

Development Scenarios for the Electricity Economy of Lithuania

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Overview

The Baltic states Estonia, Latvia and Lithuania have been politically and economically connected to the western world a few decades ago. The Baltic nations are now striving after both, a stable and steady electrical power supply as well as independence from Russia. The Baltic nations shall gradually be integrated into the European interconnected systems, in order to achieve the objectives set by the Baltic Energy Market Interconnection Plan [1] on the part of the European Commission. Lithuania is located in the north-eastern part of Europe and is neighbouring Latvia, Belarus, Poland and the Russian exclave Kaliningrad. Lithuania was part of the former Soviet Union and became independent in 1990. Lithuania joined the NATO in 2004, became member of the European Union in 2004 and introduced the euro as currency in 2015. In 2009, Lithuania has been hit very hard by the financial crisis [2] and additionally the only nuclear power plant Ignalina has been shut down for security reasons. This has introduced a new era for the electricity sector in Lithuania, because the country has become dependent on electricity imports from the neighbouring countries. Therefore, an energy strategy [3] has been formulated in 2009 covering the period up to 2050, but focusing on the timeframe up to 2020. Main targets of this strategy are:

- Securing of the energetic independency until 2020
- Improvement of the competitiveness
- Reaching of a sustainable development path

In order to reach the mentioned targets following measures have been defined:

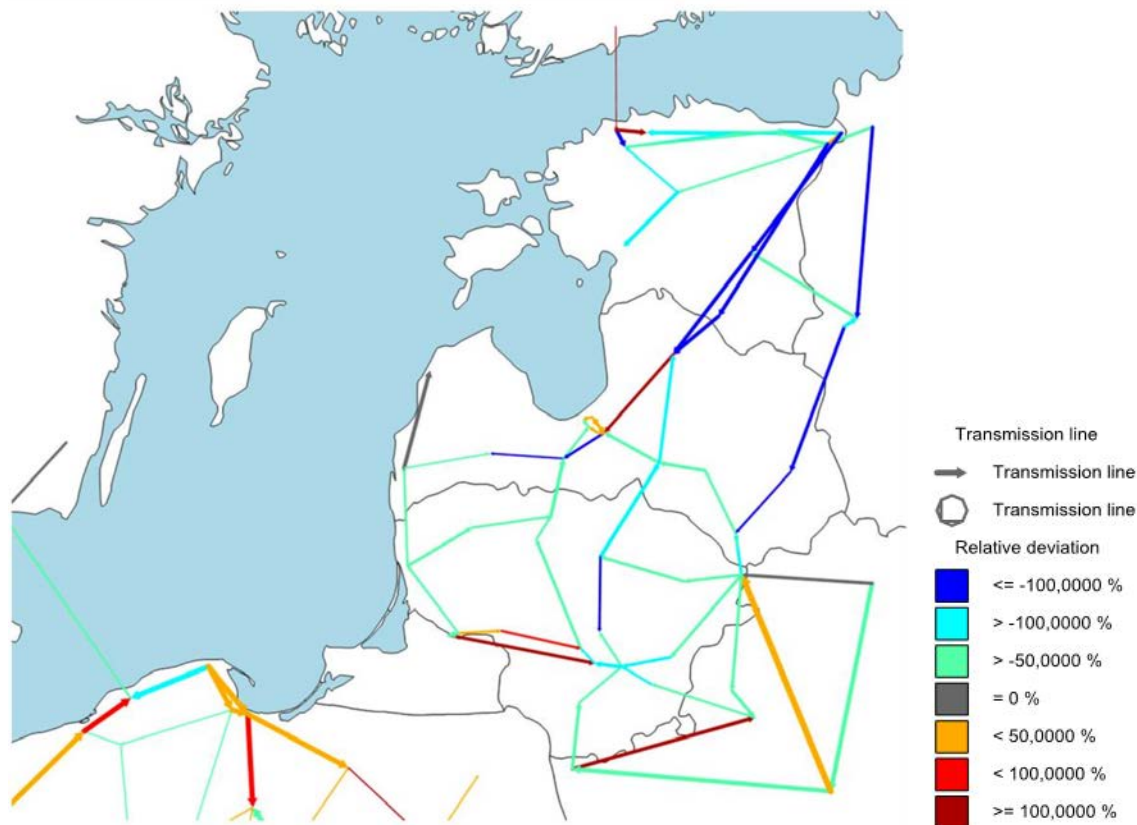
- Integration of the Lithuanian energy system in the European energy market
- Development of own energy resources
- Introduction of the third energy package of the EU
- Liberalisation of the electricity sector
- Improvement of the energy efficiency

Methodical Approach

This paper analyses the development of the electricity industry of Lithuania covering the production and network structures, consumption levels, energy market in general as well as the development of the industrial sector [5]. The investigations have been done based on the simulation model ATLANTIS, which has been developed by the Institute for Electricity Economics and Energy Innovation of Graz University of Technology [6]. The simulation of the Lithuanian electricity industry covers a timeframe until 2030. Moreover, different scenarios have been created regarding the integration of the state into the European interconnected system as well as a desynchronization from the Russian system. The assumptions for the model development are based on the official national energy strategy of Lithuania [3], on the EU reference scenario [4] and on information of the transmission system operator Litgrid [7].

Results and Conclusion

One important investigation concerns the shutdown of the only nuclear power plant Ignalina in Lithuania, which led to a total shift in the nation's electricity supply. The state became a net importer of electricity, because the electricity generation has been reduced by one third. The remaining electricity supply is mainly based on natural gas based production and a certain amount of renewable energies. Compared to the other Baltic states, Lithuania develops also PV-production and a major pillar will be the wind power development.



Above figure shows a result of one selected simulation scenario. The graph shows the load flow differences of the situation with and without the nuclear power plant Ignalina. The relative deviation is marked in different colours according to the given legend. It can be seen, that the shutdown of the nuclear power plant has led to enormous changes in the load flow situation. The red and orange coloured lines indicate the higher electricity imports especially from Belarus and Kaliningrad and the detailed analysis will be presented in the full paper.

References

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