of accidents at NPP including the heaviest shows that there is no serious danger for population in the station region. Scenarios of all accidents consider sequence of protective activities."

MOP6, para 64: Confidence building

- IAEA SEED mission (International Atomic Energy Agency, Site and External Events Design mission) is an independent review for site selection on:
  - adherence to the IAEA guidance and appropriateness of the selection and site selection criteria;
  - adherence to the IAEA safety requirements - whether site is safe and appropriate for installing design;
  - adherence to the IAEA environmental assessment requirement;
  - development and operation of the NPP: site hazard evaluation against natural and human induced external and internal hazards. Design safety margin assessment against external hazards etc.

Belarus has not provided dates or schedules, when the SEED mission would take place. No request to the IAEA on the SEED mission.

- "Stress-test" - on 23 June 2011 Belarus committed to perform the "stress-tests" according to EU methodology, however, up until now it has not been done.

MOP6, para 53 – nothing clear about:

1. Site selection criteria;
2. Assessment of locational alternatives;
3. Seismic safety assessments of Ostrovets site;
4. Commencement of construction works on Ostrovets site;
5. NPP resistance in case of a heavy airplane crash;
6. Belarus plans and schedules for the IAEA SEED peer review mission;
7. Belarus plans and schedules for the stress tests activity;
8. Minimisation of potential NPP impact to Lithuanian territory and population;
9. Measures planned to avoid cooling malfunctioning;
10. Measures planned to avoid potential contamination of the river Neris (Viljui);
11. Emergency preparedness plans;
12. Strengthening of nuclear safety regulatory authority in Belarus;
13. Financing issues of the NPP project;
14. Control of quality of construction works and operation of NPP;
15. Management of spent nuclear fuel and radioactive waste.

Lithuania’s public rights infringed

Not every public event is considered to be a public hearing.

- Adequate EIA Report, required by the Espoo Convention, is a key for public hearings.
- On 2 March 2010 public event failed.
- Event of 17 August 2013 in Ostrovets (Belarus) – totally unacceptable as public hearing:
  - Lithuania was not allocated with reasonable time to examine EIA report, presented in June 2013;
  - The EIA report was google-translated into incomprehensible Lithuanian-like language;
  - The event was organized unilaterally by Belarus;
  - There were serious restrictions for Lithuanian public to participate (transportation, visas, passports, people were allowed to the event only if they agreed not to ask questions).
- Lithuania continuously suggesting Belarus to co-arrange public hearings for Lithuanian public in Lithuania.
Non-compliance with Art. 5 – experts' consultations

Meeting on 18 June 2010 — a failed attempt to organize experts' consultations as:
- LT learnt during the meeting – a subject for consultation is unknown for LT experts: EIA report suddenly appeared significantly amended (4 times as bigger as the previous version, received and analyzed by Lithuania);
- No time provided to examine the EIA report;
- LT received amended EIA report AFTER the meeting in 8 months time – in February 2011;
- LT sent official letter 9 July 2010 on status of this meeting regarding its non-compliance as experts' consultation according Espoo Art. 5.

Espoo: Experts' consultations — after the completion of the EIA documentation, before the adoption of Final Decision.

IC of the Espoo Convention on 12-14 March 2013 noted (para.52):
"..." In order to allow for meaningful consultations under article 5, the information provided should be as complete and precise as possible and, in particular, should meet any reasonable request as to its scope made by the affected Party."

Bilateral Agreement on the Implementation of the Espoo Convention

On 5 November 2015 Lithuania presented the draft Bilateral Agreement and invited Belarus to discuss it on 17 December 2015 in Vilnius.

Lithuania's objectives in the Agreement:
- ensure the proper implementation of the Espoo Convention;
- increase clarity of legal norms (clear guidance in performing transboundary impact assessment procedures);
- define and forms and timeframes of procedural steps;
- settle language requirement issues.

Post-project analysis-premature, but Lithuania is in

Post-project analysis program (Art. 7), shall be carried out for activities for which an EIA has been finished.

Transboundary EIA procedure for Belarus NPP with Lithuania is still non-compliant.

Without EIA completion, objectives of the post-project analysis (listed in the Appendix V) cannot be achieved.

In spite of this, Lithuanian authorities analyzed the post-project analysis and presented to Belarus detailed findings.

As the post-project analysis is a document for the next 60 years, the post-project analysis programme should remain open for revision.

MOP6, para 62: Permanent joint body

Lithuania proposed to use already existing bilateral legal instruments which provide possibilities to discuss in joint bodies:
- Bilateral Agreement between Ministries of Environment of Lithuania and Belarus (signed in Minsk, 14 April 1995);
- Bilateral Technical Protocol on Cooperation in Monitoring and Information Exchange on Status of Transboundary Surface Waters (Minsk, 10 April 2008).

Lithuania also proposed to include a joint body provision into the Bilateral Agreement on Implementation of the Espoo Convention.
Conclusions

Lithuania is seriously concerned on potential transboundary impact of Belarus NPP for LT environment and population.
Lithuanian concerns are not addressed properly - Lithuanian key questions still remain without answers.
Lithuanian public rights are being infringed.
No progress from Belarus side in implementation of the recommendations of MOP6.
On the contrary, Belarus quickly advances with construction works on Ostrovets site.
That is an infringement of the Espoo Convention.
A formalistic point of view towards the implementation of the Espoo Convention cannot be acceptable, as it goes against the objective of the Convention – to prevent, reduce and control significant adverse transboundary environmental impact from proposed activities.

Steps to be taken

In order to respect the rights of Lithuania and its citizens and implement Espoo Convention:
- Belarus should:
  1. answer 15 key/outstanding/open questions, Lithuania has been raising since 2009;
  2. invite the IAEA SEED mission and perform „stress-test“ for its NPP without any further delay;
  3. supplement the EIA report with requested information;
  4. co-organize public hearings for Lithuanian public in Lithuania.
- An expert body, modelled after the Inquiry Commission, as proposed by the IC in December 2015, would be a good instrument to give advice of technical and scientific nature to the IC for further assessment of Belarus compliance with the Convention.

The geological and seismic aspects of Ostrovets and alternative sites: the major issues

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Dr. Andrius Pačėsa
Lithuanian Geological Survey

What criteria served for selection of Ostrovets site as priority for NPP construction?

Why equal assessment of locational alternatives is absent in the environmental impact assessment (EIA) report?
What criteria served for selection of Ostrovets site as priority for NPP construction?

There are no prohibition factors in all three competing sites (factors or conditions not permitting NPP placement according to the requirements of the corresponding normative documents).

In Krasnopolyana and Kukshinovsk sites there is a potential possibility of activation of suffozion-karts processes that is a complication factor.

Engineering-geological and hydrogeological conditions of Kukshinovsk site are complicated (the thickness of different types of soils is uneven, there is press water with piezometrical level close to the surface up to 1.5 m).

According to the totality of important factors Ostrovets site has advantages over Krasnopolyana and Kukshinovsk sites.

Criteria for prioritisation of Ostrovets site are not motivated by data (1)

Conclusion: Ostrovets site has the least favourable seismo-tectonic conditions in comparison to alternative sites.
Criteria for prioritisation of Ostrovets site are not motivated by data (2)

The absences of suffusion-karst processes is the most important geological factor that allowed the prioritization of the Astravets site in comparison with two other alternative sites.

Karst - dissolving action of water on carbonate bedrock (usually limestone, dolomite). Karst sinkholes form by the process of 'suffosion' when loose, unconsolidated material (soil, ‘head’, loess and clay) overlies fissures in the underlying limestone, and material is washed into these fissures and into the caves beneath. Over time, this creates a depression on the landscape of varying depth (BGS info).

Table 5 – Analysis of competing sites correspondence to normative documentation requirements

<table>
<thead>
<tr>
<th>Factors considered inside choice</th>
<th>Krasniy site</th>
<th>Krasnoy site</th>
<th>Ostrovets site</th>
</tr>
</thead>
<tbody>
<tr>
<td>Characteristic</td>
<td>Conclusion</td>
<td>Characteristic</td>
<td>Conclusion</td>
</tr>
<tr>
<td>Karst presence</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Potential likelihood of suffusion-karst processes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Possibility of development of piping-karst processes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Chlorite layer</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Clay layer</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Thickness of carbonate succession</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Depth of carbonate succession</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
</tbody>
</table>

Prohibitive factors for NPP construction (according to IFK-09-2012):

- Based on the data provided for Lithuanian side Ostrovets site is investigated only by few? wells e.g., Krasnaya Poliana site is investigated by 140 wells and seismic surveying;
- the Devonian sediments in Ostrovets site are penetrated by drilling only 1-13 meters in 27 wells*.

No clear answer

Clear geological information on the absence of the risk of potential activation of the suffusion-karst processes in Ostrovets site is not provided

Questions:
1. It is not clear if 100 m thick chalk (carbonate) succession occur or not in Ostrovets site and, respectively, if potentially possible activation of suffusion-karst processes could occur?
2. It is not clear if potentially possible activation of suffusion-karst processes in Ostrovets site has been studied with the same accuracy as for alternative sites?

Criteria for prioritisation of Ostrovets site are not motivated by data (3)

The sites are not equally evaluated in terms of hydrogeological and hydrological conditions:

- EIA report proves (page 188, 192) that drainage of ground and surface water is actual also at Ostrovets site, not only in Kuksonovsk site.
- Ostrovets site is not evaluated in the terms of technogenic flood (the source of which is not the river) and change of soil water regime.
- Due to complicated hydrological conditions in Ostrovets site, the safety of the facility could be affected and additional measures will be needed to avoid dangerous surface and soil water factors.

Inconsistent information about geological structure of Ostrovets site

Supplementary information presented by Belarus document No. 13-15/2858-BH „Information to support justification on NPP site selection“

„The Cimmerian and Alpine complex is represented by depositions of chalk, neogene and tertiary: green terrigene-glauconite phosphorite carrying formation (Alb and Cenomanian), formation of writing chalk (Cenomanian, Turonean, Maastricht) having thickness of more than 100 m; a predominantly glacial complex of tertiary depositions having thickness from 80 to 140 m.“

„Neogene sands are underplayed by sediments of Narovskii horizon of mid–Devonian (D2nr), namely, by siltstones and marls often interleaved by dense cracked dolomites with sublayers. The layers of clay and chalk are also met in marls. There are blue–green–gray sediments and speckled gray–brown siltstones. The revealed thickness is 2.2-11.8 m.“
What type of seismic safety assessments were carried out taking into account seismicity of the territory of Belarus and adjacent territories?

- What are seismic hazards assessment values in terms of obtaining ground motion values (e.g. seismic hazard levels SL-1 and SL-2) for design basis in terms of IAEA safety standards SSG-9 and NS-R-3?

- How do provided values of Design-basis Earthquake (DE) and Maximum design-basis Earthquake (MDE) correspond to the IAEA requirements seismic hazard levels SL-1 and SL-2?

- Explanations on the inconsistency between calculated peak acceleration and MDE (horizontal component) provided in term of acceleration are needed?

Inconsistent information for Probabilistic Seismic Hazard assessment

Seismic hazards of Ostrovets site were determined in terms of intensity points (MSK-64 scale) using the deterministic method and probabilistic method (based on Northern Eurasia map of seismic risk zoning OCP-97-D (1:10000000; 1997) compiled before the Kaliningrad earthquakes of 2004 of Mw=5.2 (Gregersen, 2007); Russian Academy of Sciences - magnitude of main shock - Mw=5.4:

Design-basis Earthquake DE = 6
Maximal Design-basis Earthquake MDE = 7

BY statement: Belarus carried out 48 explosions at Ostrovets site and were measuring ground accelerations to simulate natural earthquakes from Oshmyany seismogenic zone.

But: induced explosions could significantly differ (by frequency range and focal mechanisms) from the shocks caused by natural earthquakes. Earthquakes of magnitude M=4.5 or M=5.0 could be hardly achieved using the explosions’ simulations.

Thus, Belarus side established relation between seismic source magnitude (earthquake magnitude) and “maximum acceleration” of the soil particles (or PGA?) but not between macroseismic intensity and PGA.

The same question:- How seismic hazards in MSK-64 intensity points were converted to „acceleration values” (supposing Peak Ground Acceleration (PGA) values?)

What are seismic hazards assessment values in terms of ground motion values (e.g. seismic hazard levels SL-1 and SL-2) for design basis following IAEA safety standards SSG-9 and NS-R-3?

BY statement: Belarus NPP post-project analysis Program define seismic hazards of Ostrovets site in terms of intensity (MSK-64 scale intensity points): DE=6 and MDE = 7.

Belarus NPP post-project analysis Program: DE corresponds to „horizontal acceleration“ = 54.29 cm/s² and MDE = 67.22 cm/s².

Questions: - How seismic hazards in MSK-64 intensity points were converted to „acceleration values“ (supposing Peak Ground Acceleration (PGA) values?).
- How do provided values of Design-basis Earthquake (DE) and Maximum design-basis Earthquake (MDE) correspond to the IAEA requirements, e.g. seismic hazard levels SL-1 and SL-2?
Inconsistent information for seismic hazard assessment following IAEA safety standard NS-G-1.6

**Question:** It is not clear if MDE is considered to be equal to 0.1g (~100 cm/s²) at least, following recommendations of IAEA Safety standard NS-G-1.6, item 2.7 (SL-2 = 0.1g; 0.1g = 0.98 ms⁻² = 98 cm/s²).

**BY statement:** “The highest estimate of calculated peak acceleration, obtained for the Ostrovets site, is a little more than 100 cm/s² and, accordingly, is much less than 0.1g”, e.g. “Maximum calculated peak acceleration (MCPA) > 100 cm/s² and MCPA << 0.1g”.

Statements that MCPA > 100 cm/s² and MCPA < 98 cm/s² contradict.

**The same Question:** What is the final estimation of MDE (or SL-2?) provided in terms of acceleration considering the requirements of IAEA Safety standard?

<table>
<thead>
<tr>
<th>No.</th>
<th>Precise events, factors</th>
<th>Parameters considered in the project backgrounds</th>
<th>Parameter amount or impact characteristics</th>
<th>Frequency</th>
<th>NFP site affected or not (or hazard degree)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>Design seismic impacts</td>
<td>Maximum design basis earthquake</td>
<td>Maximum acceleration</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(M) max magnitude; (H) min hypocentre depth</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Maximum vertical acceleration</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Assumed to be 2/3 of the maximum/horizontal</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Table 1** - Necessary of natural occurring events in the Belarusian NPP area and at the site to be taken into consideration for the purpose of emergency situation response planning.

**Inconsistent information regarding Deterministic Seismic Hazard Assessment**

Describing seismic hazard of Ostrovets site the Belarus side is using a several different terms: Design Earthquake (DE), Maximum Design Earthquake (MDE), Calculated Earthquake (CE) and Maximum Calculated Earthquake (MCE). Maximum calculated peak acceleration (MSPE), acceleration values, ground acceleration, horizontal acceleration etc.

**Question:** What are seismic hazards assessment values in terms of ground motion values (e.g. seismic hazard levels SL-1 and SL-2) for design basis following IAEA safety standards SSG-9 and NS-R-3?

**Question remaining:** Why different methodologies were used assessing different seismic zones?
Issues of concern: potential contamination of the groundwater resources in capital Vilnius in case of major accidents in Ostrovets NPP (1)

The river Neris is envisaged as the main cooling source for the NPP.

The river Neris flows through the Lithuanian capital Vilnius and belongs to the Nemunas river basin, which covers 72 percent of Lithuanian territory.

Significant radiological impact is possible as a consequence of a major accident beyond the design-base or disaster at NPP, because in such situations discharges of radionuclides are not controlled and can get into the watercourse through direct liquid discharges and from the air.

In case of accident at Ostrovets NPP, Neris river water, contaminated with radioactive substances, during 12 hours can reach N. Vilnius wellfields, located on riverbanks only in 30 km from NPP.

Potable water supply of Vilnius is based totally on groundwater from >20 riverbank wellfields; 11 of them located in Neris river valley.

They have 73% of total potable water supply of Vilnius.

Issues of concern: potential contamination of the groundwater resources in capital Vilnius in case of major accidents in Ostrovets NPP (2)

The reduction of exploitable resources in case of major accident in Ostrovets NPP was calculated based on detailed mathematical model (Evaluation of possible impact of Astravas nuclear power plant to groundwater resources of wellfields located on river side Gregoraius, Klimas, A. UAB "Vilnius hidrogeologija" - Vilnius, 2014.) showing that:

57-95% of exploitable groundwater resources could be lost in the wellfields of cities Vilnius, Kaunas and Jonava in case of major accident at Ostrovets NPP.

Issues of concern: Assessment of impact of major accidents of Ostrovets NPP to groundwater resources in capital Vilnius

Surface and groundwater monitoring program in „Belarusian NPP Post-project analysis program“ is developed to assess only impact of the normal operating regime of Ostrovets NPP or small scale accidental spills.

In the case of major accidents it’s crucial to know radioactive status of water in river Neris (Vilija) in real time - monitoring program in case of accidents and the access to real time data to Lithuanian side will be assured.

The special plan for drinking water supply in case of the major accident should be prepared for Vilnius, Kaunas and Jonava cities.

Thank you for your attention
Belarusian NPP impact on the radiation safety state in Lithuania

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Radiation Protection Centre
2016

Belarusian NPP

Belarusian NPP, currently known as Astravets NPP, will be constructed by Russia’s Atomstroyexport.

It would be equipped with third generation VVER 1200 type 2 reactors.

Each reactor is planned to have 1150 MWe capacity.

The first reactor of the Astravets NPP is expected to be operational by 2018, and the second by 2020.

Location of the Astravets NPP

HERCA-WENRA Approach
for a better cross-border coordination of protective actions during the early phase of a nuclear accident
(Stockholm, 22 October 2014)

1. In 5 km radius from NPP evacuation shall be organized;
2. In 20 km radius – sheltering and iodine prophylaxis;
3. Should be possibility to increase the radius of evacuation up to 20 km, with applying sheltering and iodine prophylaxis up to 100 km radius (it means 14 districts of Lithuania, including Vilnius region).

HERCA - Heads of European Radiological Protection Competent Authorities
WENRA - Western European Nuclear Regulators Association
The Quantity of single dose of potassium iodide (KI) for Lithuanian population living in protective action planning zone (according current Lithuanian legal requirement)

<table>
<thead>
<tr>
<th>Different zones</th>
<th>Zones</th>
<th>The number of 65 mg of KI tablets</th>
<th>The number of packages containing 10 tablets</th>
<th>The number of population</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Urgent protective action planning zone up to 30 km</td>
<td>66 000</td>
<td>6 600</td>
<td>32 958</td>
</tr>
<tr>
<td>B</td>
<td>Distant zone 30–50 km</td>
<td>1 275 000</td>
<td>127 500</td>
<td>637 331</td>
</tr>
<tr>
<td>C</td>
<td>Distant zone 50–100 km</td>
<td>497 000</td>
<td>49 700</td>
<td>248 894</td>
</tr>
<tr>
<td>A+B+C</td>
<td>Urgent protective action planning zone and distant zones up to 100 km</td>
<td>1 838 000</td>
<td>183 800</td>
<td>919 183</td>
</tr>
</tbody>
</table>

The following considerations summarize our concerns:

1. Safety of Lithuania’s population in the event of minor and major NPP failures and accidents;

Evaluation of Institute of Physics (At present Center for Physical Sciences and Technology) of consequences of severe accident (7 level of INES), Effective dose for population of Vilnius (at 50 km distance, if protective measures will not be applied, average scenario of 7 level):

- 57 mSv (in period of first 7 day)
- 100 mSv (in period of first 30 days)
- 230 mSv (in period of 1 year)

Evacuation or relocation shall be needed
In EIAR of Belarusian NPP only accident of 5 INES level was evaluated

2. Effects on possible contamination of water (basin of river Neris, ground water), vegetation and habitat over the entire land area of Lithuania;

The problem: limited water resources for cooling reactors of Belarusian NPP. The water of Neris river will be used for cooling reactors.

The Neris river is the principal source of potable water for population of Vilnius. That means the risk of contamination of drinking water in the Vilnius area.

As evaluated by company „Vilniaus hidrogeologija“, if radionuclides get in Neris river, significant part of them (depending on the type of Watering place) will be found in watering places near Vilnius.
3. Plans, funds and provisions to resolve long term contamination effects should be elaborated in case of contamination of territories and premises

4. System of early notification and additional monitoring stations should be implemented

5. More transparency and work in the field of public information is necessary

Thank You for attention