Lietuvos Energija AB

ENVIRONMENTAL IMPACT ASSESSMENT PROGRAMME SUMMARY OF NEW NUCLEAR POWER PLANT CONSTRUCTION

1 PROJECT AND ITS JUSTIFICATION

Lietuvos Energija AB has initiated an environmental impact assessment procedure (EIA procedure) for investigating the environmental impacts of a planned economic activity New Nuclear Power Plant (new NPP) in Lithuania. It has hired a consortium of Pöyry Energy Oy (Finland) and Lithuanian Energy Institute to carry out the EIA programme phase and write the related documents.

The net electrical output of new nuclear power plant would be at most 3 400 MW. The present NPP unit 1 of Ignalina NPP has been closed and the unit 2 will be closed at the end of 2009, thus replacement capacity is needed.

Presently the Ignalina Nuclear Power Plant (INPP) is the only nuclear power plant in Lithuania. About 70% of the total domestic electricity production was generated by the INPP in 2005. The current Lithuanian electricity generating capacities, including small capacity combined heat and power plants that are planned to be constructed, will be sufficient to meet the national demand until 2013. After the shutdown of INPP Unit 2 the new nuclear power plant would become the major electricity generating source in Lithuania.

The planned new nuclear power plant would meet the aims of the National Energy Strategy (*Lithuania Parliament Decision No. X-1046 dated 18 January 2007, State News Nr. 11-430, 2007*). According to the strategy, one of the identified main tasks is "to ensure the continuity and development of safe nuclear energy; to put into operation a new regional nuclear power plant not later than by 2015 in order to satisfy the needs of the Baltic countries and the region".

1.1 Environmental impact assessment procedure

According to the Law on the Assessment of the Impact on the Environment of the Planned Economic Activities, construction, shutdown or decommissioning of nuclear power plants or other nuclear facilities are such activities for which an environmental impact assessment procedure must be carried out.

The EIA is carried out in two subsequent stages. In the first phase, the EIA program is prepared and presented to the authorities and public for a review. The EIA program defines the scope and content of the EIA report. It must be approved by the competent authority (Ministry of Environment of Lithuania) before the EIA report can be prepared.

In the second phase, the EIA report will be prepared based on the approved EIA program and the opinions and statements got from different stakeholders. It will

present information about the project and its alternatives, as well as a coherent assessment of their environmental impacts. Information about existing environmental assessments as well as those carried out during the EIA study will be collected in the report.

The UNECE Economic Commission for Europe Convention on Environmental Impact Assessment in a Trans-boundary Context (the so-called Espoo Convention) is also applied to the project. Nuclear power plants are mentioned in the project list of the Convention. In Lithuania, the contact point for applying the Convention is the Ministry of Environment.

1.2 Location

The power plant would be located in the vicinity of the present Ignalina nuclear power plant. Ignalina Nuclear Power Plant is located on the southern coast of Druksiai Lake, 39 kilometres from the town of Ignalina and close to the borders with Latvia and Belarus. The nearest large cities are Vilnius, located 130 kms from INPP and Daugavpils in Latvia, located 30 kms from INPP.

Figure 1. The location of the new nuclear power plant.

1.3 Project options

The environmental impact assessment will evaluate the construction and operation of a new nuclear power plant with an approximate electric power of 3 400 MW in Lithuania. There are two options for the location of the new plant in the territory of the existing Ignalina nuclear power plant. The possible technical alternatives of the new plant are: boiling water, pressurised water or pressurized heavy water reactor. The alternative locations of the cooling water outlet and inlet channels for the new power plant will be assessed as part of the studies and presented in the EIA report. In

addition, the environmental impact assessment will evaluate the impacts of the non-implementation of the project (the zero-option).

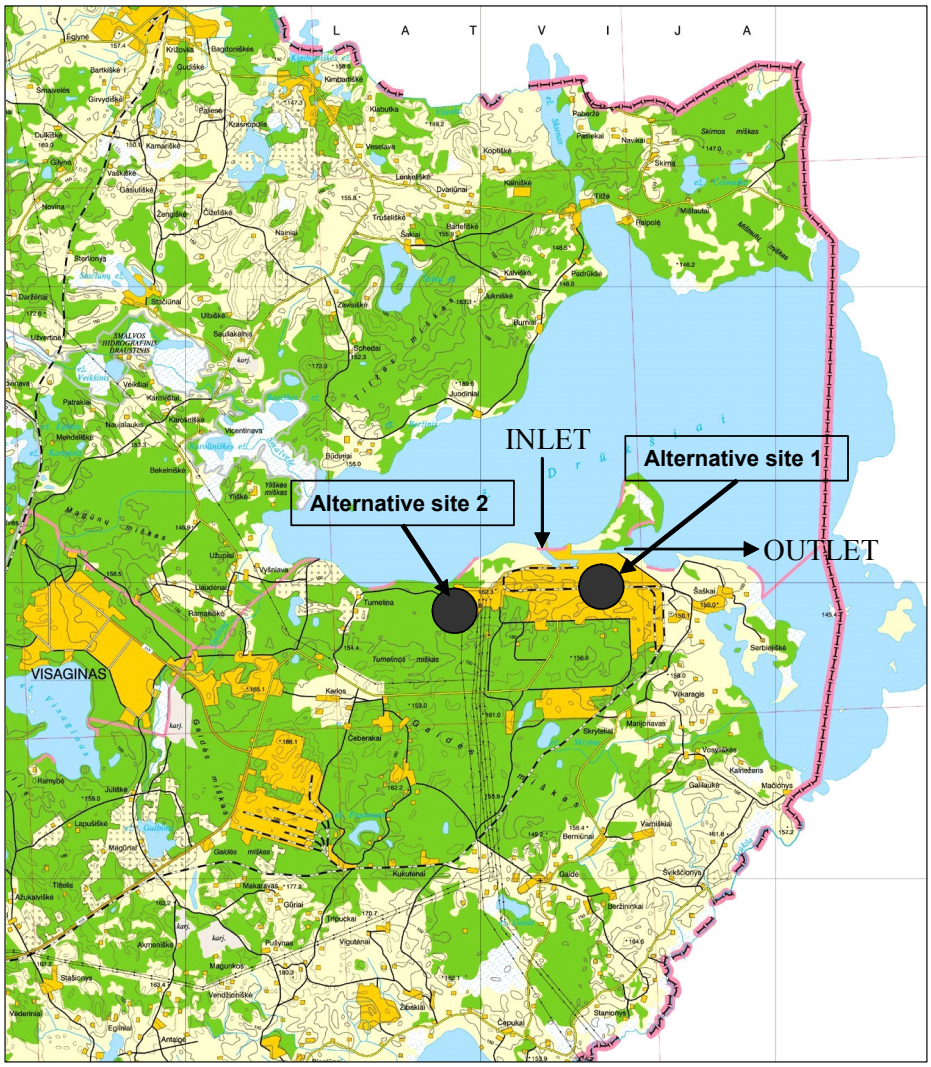

Figure 2. Location of alternative sites 1 and 2 and present cooling water intake and outlet.

1.4 Nuclear safety

A nuclear power plant must be designed in accordance with nuclear energy legislation and regulatory guidelines on nuclear safety in order to ensure the safety of its operation. Nuclear power plants have been developed and are continuously being developed in many ways to improve their safety and operational reliability. The latest safety requirements will be taken into account in the planned new power plant so that it can survive even for the most severe accidents without causing significant consequences in its surroundings.

Reactor safety requires the availability of three factors in all functions:

- managing the chain reaction and the power it produces
- cooling the fuel after the chain reaction has ended, also known as decay heat removal
- isolation of radioactive substances from the environment.

The fundamentals of safety include three barriers for radioactive substances and the "defence in depth" - principle of safety. The principle of three barriers means that there is a series of strong and tight physical barriers between radioactive substances and the environment, preventing the substances from entering the environment in all circumstances. The tightness of any single barrier alone is enough to ensure that no radioactive substances can enter the environment. The "defence in depth" principle refers to the prevention of occurrence of accidents and control of accidents and mitigation of their consequences. Lithuanian authorities inspect the analyses related to the plant's safety and ensure that the plant is built and operated in accordance with the safety requirements and that the employees have sufficient qualifications.

1.5 Spent nuclear fuel and operating waste

The basis of nuclear waste management is the permanent isolation of waste from the environment. To ensure long-term safety, the disposal of nuclear waste will be designed in a way that does not call for continuous supervision. The basis of the waste management of the new plant is to utilise existing solutions at the INPP (designed or already in use) to maximum extent. The capacity of those is extended when necessary.

Nuclear fuel becomes highly radioactive in the reactor. After removal from the reactor, the spent fuel will be stored at interim storage facilities and after that disposed or reprocessed. During the storage, the activity and heat production of the spent fuel will decrease. After the storage period, the spent fuel of power plant will be permanently disposed of.

Most of the waste produced during normal operation is low in radioactivity. This waste mostly includes typical maintenance waste, such as isolation materials, paper, old working clothes, machine parts, plastics and oil. The intermediate-level waste mainly consists of the ion exchange resin from the purification system of the circulating water and the evaporator bottom from sewage water treatment.

The operating waste of the new power plant will be solidified, dried and absorbed in a suitable medium. The low-level and intermediate-level operating waste will be disposed of in the final repository. If necessary, the existing final repository of operating waste will be expanded to accommodate the waste from the new plant. Wet waste will be solidified in the solidification facility

1.6 Present state and monitoring of radiation

Radioactive liquids and gases generated in a nuclear power plant are collected, delayed to reduce radioactivity, and filtered. Even after filtering, minor amounts of radioactive substances are released into the atmosphere and water. Atmospheric emissions occur through the vent stack while discharges into the lake take place after radiation control through release tanks and discharge channel of the plant unit. Water released into the lake is mixed into the cooling water flow in the discharge channel.

According to the existing practice, Ministry of Environment issues permissions for Ignalina NPP for releases of radioactive material into environment. Radioactive emissions from Ignalina NPP into atmosphere and water are continuously monitored. Releases are and have been far below the permissible values indicated in the valid permission of Ministry of Environment.

The Republic of Lithuania regulations require that the average annual effective dose to the critical group members due to operation of a nuclear facility, including anticipated short-time operational increase, shall not exceed 0,2 millisievert/year (mSv/year). If several nuclear facilities are located in the same sanitary protection zone, the same dose limit value shall envelope impacts from all operating and planned nuclear facilities.

Different release routes (e.g. into the environment air and water) can lead to doses for the same or different critical group members. Therefore the dose limit value used for each route should be half of the total dose limit (i.e. 0,1 mSv per year). The actual annual dose to critical group members of the population due to existing releases of the Ignalina NPP is about 1 % of the established dose limit of 0,1 mSv/year.

Based on the existing practice, samples of some fish species are continuously investigated by Ignalina NPP. In EU member states the cesium concentrations of edible wild products on the market should not exceed the total of 600 becquerel/kg (Commission Recommendation 2003/274/ Euratom). The total radioactivity of the fish in Druksiai Lake is 0,1–0,6% of this recommendation value, i.e. very low.

2 IMPACTS TO BE ASSESSED

The EIA report will present the impacts during the construction and operation of the plant, as well as those arising from the decommissioning of the plant. In addition to the above, the impacts arising from the disposal of spent nuclear fuel will be described, and the possible associated projects and their environmental impacts will be examined.

The EIA procedure will assess:

- The impacts of construction
- The impacts during the operation of the new plant unit on:
  - Water systems
  - Air quality
  - Impacts of waste and by-products and their treatment
  - Groundwater
  - Soil and bedrock
  - Vegetation, animals and conservation areas
  - Land use and landscape
  - Cultural heritage
  - People and society
  - Impacts of exceptional and accident situations
- Impacts of power plant unit decommissioning
- Impacts of the zero-option

In addition, the impacts of nuclear fuel production and transportation as well as spent fuel treatment and disposal shall be described.

A comparison between alternatives will be done and summarized. Mitigation measures to alleviate or prevent harmful impacts will be presented. Suggestion to main content of environmental impact monitoring shall be presented.

In practice, the project's environmental impacts will be assessed by examining the present state of the environment and assessing the changes as well as their significance by experienced experts and based on the ample information available of the impacts of the present INPP and numerous NPPs in corresponding circumstances.

The EIA report will discuss the environmental impacts of exceptional situations based on the safety analyses and assessments prepared for corresponding plants elsewhere as well as on the requirements imposed on the new power plant. The ramifications of exceptional situations will be assessed based on the extensive research data on the health and environmental impacts of radiation. In addition to the above, the progress of the safety of nuclear power plants will also be considered.

3 POTENTIAL IMPACT ON NEIGHBOURING COUNTRIES

The impacts via Lake Druksiai to the part of the lake belonging to Belarus will be assessed. The other impacts having a transboundary character like impacts of exceptional situations and accidents will also be assessed.

4 SCHEDULE

The EIA procedure is scheduled to be completed by the end of 2008. It is planned that at least the first unit of the new nuclear power plant would be in operation not later than 2015. Typical construction time of a new NPP unit is 4 - 5 years and operation time is 60 years or even more.

5 CONTACT INFORMATION

The developer of proposed economic activity is Lietuvos Energija AB.

Address	Žvejų g. 14, LT-09310 Vilnius, Lithuania
Contact person	Mr. Tadas Matulionis
Telephone	+370 5 278 2589
Fax	+370 5 212 6736
E-mail	tadas.matulionis@lpc.lt

The developer of EIA Program is Consortium Pöyry Energy Oy (Finland) and Lithuanian Energy Institute (Lithuania).

Organization	**Pöyry Energy Oy**	**Lithuanian Energy Institute, Nuclear Engineering Laboratory**
Address	Tekniikantie 4 A, P.O. Box 93 FI-02151 Espoo Finland	Breslaujos 3, LT-44403 Kaunas Lithuania
Contact person	Mr. Mika Pohjonen	Mr. Povilas Poskas
Telephone	+358 10 33 24346	+370 37 401 891
Fax	+358 10 33 24275	+370 37 351 271
E-mail	mika.pohjonen@poyry.com	poskas@mail.lei.lt