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Interconnections To Increase Baltic Energy Safety

Abstract

The interconnections are needed to support the integration of the national markets into a regional and later European market. It is allowing for trade in electricity generated from different sources, adding to the security of the system through flexibility and optimization of the system. It may offer benefits to the traders on all countries concerned. Differences in energy mix of the three Baltic states and particularly the large hydropower generation of Latvia are an asset for such interconnections. The further interconnection of the three Baltic States with the UCTE system will reinforce further their integration in the European market. In increasing their security of supply, the three Baltic States should be together the beneficiaries of these new interconnections.

INTRODUCTION

A precondition for Lithuanian EU-Membership was the closure of the Ignalina Nuclear Power Plant. Ignalina Nuclear power is based on the RBMK reactor. Unit 1 (1500MW) was shut down on 31-Dec 2004, and unit 2 (1500MW) is scheduled for closure in 2009. Ignalina represents a significant proportion of the installed power generation capacity in Lithuania (generating over 70% of all power consumed), and plays a major part in maintaining adequate generation-demand balance in the entire Baltic power market [1].

However as well as the closure of Ignalina in Lithuania, there will also be reduced generation capacity in Estonia as a result of the closure of generation capacity at the Narva Power Plant due to the requirements of the Large Combustionts Directive.

In the absence of imports from ther Baltic neigbours, the Baltic states may also need to depend on imported power from Russia, Belarus and Finland (via the Estlink interconnector). Estlink is a 350MW HVDC sub-sea interconnector between Finland and Estonia. Its purpose is to enable power trading between the Nordic and Baltic markets and enhance security of supply in the Baltic states by reducing reliance on imported power from Russia. However, Finland also depends on imports of up to 1400MW from Russia so it is possible that export might not be available from Finland to Estonia over this period.

Latvia has a three line combined interface with Estonia and Russia and there are five lines between Lithuania and Belarus. However, with no generation at Ignalina this will cause higher loading on the inter-TSO tie- lines in the Baltic States and especially on the IPS/UPS – Belarus – Lithuania intersections. If any of this transmission infrastructure were to be disconnected (for maintenance or other reasons), or if there were no surplus power available for export in North-West Russia, then this would have a severe impact on security of energy supply in the Baltic States.

I. POTENTIAL SOLUTIONS TO INCREASE BALTIC ENERGY SAFETY

Having established the need to increase power supplies to the Baltic States as a result of Ignalina Nuclear Power Plant closures, a number of solutions can be considered. These can be categorized as generation solutions (construction of new power generation facilities in the Baltic States), Transmission solutions (new/upgraded transmission infrastructure in the Baltic or neighbouring states) and Interconnection solutions (construction of new interconnectors between the Baltic and others states) [2-7].

Generation Solutions.

Although a small increase in renewable generation is to be expected, to replace the large losses of generation capacity at Ignalina and Narva would necessitate the construction of large-scale generation plants. For environmental reasons it is unlikely that coal- or oil-fired generation would be acceptable. Furthermore, although a large increase in gas-fired generation might reduce the Baltic States reliance upon imported electricity, it would leave them heavily dependent upon imported gas. Currently the only gas transmission infrastructure feeding the Baltic States comes from Russia.

Elsewhere in Europe it has also been noted that the lead-time to gain consent for and construct gas-fired generation is considerably shorter then the lead-time necessary for any new transmission infrastructure which might be necessary to connect new generation plant.

There is also the possibility to construct new nuclear generation, either by re-planting Ignalina with a new reactor based on modern technology or to construct new nuclear generation at an alternative location.

Transmission Solutions.

To increase the availability of imports from the rest of the European Union would necessitate the construction/ upgrade of transmission infrastructure in surrounding countries. This new infrastructure would generally be associated with the construction of new interconnection capacity with the Baltic States. However, it would be necessary to increase transmission capacity between Estonia and Latvia in order to transport imports of power from Finland, from Sweden or from Poland.

Interconnection Solutions.

The creation of interconnections is a first priority condition for creating the common electricity market for the Baltic countries EPS. For the Baltic countries it is further diversification of the primary energy resources.

Currently the only interconnection between the Baltic States and the rest of the European Union is the 350MW Estlink interconnector with Finland. A number of possibilities for new interconnection exist

– either increasing the capacity with the Nordic countries, or to construct new interconnection between Poland and Lithuania.

Estlink 2 is the project to construct a second interconnector between Estonia and Finland. Estlink would have a capacity of 700MW and is currently in the planning stage. It could potentially be operational by 2015 provided funding were available and consents could be obtained.

There are also a number of potential projects to construct interconnection capacity between Sweden and the Baltic States. There has been a lack of agreement as to where these interconnectors should land on the Baltic side (Latvia or Lithuania), and these different options would also reguire different transmission infrastructure reinforcements on the Swedish grid.

The likely capacity of Sweden/Baltic States interconnector would be 700-1000MW and could probably be in operation by 2015. "*Swedenlink*" have great significance:

- firstly, it is a precondition for enhancing safety in the Baltics;
- secondly, it will promote competitiveness in electricity trading;
- it will be used to purchase electricity from Sweden or sell the Baltic electricity to Sweden.

The building of new Ignaline NPP in Lithuania will determine the development of the Lithuania – Poland connection ("PowerBridge"). It will become the first connection between the Baltic countries and Central Europe and this will make possible to be joined to USTE system. The map of the interconnection solutions for the Baltic States is shown on Fig.1.

Fig.1. The map of the interconnection solutions for the Baltic States

The intersystem connections will make it possible to buy electricity from different sources and to increase systems safety through flexible and optimizable systems. It is assumed the benefit from the trade in all countries of participants. The future interconnections of three Baltic countries with UCTE system gives further integration into European market.

On 17 June 2009 in Brussels has been signed the Baltic Energy Market Interconnection Plan (BEMIP) and road map. The document outlines the gradual steps to be taken so that, following the principles of the Nordic power exchange NordPool, an open and free electricity market starts functioning in the Baltic region. The aid of the European Commission is directed toward the development of the joint plans for the Baltic countries actions coordination by 4 positions: the introduction of united market principles; the development of intersystem connections; the creation of the new generating sources; the development of gas pipes.

II. CONCLUTIONS

1. The interconnections development and EU Member States cooperation is the main target to increase of Baltic energy safety.
2. The infrastructure improvement, the power supply diversification, energy effectiveness, the best use of local resources - all these projects of the base tendencies of new action plan for EU Energy Security and Solidarity

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