

Implementation of the Visaginas Nuclear Power Plant Project

M. Grinevičius, Dr. G. Klevinskas, L. Koraliovas

Visagino Atominė Elektrinė, UAB,
Vilnius, Lithuania

Abstract. On June 28, 2007, the Parliament (Seimas) of the Republic of Lithuania passed the Law on the Nuclear Power Plant No. X-1231. This Law plays the role of the “decision in principle” for the construction of new nuclear power plant in Lithuania and the objective of this Law shall be to lay down provisions and to create legal, financial and organisational preconditions for the implementation of a new regional nuclear power plant project in Visaginas. The paper describes the main preparatory phase activities carried out in order to achieve one of the main strategic objectives of Lithuania in the field of energy supply. It is planned that the new nuclear power plant in Lithuania should start its operation in 2018-2020.

1. INTRODUCTION

The strategic safety of energy supply, highly unstable prices of fossil fuel and limited resources along with the climate change have become predominant factors making a great impact on the choice of future electricity production technologies. In this context, nuclear energy seems to be a reasonable option since it does not pollute the atmosphere, uranium mining industry is concentrated in the politically stable regions, fluctuations in the cost price of produced electricity are insignificant, and resources of natural uranium surpass those of fossil fuel.

Taking into account that the electric energy makes a significant impact on the quality of our life, it is natural that with the growing economy, electricity consumption considerably increases as well. For example, the average growth of gross domestic product in 2000–2007 in Lithuania was 7.9 percent per year, and electricity consumption during the same period increased 1.4 times, or on the average by 5.1 percent per year. According to recent forecasts, despite the influence of the global financial crisis, the tendency of growth in electricity demand will continue. Therefore, a scarcity of supply may emerge in the Baltic market from end 2015 with increased need from interconnected markets.

Along with a growing concern about climate warming, the forecasts that sooner or later the emission levels of the greenhouse gasses will be very strictly controlled in the whole world become increasingly popular. Currently, the production of electricity from nuclear power or hydro recourses helps cutting down the emissions of CO₂. In 2003 experts of the United States Massachusetts Institute of Technology completed an in-depth study *The Future of Nuclear Power* [1]. Calculations performed under one of the scenarios illustrated that if the quantity of electric energy produced in nuclear power plants grew three times by 2050, and the total capacity of these power plants reached one million MW, the quantities of carbon dioxide released into the atmosphere would drop by 0.8–1.8 billion tons per year (depending on the type of power plants which would be replaced by the nuclear ones). Therefore, it is no surprise that the governments and electricity suppliers in a number of countries more often than not have been favouring an option to construct new nuclear power plants – nuclear energy is one of the alternatives enabling to reduce the emissions of carbon dioxide.

As a result, Lithuania’s ambition to further develop nuclear energy is quite rational. In the updated *National Energy Strategy* [2], which came into effect on 27 January 2007, it has been noted that it is necessary to ensure the succession, continuity and development of the safe nuclear energy.

2. ENERGY GENERATION CAPACITIES IN BALTICS AND LITHUANIA

The total generating capacity in the Baltic States is currently close to 10 GW. At present the installed capacities for energy production in Lithuania is approximately 5 GW (Table 1). The figure does not take into account the small power plants capacities.

Table 1. Lithuanian main generating capacities

Plant name and type	Plant power (MWel)
Kaunas HPP	100
Ignalina NPP	1300
Kaunas CHP	178
Mazeikiai CHP	194
Lietuvos TPP	1800
Vilnius CHP	384
Kruonis HPSP	900

Ignalina Nuclear Power Plant (INPP) is the only nuclear power plant in Lithuania. It houses 2 reactors of RBMK-1500 type. In 2007, Unit 2 of Ignalina Nuclear Power Plant produced about 70 percent of electricity consumed in the country. But in line with the provisions of the accession to the EU treaty that Lithuania has signed in 2004 Unit 1 of the Ignalina power plant that has started its operation in 1983 was shut down for decommissioning at the end of 2004. Unit 2 that has started its operation in 1987 is planned to be stopped for decommissioning at the end of 2009. The closure of INPP in 2009 will have a significant impact on energy security in all Baltic States, and especially – in Lithuania. Thus, in the short-term perspective, it is crucial that the country has reliable, environmentally-friendly electricity generation source.

Considering the fact that Lithuania already has an operating nuclear power plant, as well as sufficient experience in developing nuclear energy and nuclear decommissioning infrastructure (including the construction of the radioactive waste treatment, storage and repository facilities) and maintaining high level of nuclear safety, this experience may be used when constructing Visaginas nuclear power plant. Modern technologies and scientific progress will be a basis for constructing a safe, modern, environmentally-friendly and cost-effective nuclear power plant.

3. STRATEGIC DIRECTIONS FOR NEW NUCLEAR POWER PLANT PROJECT IN LITHUANIA

New NPP project preparation works have been started in 2006, after the results of the Feasibility Study completed by AB “Lietuvos energija“, AS Latvenergo and Eesti Energia AS showed that new nuclear power plant in Lithuania is feasible from technological, environmental, legal, financial and grid points of view. The Parliament of Lithuania has passed the Law on Nuclear Power Plant No. X-1231 in 2007 [3] thus taking political commitment to continue with the nuclear energy option in Lithuania.

The first edition of the Law indicated that the construction of the power plant will be performed by the national investor company, but in the face of the global financial crisis the decision has been reviewed and the second edition of the Law states that the construction of the power plant is going to be performed by the state company with the involvement of the strategic investor and strategic partners. In order to implement the new provisions of the Law, the development and implementation of a suitable business model and financing plan are required. The Government of the Republic of Lithuania on 22 April 2009 has adopted the decision No. 300 “Strategic Directions of the Implementation of the New Nuclear Power Plant Project in Lithuania” [4]. The decision sets up 3 strategic directions for the implementation of the project: Political, Economic and Technological. The first direction says that Lithuanian energy sector development and the Project implementation is inseparable from the creation of the technical, legal and organizational conditions, which enable to connect the Lithuanian energy system to the Union for the Coordination of Electricity Transmission (UCTE) system (now – ENTSO-

E) to work in synchronous mode. The second objective says that Economic validity of the Project must be ensured by the business model which is effective and corresponding to the international nuclear project management practices as well as well-prepared and implemented financing plan. The Project must be economically justified (after assessing the costs of new nuclear power plant construction, operation, its decommissioning and nuclear fuel-cycle). It must also satisfy the economic interests of the state in electric power sector, including the price of electricity. The third direction sets up the requirements for selection of technology, site and strategic investors and partners. The decision also provides the orientation plan for the implementation of the strategic directions until the start of the construction of a new nuclear power plant [4].

In line with the requirements of the above mentioned Government decision Visagino Atominė Elektrinė (VAE, UAB) has contracted the consortium led by N M ROTHSCHILD and Sons Limited for Preparation of the business model and financing plan for the Project and for formulation of the negotiation positions for the state of Lithuania. While preparing the business model Lithuania is also establishing an attractive platform for partnership and investment. Creation of this platform involves considerations in solving of the questions in the fields such as control in decision making and operating contract, regulatory and planning approvals regime, social and political acceptance of the project, site suitability, technology choice, waste and decommissioning arrangements, investment incentives regime, scale of investment, funding access and many others.

4. VISAGINAS NPP PREPARATORY WORKS PROGRAMME

The company in charge of project preparatory activities Visagino Atominė Elektrinė (VAE, UAB) has been established on 28 August 2008. Along with the preparation of the business model and financing plan for the project implementation VAE, UAB is implementing the so-called “Preparatory works program”. The main goal of this program is to set the background for successful implementation of the Project. Along with the activities related directly to reaching of the mentioned goal the company implements the long term programs for organization and human resources development, takes part in legislative initiatives, carries out the preparation of IT infrastructure, manages and takes into account the relations with the Ignalina NPP decommissioning and conducts extensive public relation campaign.

In order to achieve the goals of the “Preparatory works program” some of the important projects that have already been implemented or are under implementation are outlined below.

At the very early stage of project implementation, the Technology acknowledgment project was carried out. The project has already been implemented. It was related to the gathering of the information from the different nuclear power plants technology vendors. The information received is still being updated.

Environmental impact assessment. The project has been finalized in the spring of 2009. The main goals of the environmental impact assessment process are to evaluate the impacts of construction and operation of Visaginas NPP and to receive the justified decision of the Ministry of Environment if the proposed economic activity by virtue of its nature and environmental impacts may be carried out in the chosen site. The schedule of the environmental impact assessment process is given in Table 2.

Table 2. EIA process schedule

Stage	Schedule
Preparation of the EIA program	May-July, 2007
Public informing, coordination and approval of the EIA program	July-November, 2007
Approved EIA program	November, 2007
Preparation of the EIA report	February – August, 2008
Public informing, coordination and approval of the EIA report	August, 2008 – February, 2009
Approved EIA report	April, 2009

The EIA Report drawn up by foreign and Lithuanian experts assessed the impact of construction and operation of a nuclear power plant with the capacity of up to 3400 MW of electrical power on the environment: public health, social economic environment, biological diversity, surface water, climate and air quality, sub-soil, landscape and objects of cultural heritage.

The report was coordinated with 11 government and municipal authorities in Lithuania, also it was provided for public consultations. The report was coordinated with Poland, Belarus, Latvia, Estonia, Finland, Sweden and Austria. Also EIA report and procedures were positively evaluated by special International Atomic Energy Agency (IAEA) mission. The competent authority, the Ministry of Environment of the Republic of Lithuania, has concluded that “the construction and operation of Visaginas Nuclear Power Plant with the power capacity up to 3400 MW of electrical power in the examined sites is permissible”. However, it has putted a number of limitations that will be needed to implement in later Visaginas NPP project development stages, such as site evaluation against IAEA safety requirements, evaluation of possibilities to utilize Ignalina NPP radioactive waste management facilities, implementation of Drūkšiai lake water temperature monitoring system, fulfilment of imposed requirements for the environmental management plan, implementation of noise impact mitigation measures during the construction period of a new nuclear power plant.

The Visaginas NPP will be constructed next to the current Ignalina NPP, which is located on the south bank of Drūkšiai Lake, six kilometres from the town of Visaginas and next to the border with Latvia and Belarus. Two possible sites are being considered for the new nuclear power plant, and upon conducting a comprehensive VNPP construction site study, the most suitable site will be chosen.

Site evaluation against International Atomic Energy Agency (IAEA) requirements. The project is aimed at assessing the appropriateness of the potential sites for the construction of the Visaginas Nuclear Power Plant according to the IAEA Safety Guide No. NS-R-3 „Site Evaluation for Nuclear Installations“ [6] and national nuclear regulator (VATESI) regulations and at analyzing the compatibility of the standard nuclear facilities designs with the specific conditions in the potential sites. The activities related to the evaluation of external human induced events, evaluation of dispersion of radioactive materials in the air and water along with the evaluation of distribution of the population in the region, evaluation of the meteorological events and flood hazards have already been performed. The evaluation of the geotechnical aspects of the site and seismic hazards are ongoing and should be finalized in the first half of 2010. It is foreseen to ask for IAEA mission to be arranged for evaluation of the process and results achieved.

Preparation for procurement process. The goal of this project is to prepare the initial set of information and input data necessary for the preparation of the bid invitation specification for a new nuclear power plant. The collection of information on Project legal environment, Lithuanian licensing and permitting processes and applicable codes, standards, regulations, Site characteristics, Cooling system, Transmission grid technical requirements, Logistics and Physical security is being performed. Also strategies on nuclear fuel cycle and supply assurance, radioactive waste management, local participation, quality assurance, personnel training programs and technology transfer are under preparation.

There are some other important projects also ongoing like: Territorial planning, Site environmental due-diligence, Development of the infrastructure for connection of the power plant to the grid, Measurement of Drūkšiai lake thermal balance and Takeover of the existing Ignalina NPP infrastructure which could be reused for the purposes of new nuclear power plant.

Program for the human resources development foresees two goals: in short term – development of VAE, UAB human resources, while in the long term – ensuring of the necessary competences during the entire implementation of the project. In the scope of this program some important steps have already been taken - a draft Programme of Preparation of High Qualification Specialists in Nuclear Energy has been developed. Vilnius University and Kaunas University of Technology are involved in preparation of necessary specialists.

Construction and operation of the new nuclear power plant project requires efforts both from the entity implementing the project and the state. Lithuanian nuclear regulator (VATESI) is the state institution which is and is going to be one of the state institutions having the heaviest involvement in the project. In order to facilitate the early familiarization of the VATESI with the project an official process of consultations was established in 2008. Consultations are held in particular fields of interest in nuclear safety, licensing, quality assurance, physical protection, general time schedules etc. Decisions regarding further actions to be taken are adopted during quarterly joint meetings both VATESI and VAE, UAB are the beneficiaries of this process.

Public acceptance of the continuation with nuclear power in the country is of crucial importance for successful project development. Therefore, public relations activities shall be considered as a significant part of preparatory works. Achieved results are continually published in regular newsletters about the project development status as well as in special webpage <http://www.vae.lt>, social dialogue with public and other stakeholders is being developed. VAE, UAB also benefits from the membership in Lithuanian Nuclear Energy Association, LBEA (which is a member of European Nuclear Society, ENS), as well as from the membership in World Nuclear Association, WNA which allows also spread out the information about the project status in a timely manner to the wider audience.

Finally, it has to be stressed out that public acceptance in the country is positive – public surveys conducted in 2007 have shown that majority (more than 60 percent) of Lithuanian residents are in favour of continuation of nuclear power in the country, while in Visaginas town this number exceeds 80 percent.

5. CONCLUSIONS

1. Strong rationale for the Lithuanian nuclear development do exist - the New Nuclear Power Plant is an important new generation option for Lithuania as the country faces the closure of the Ignalina Nuclear Power Plant and future growing electricity demand while seeking to meet security of supply and environmental objectives.
2. An extensive Visaginas nuclear power plant preparatory works programme is launched. Having successfully accomplished the necessary activities it is planned that the new nuclear power plant in Lithuania should start its operation in 2018-2020.
3. A necessary precondition for the successful and timely accomplishment of the project is development and implementation of a suitable business model and financing plan. This can only be guaranteed by an effective strategic partnership, the appropriate selection of a strategic investor, and goodwill in the cooperation of Governmental and private investors.

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