9 July 2013 / **Nuclear Energy Country Analysis: Lithuania**

Summary

Lithuania has one nuclear power station on its territory – Ignalina – in the municipality of Visaginas in the northeast of the country. The plant has two Soviet-era RBMK reactors, Ignalina-1 and Ignalina-2, both of which are in permanent shutdown.

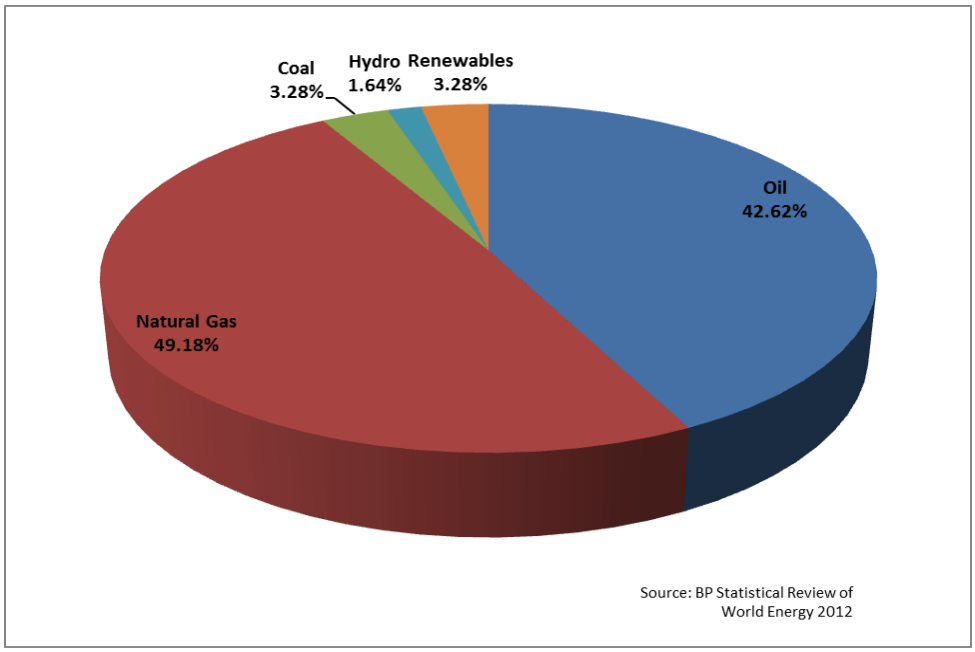
Due to their similarity to the Chernobyl reactors and because of several fundamental safety concerns (e.g., the lack of a containment building and a positive void effect), the first reactor unit was permanently shut down on 31 December 2004 and the second one on 31 December 2009. This was a condition for Lithuania's accession to the European Union.

Since the 1990s, a proposal has existed for the construction of a new nuclear power plant on the same site, also known as the Visaginas project. A legally non-binding referendum in 2012 showed 62.7 percent of the public were opposed to its construction. The government attributed the result to the public being influenced by the accident at the Fukushima-Daiichi nuclear plant in Japan in March 2011.

As a result, Lithuanian prime minister Algirdas Butkevičius said the Visaginas project would be cancelled, although a formal decision from the legislature is pending. The government has repeatedly said it is committed to the development of nuclear power and announced in April 2013 that it plans to renew talks with Latvia and Estonia on construction of the Visaginas plant. A consultation process began in May 2013.

- Total installed nuclear capacity in 2012: 0 megawatt (MW)
- Percentage of nuclear-generated electricity since 2010: 0 kilowatt-hours (kWh)

Energy mix (consumption of primary energy) in 2012:



Nuclear Power Plants in Lithuania

Name	*Type*	*Status*	*Location*	*Net electrical capacity (MW)*	*Date Connected to Grid*	*Date of Commercial Operation*	*Date of Shut-down*
Ignalina-1	LWGR[1]	Permanent Shutdown	Visaginas	1185	31 Dec 1983	15 May 1984	31 Dec 2004
Ignalina-2	LWGR[1]	Permanent Shutdown	Visaginas	1185	20 Aug 1987	15 Aug 1987	31 Dec 2009

1) Light-water-cooled graphite-moderated reactor

Nuclear Energy Policy

According to data from the European Commission, the Ignalina nuclear power plant accounted for about three quarters of the country's electricity generation in 2009. After Ignalina-2 was shut down, replacement capacity in the form of oil and natural gas was used. Eurostat, the statistical office of the European Union, says that in 2011, 81.8 percent of Lithuania's energy mix came from imports, making it the fifth-most dependent EU member state in terms of energy imports.

The EC says the shutdown had an impact on electricity prices – increases of approximately 35 percent for households and 45 percent for industry were recorded. An increase of VAT from 19 to 21 percent added to the increase.

The Ministry of Energy of Lithuania says the country's nuclear energy policy is influenced by two additional factors.

- First, the electrical energy sectors of the Baltic States are being integrated into the EU energy systems with construction of a Lithuania-Sweden 700-MW interconnector by 2015, a Lithuania-Poland 1000-MW interconnector by 2020, and a second Estonia-Finland 650-MW interconnector by 2014.
- Second, several fossil fuel power plants will be decommissioned in 2016 while demand for electricity is increasing. Forecasts show that by 2020, the Baltic States will have a deficit of 10.5 billion kWh of electricity generation, requiring 1300 MW of baseload capacity to be installed.

These factors were taken into account when Lithuania, Latvia and Estonia decided to cooperate on the construction of the Visaginas nuclear plant as the best alternative for electricity generation for baseload capacity.

In 2007, the project for the construction of Visaginas (on the site of the Ignalina nuclear plant) was officially signed into law. It was estimated to have a total cost of five billion euros and would be co-financed by Estonia and Latvia as key regional partners.

In 2008, a new company called Visagino Atominė Elektrinė (VAE or Visaginas Nuclear Power Plant) was created to supervise the implementation of preparatory work for construction of the Visaginas nuclear plant. The environmental impact assessment report was prepared and presented, and international cooperation and cross-border consultation launched.

In 2009, the Lithuanian Ministry of Environment and an expert mission from the International Atomic Energy Agency (IAEA) gave a positive evaluation of the environmental impact assessment report and the Lithuanian government passed the Visaginas project development and implementation plan.

In 2011, Japan's Hitachi GE Nuclear Energy Ltd. was chosen as the strategic investor and provider of the reactors. The new plant would operate an advanced boiling water reactor (ABWR), of which there are four operational and one under construction in Japan, and two under construction in Taiwan. Other ABWRs are planned for Japan and the US.

The Lithuanian parliament adopted or amended 12 laws on nuclear energy and radiation protection creating a new framework for the efficient and transparent regulation of nuclear energy.

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Algirdas Butkevičius's government has repeatedly said that Lithuania is in favour of developing nuclear power, but only if it is assessed to be economically competitive. The Lithuanian government and the regional partners – the governments of Estonia and Latvia – are auditing and reviewing the project.

A strategic plan approved by the Lithuanian cabinet in 2012 allocates 38 percent of Visaginas to Lithuania, 22 percent to Estonia, 20 percent to Latvia and the final 20 percent to Hitachi GE.

Security and Safety

The Lithuanian State Nuclear Power Safety Inspectorate (Vatesi) is the main authority in the country on nuclear safety as well as the issuing authority for licences and permits. It performs safety assessments of nuclear facilities and carries out inspections. Vatesi is an independent state institution as confirmed by the European Nuclear Safety Regulators Group (Ensreg). Its head is appointed by the president after nomination by the prime minister.

Since the shutdown of both units at Ignalina, Vatesi has reorganised its work to accommodate the decommissioning of the nuclear power plant. Its licensing role has focused on new nuclear facilities related to spent nuclear fuel and radioactive waste management.

In 2011, the laws on nuclear energy, on radiation protection, and on radioactive waste management were amended and a new law on nuclear safety was enacted. The aim was to accommodate a more detailed and explicit formulation of the safeguards principles of the European Atomic Energy Community (Euratom) and the IAEA. With the update of the legal framework, Vatesi can exercise its competence of licence issuing to ensure nuclear safety, radiation protection, physical security and accounting and control of nuclear materials. The revision of legal provisions was needed to ensure that the highest safety standards are implemented for the construction and operation of the planned Visaginas nuclear power plant.

In 2012, Vatesi adopted the final version of a report on the strengthening of nuclear safety in Lithuania. The plan detailes in the report was created as a result of the stress tests conducted on Ignalina and on the country's two spent fuel interim storage facilities in the framework of the wider European nuclear safety stress tests. The resulting report contained a number of recommendations, mostly relating to evaluation and assessment of safety standards and procedures in the case of natural disasters and several design issues. Vatesi says all these recommendations have either already been implemented or will be completed by 2014.

Vatesi's report is online:

www.vatesi.lt/fileadmin/documents/leidiniai/en/National_Progress_Report_on_stress_tests.pdf

Vatesi is also engaged in preparing the new nuclear safety requirements for the proposed Visaginas nuclear power plant. It is taking part in the evaluation of the site for the new plant together with the operator VAE. They are engaged in the training of and improvement of qualifications of specialists as well as cooperation with regulatory institutions from other countries.

The Fuel Cycle

The OECD Nuclear Energy Agency (NEA) says exploration has shown Lithuania does not have any uranium on its territory. Any operational nuclear power plant would depend on the import of nuclear fuel.

Because of the decommissioning of the Ignalina plant, the uranium requirements of Lithuania decreased from about 210 tonnes in 2008 to 105 tonnes in 2009. Since the shutdown of Ignalina-2, the country no longer needs uranium. The NEA predicts that if a new 1358-MW unit begins operation at the planned Visaginas station, Lithuania would need between 265 and 525 tonnes of uranium from 2025 onwards.

Vatesi reports show that spent nuclear fuel (SNF) has been stored at Ignalina near the reactor premises since its operation began. Due to the lack of possibilities for transport for recycling, the existing temporary dry storage facility was constructed about one kilometre away from Ignalina's power units. The technology

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used was CASTOR RBMK-1500 casks and later CONSTOR RBMK-1500 casks with both types manufactured in Germany by GNB.

This dry storage facility is now full and the extra SNF is stored in the Unit 2 reactor and the storage pools of both units. A new interim SNF dry storage facility is under construction near Ignalina with CONSTOR RBMK-1500/M2 technology. This type of storage will continue for 50 years, while a geological repository for such waste is being explored. The issue remains unresolved.

Politics

A legally non-binding referendum was held on the construction of Visaginas in October 2012. The result was 34.07 percent in favour and 62.70 percent against, with 52.52 percent voter turnout. In response to significant public opposition to the project, prime minister Algirdas Butkevičius announced the project might be cancelled.

Algirdas Butkevičius: "The decision about the project will depend on whether it will pay off financially".

A working group analysing the result of the referendum and assessing the viability of the Visaginas project concluded that the Visaginas project should be continued, but only if the following conditions were fulfilled:

- Regional partners agree to share the risks and implementation expenses.
- The economic competitiveness of the electricity generated by Visaginas is ensured.
- The public is aware of the costs and benefits of the project.

These conclusions saw the prime minister reconsider the project and re-launch negotiations with Hitachi GE as the main strategic investor.

In May 2013, negotiations were started with the governments of Estonia and Latvia to continue their support as regional partners.

In an interview in June 2013, Lithuanian prime minister Algirdas Butkevičius said: "Our government has commissioned a feasibility study which has already been published. We have forwarded the conclusions to our regional partners in Latvia and Estonia... The decision about the project will depend on whether it will pay off financially and how cheap energy prices will be as a result."

The government has given priority to the provisions of the EU internal market for electrical energy and the construction of infrastructure connecting Lithuania to Poland and Sweden. The three Baltic States are interconnected and there is still a 3000-MW interconnection with Russia. However, they are separated from the rest of the EU, apart from a single 350-MW connection between Estonia and Finland. The completion of this project is seen as vitally important for the energy security of Lithuania and the region. It would also increase regional independence from Russia and add to security of supply.

Next Steps

In light of the consultation process, it will largely be up to the governments of Latvia and Estonia to decide whether Visaginas will be built. If either partner refuses to invest, then the project will not go ahead, at least in the immediate future. In May 2013, Andres Tropp, head of nuclear power at Estonian utility Eesti Energia AS, said: "Eesti Energia has received confirmation that at this point the Visaginas project is not economically feasible."

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Public opposition should also be taken into account. The government of Lithuania has said it intends to hold another referendum once concerns created by the Fukushima-Daiichi accident in March 2011 subside and the economics of the project are better understood.

Andrus Ansip, prime minister of Estonia, has said a new referendum must be held to prove that the Lithuanians want Visaginas to be built. “Of course we are interested in going forward with the Visaginas project, but unfortunately two-thirds of the voters gave a clear ‘no’ in the referendum held in Lithuania [last year]. First, the Lithuanians must decide whether they want it or not. Only a new referendum can change the previous standpoint”, he said.

Lithuania, Latvia and Estonia acknowledge that Visaginas will play an important role in increasing energy security, but public opposition and continuous economic revisions to the project have stalled new nuclear for now.

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