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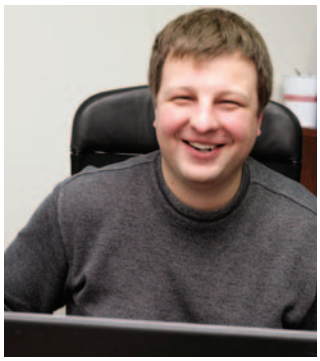
ENERGY UPDATE

PUBLISHED BY THE LITHUANIAN ELECTRICITY TRANSMISSION SYSTEM OPERATOR

LitGRID

TODAY AND TOMORROW

Standards prepared by a Lithuanian engineer will be applied throughout entire Europe's energy system



Ramūnas Ponelis, *Head of the Technical Division at Litgrid*

In territorial terms, the world's electrical energy system that weaves a web across our continents was by far humankind's largest engineering feat by the end of the 20th century. Only at the turn of this century could another system, the data-transmission network, run it close and now one is unimaginable without the other. A team of specialists at Litgrid, Lithuania's only electricity transmission system operator, is responsible for ensuring that power grid functions smoothly (which is by no means an easy task). One of these specialists is Ramūnas Ponelis, Head of the Technical Division at Litgrid. He has contributed to a number of technical solutions for integrating electricity generators into the transmission grid. Although such behind-the-scenes work remains invisible to electricity consumers, the fact that not a single bulb has ever gone off for reasons other than

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STRATEGIC PROJECTS

Strategic project with Poland will ensure Lithuania's energy independence

The LitPol Link power interconnection currently being constructed between Poland and Lithuania is one of our country's key strategic projects in the energy sector. The project is due for completion by the end of 2015. The 400 kV overhead double-circuit transmission line will connect transformer substations in Alytus (Lithuania) and Elk (Poland). This project is a joint initiative by Litgrid and PSE, which are respective national transmission system operators in Lithuania and Poland. Lithuania's electricity system will be connected to the Western European power grid when the project is completed, laying the groundwork for integrating electricity markets of the Baltic States into Western European electricity markets. This will bring added benefits to Lithuania's economy. We asked Karolis Sankovski, Litgrid Project Manager responsible for successful implementation of the LitPol Link

Everything is going according to plan, so the project should be successfully completed by the end of 2015.

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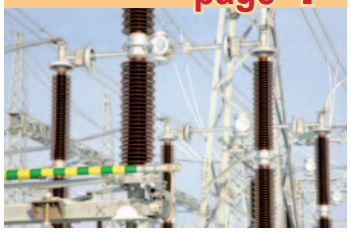

TODAY AND TOMORROW

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natural calamities shows that this painstaking task is adeptly handled.

The energy expert's road

Ponelis' biography is made distinctive by his ability to combine scientific research with practical work. Ponelis has been interested in engineering since his youth and went to study electrical power systems engineering at Kaunas University of Technology. Towards the end of his studies, the capable young man realised that he sees his future in the electricity sector and that he is interested in the activities of Lithuania's electricity transmission system operator.

Mr. Ponelis was entrusted to prepare solutions to integrate electricity generators into the country's electricity transmission grid

However, getting into Lietuvos Energija (which transferred its electricity transmission system operator functions to Litgrid two years ago) was not an easy task in 2004 without being highly qualified. In his fourth year at the university, the bright undergraduate student was recommended to Lietuvos Energija by his scientific supervisor Dr. Vaclovas Ažubalis and carried out his first scientific research for the company. As only a student, the first task Ponelis was given was to restore the electrical energy system after a blackout. After successfully completing the work, the young man was noticed by senior managers of the National Dispatch Centre and System Reliability Division and presented to the company's executive board. But even after this challenge he had to hang tough to secure a job and do a scientific research project called Estimation of System Transition Processes Following Closure of the Ignalina Nuclear Power Plant. He carried out the research before the Ignalina NPP's closure, which therefore had tremendous practical value later on. After completing this task fairly successfully and gaining a Master's degree, Ponelis was offered a job in Lietuvos Energija's National Dispatch Centre. He thus became an engineer in the System Reliability Division and there met Rimvydas Dičius, who was to become his teacher in practical matters.

Having started as a simple engineer, Ponelis now has a remarkable career and substantial experience of international project work on his CV. His history as an expert in the energy field has recently been supplemented by a doctoral degree in technical sciences.

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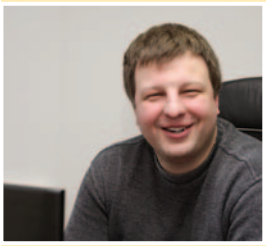
Ramūnas Ponelis' doctoral dissertation:

Supervisor: Docent and Doctor of Technical Sciences Vaclovas Ažubalis.
Topic: Dynamic Process Modelling of Thermal Power Plant Generation Units.
Aim: To create a dynamic model of a thermal power plant generation unit, allowing an assessment of multiple steam extraction in the turbine and modelling its operation specifics on the analysis of electromechanical transient processes in power systems. A dynamic model for a thermal power plant steam turbine with multiple steam extraction is created, allowing the use of permanent power proportion coefficients to investigate different operational regimes of a power generation unit. The research was conducted in Mažeikiai Power Plant.
Practical value of the work: The proposed dynamic model of the steam turbine with multiple steam extraction enables a more precise determination of stability limits and transmission grid bottlenecks, permissible electricity market regimes and the potential for development of renewable energy sources, as well as the integration capabilities of large power generating units in small power systems and participation in the frequency control of thermal power plants. The EU encourages the construction and development of cogeneration power plants that supply both electricity and heating, switching from condensation power plants that can only produce electricity. The number of such power plants is rising across all electrical energy systems and a more accurate and convenient model for assessing their operational regimes is definitely useful for any future investigations of electromechanical transient processes in electric power systems.



Ramūnas Ponelis' career:

2004: System Reliability Division Engineer at Lietuvos Energija.
2005: System Reliability Division Senior Engineer.
2006: System Reliability Division Managing Engineer.
2008: Leader of the group devising technical standards for system development.
2010: System Development Managing Engineer at Litgrid.
2012: Head of Technical Division at Litgrid.

Completed tasks and projects and participation in studies:

Working group member of the feasibility study for a full synchronous interconnection of UCTE-IPS/UPS.

Working group member of the feasibility study for construction of a new nuclear reactor in Lithuania.

Calculation of the electrical system regime after the closure of Ignalina NPP.

Preparation of the plan for restoring the electrical energy system after a blackout and calculation of the system's dynamic regimes.

Preparation of technical requirements for integrating wind farms for power generation and other types of electricity generators into the country's electricity transmission system and for the NordBalt and LitPol Link interconnection projects.

Testing generators to be connected to the energy transmission grid, determining their characteristics and assessing the quality of their operations in view of relevant technical requirements.

Ponelis now has a remarkable career and substantial experience of international project work on his CV. His history as an expert in the energy field has recently been supplemented by a doctoral degree in technical sciences.

Training the younger generation

These days it is much easier to become a part of the team at Litgrid, Lithuania's electricity transmission system operator. This is because of the internship programme initiated by the company itself. Litgrid's personnel should undoubtedly comprise experts in the field, professional theorists who continuously review and analyse proposed and applied technologies, assess their pros and cons and later offer convincing arguments for adopting solutions that entrust Lithuania's electricity transmission, as far as possible, to methods that are most effective from the consumer's point of view. Litgrid has now stopped carrying out repairs of the electricity transmission system on its own, when all that specialists need to do is follow the instructions given. This is a company that requires personnel capable of highly intellectual work.

Litgrid therefore cooperates with universities to attract the brightest and most proactive students and relies on recommendations from scientists who teach them.

During the 2012 internship programme, Litgrid chose 3 young specialists who are successfully working for the company today by applying the knowledge they acquired in their universities and learning from the company's highly-experienced professionals. This year, Litgrid plans to select 5 young specialists from the programme.

Tasks have been dictated by the country's key energy projects

Lithuanian businesses became seriously interested in generating electricity from renewable sources nearly a decade ago. It was then necessary to find out the best way to integrate such producers into the country's energy system and the requirements they should be set, as well as researching problems faced in other countries and ways to prevent them in Lithuania. Lithuania's electricity transmission operator did not then have any staff for carrying out this function and conducting relevant supervision. This complicated field was entrusted to Ponelis.

Ponelis studied the examples of Denmark, Germany, Spain and the U.S., where renewable energy development started much earlier, and in this way devised technical requirements for renewable energy producers wishing to connect to the country's electricity transmission grid. An entirely new concept was born based on global best practices. The technical requirements devised by Ponelis for Lithuania's wind energy producers will be applied throughout Europe within about three years. Thanks to this capable specialist, Lithuania has managed to outdo most other electricity transmission operators.

Furthermore, after assessing the experience of integrating electricity generators into national transmission grids in other countries, Lithuania's electricity transmission system was shut off from poor or second-hand and outdated technologies, allowing in only high-quality and trustworthy options. For example, all wind farms connected to Lithuania's energy transmission grid must have remote control systems to adjust the power and voltage generated or shut down the whole farm. The absence of such systems among Germany's electricity transmission system operators in 2006 made them unable to keep the system in check, resulting in massive power cuts for vast numbers of consumers. Lithuania's transmission grid is currently equipped with devices that comply with the latest EU standards, have been tested in countries such as Switzerland, Germany and Sweden, and have been purchased only

Lithuania's electricity transmission grid is currently equipped with devices that comply with the latest EU standards.

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TRANSMISSION SYSTEM OPERATOR NEWS

Wind-power generation forecasts published daily

Accurate predictions about the amount of electricity produced in wind-power plants are becoming increasingly necessary for enabling effective trading of wind-generated electricity on the Nord Pool Spot power exchange. As of 8 January 2013, electricity transmission operator Litgrid publishes wind-power generation forecasts for the following day on its website (www.litgrid.eu/go.php/eng/Wind_generation/10) by 10 am each day. This forecast is used by Lietuvos Energija for making sale offers in Nord Pool Spot Lithuanian bidding area.

Under the Minister of Energy's order of 7 January 2013, Lietuvos Energija was temporarily assigned to purchase electricity generated by wind farms connected to Lithuania's high-voltage electricity transmission grid operated by Litgrid. Lietuvos Energija will be replaced in the future by a permanent wind power intermediary.

Electricity generated by Lithuania's wind farms comprises approximately 3 per cent of the country's daily electricity consumption. From now on, all electricity generated by wind-power plants will be sold via the Nord Pool Spot power exchange. Electricity generated from renewable sources is made available in this way to all market participants, thus increasing transparency in the electricity market.

Litgrid publishes daily wind-power generation forecasts on its website

TODAY AND TOMORROW

Lithuania's electricity transmission system uses high-quality, trustworthy equipment

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after careful consideration of the most technically and economically-effective options.

The scientist actively participates in the activities of ENTSO-E (European Network of Transmission System Operators for Electricity), which focuses on preparing legislative acts for connecting to electricity networks of transmission system operators in European countries.

In preparing the Visaginas NPP project, Ponelis had to assess different ways of integrating this massive electricity generator into the country's energy grid. According to him, it is already clear which areas need the most careful consideration when preparing technical requirements for the NPP's integration.

Technical requirements for the planned fifth hydro unit at Kruonis Pumped Storage Power Plant also required careful a consideration and discussion with foreign experts. The proposed hydro unit would feature a so-called asynchronous generator instead of a typical synchronous one. This would be the only such hydro unit in the Baltics, with its closest equivalent installed in Germany. Along with current hydro units, this would help control the power balance in the electrical energy system.

Litgrid's main challenge today is to synchronise Lithuania's energy grid with Western Europe's electrical energy system. All three Baltic States participate in this project. Consultants are conducting a technical feasibility study and experts from electricity transmission operators in Lithuania, Latvia and Estonia are assessing the study results and proposed technical capabilities for synchronisation. It should be noted that Lithuania's infrastructure will be part of Scandinavian and Western European infrastructure by the end of 2015, after the NordBalt and LitPol Link electrical interconnection projects have been implemented.

Source: Veidas Magazine

STRENGHTENING OF THE DOMESTIC NETWORK

Litgrid completes the reconstruction of Viršuliškės transformer substation

In January 2012, electricity transmission system operator Litgrid completed the reconstruction of Vilnius' most important electricity hub, Viršuliškės transformer substation. This project was necessary for ensuring a safe and reliable electricity supply in Viršuliškės and Karoliniškės neighbourhoods and preparing for the connection of a new underground transmission cable in 2013 near Vilnius's western roundabout way that is currently under construction. "Compared with other Litgrid projects, this reconstruction has been a fairly minor undertaking," said Vidmantas Grušas, Head of the Transmission Grid Department at Litgrid. "However, it directly affects the quality of life in many households in Vilnius, and we are therefore very happy to have completed the work in less than a year thanks to careful planning."

The brand new transformer substation that is now connected to our capital's energy grid ensures a reliable electricity supply to residents in Vilnius' Viršuliškės and Karoliniškės neighbourhoods and also to some of Vilnius' key institutions, such as Vilnius University Hospital, Lithuanian Radio and Television Centre, Vilniaus Troleibusai UAB and Vilniaus Vandenys UAB.

The reconstructed Viršuliškės transformer substation is very important for ensuring the quality of life in many Vilnius households.

Reconstruction works in Viršuliškės transformer substation, in cooperation with distribution network operator Lesto, were planned so as to prevent any transmission disruptions in households and institutions in the surrounding areas of the city. All equipment in the substation has been replaced in less than a year.

LTL 2.2 million have been invested in the reconstruction of Viršuliškės substation built in 1970s

Lithuania's transmission grid, which was built three or four decades ago, is getting old and therefore needs constant renovation. Reconstruction is started in four or five substations every year, with several completely renovated substations connected to the transmission grid annually. More than 40 different transmission grid elements are currently under construction or renovation throughout Lithuania.

Strategic project with Poland will ensure Lithuania's energy independence

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power interconnection project, to tell us more about the project and its progress so far.

How is the construction of the energy bridge going? What has been completed so far and what is being done at the moment?

The LitPol Link project started in May 2008, after coordinating company LitPol Link was established. In Lithuania, all work is being consistently carried out one step at a time. The territorial planning procedure has now been completed and the Environmental Impact Assessment (EIA) report has been prepared and presented to the public. The necessary easements have been established and land has been bought in Alytus for the development of a substation and the construction of a direct current insert. Technical projects are currently being prepared for the installation of a 330 kV distribution station (switchyard) in Alytus substation and the construction of an overhead transmission line from Alytus to the Lithuanian border. We expect to obtain all necessary permits for the construction of these elements by May. Parallel interconnection project work is being carried out in Poland. At the moment, they are performing territorial planning procedures, establishing easements and preparing an EIA report and the technical project for interconnection. Everything is going according to the plan, so the project should be successfully completed by the end of 2015.

Karolis Sankovski, *Litgrid Project Manager responsible for the successful implementation of the LitPol Link power interconnection project*

We are happy about the public acceptance of a project that is so strategically important for the country.

You mentioned that the Environmental Impact Assessment report has already been prepared in Lithuania. What are the results?

The Lithuanian EIA report was prepared in summer 2010. Three possible route lines have been considered to assess the project's environmental impact, choosing the one least harmful to nature and least obstructive to farming activities. Many interested parties participated in the EIA's preparation, comprising municipality and neighbourhood representatives, the Department of Cultural Heritage, the Region's Environment Protection Agency and Public Health Centre and other institutions. We have also organised public meetings with local residents where they shared their comments and suggestions about the planned route. We are happy about the public acceptance of a project that is so strategically important for the country. We have taken the comments of all interested parties into account when planning the route. The process of signing easement contracts with people on whose land the interconnection will be laid therefore went rather smoothly and we have had only a few objections. We are hoping to find solutions favourable to all affected parties in the near future.

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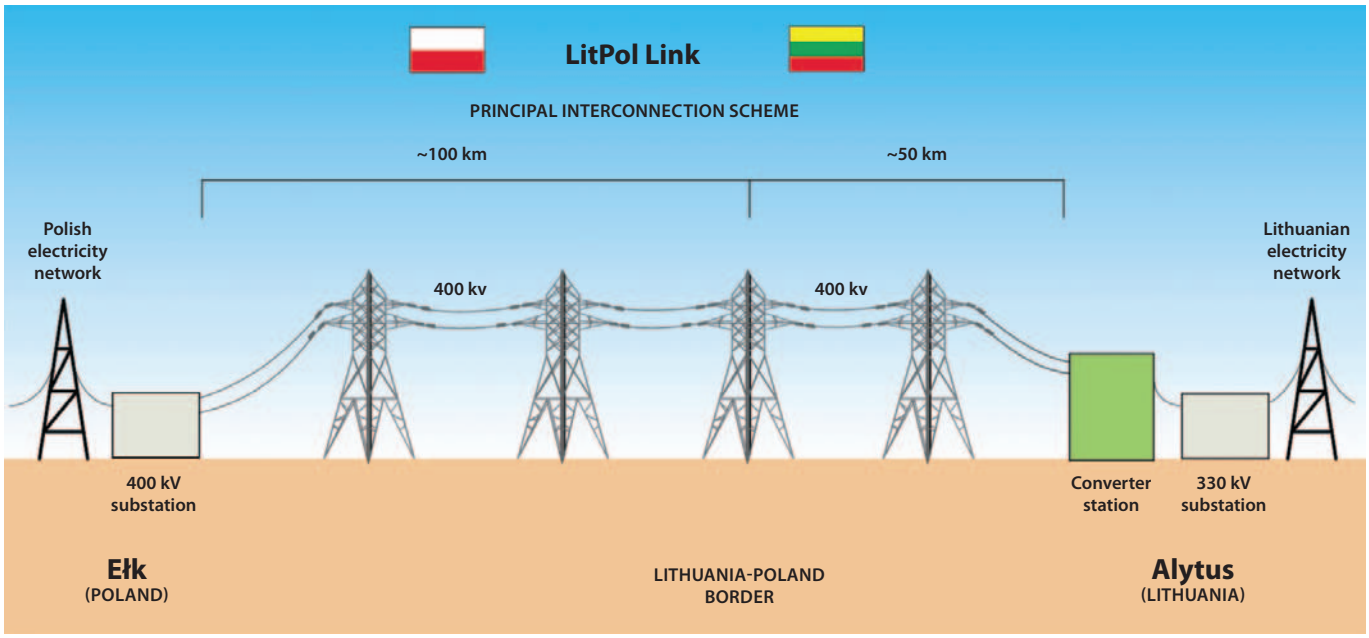
In January 2013, the Polish transmission system operator PSE announced a call for tenders to build the 400 kV (kilovolt) transmission line from the city of Elk in Poland to the Lithuanian border. The winning bidder will not only have to build the transmission line, but will also be responsible for all legal formalities, the project's preparation and the purchase of materials. The line will cross several districts, including Elk, Suwalki, Punsk and Sejny. According to PSE, all necessary contracts have already been signed for the co-financing of more than PLN 700 million (LTL 594 million) from the EU budget. PSE will finance the rest. At the start of its use, the LitPol Link interconnection line is planned to have 500 MW (megawatts) of capacity. This will increase to 1,000 MW in 2018–2020, when the second direct-current converter block is built in Alytus.

STRATEGIC PROJECTS



The LitPol Link power interconnection between Poland and Lithuania is one of our country's key strategic projects in the energy sector

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The LitPol Link interconnection is an overhead transmission line. Did you consider the option of an underground line?

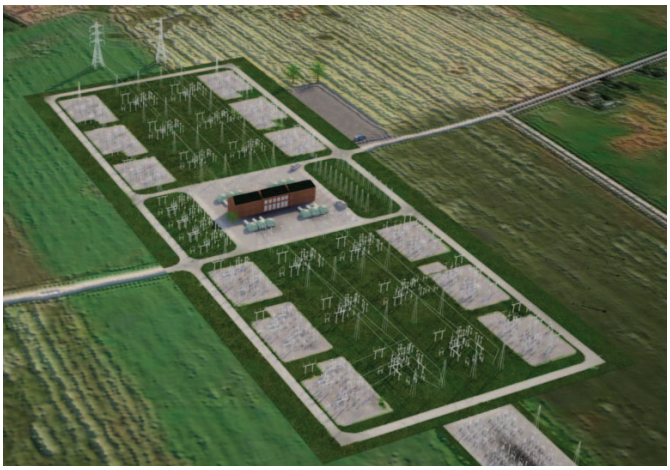
A thorough comparative analysis of possible underground and overhead lines was performed to determine the best type of transmission line in this case. The analysis showed that alternating current cable technology is more harmful to nature and agricultural land and seven to ten times more expensive. Moreover, a cable laid under the ground would cause difficulties for farmers because cultivating soil or planning other farming activities on the route is forbidden. On the other hand, an overhead line does not really restrict farming activities nearby or even directly beneath it. Local residents and farmers only have to bear in mind not to stay close to the lines longer than absolutely necessary. Time restrictions vary from one to four hours per day, which is more than enough time to carry out all the necessary sowing or harvesting. Moreover, this is not what a farmer does every day.

What technological innovations will be applied in constructing the LitPol Link power interconnection?

The project's main innovation is a direct current back-to-back converter station, of which there are very few in the world. This is a complex engineering device that requires exceptional competence. At present, foreign experts participate in the device's purchase procedure. During the preparation and setting up of an installation, training will be organised for Lithuanian experts so they can each gain valuable knowledge to aid the facility's use and maintenance.

What added value will the project bring to the region of Alytus and its residents?

The first thing we must note is that the LitPol Link power interconnection will modernise Lithuania's electricity transmission system, improving its reliability and ensuring safety both in the Alytus region and at a national level. Construction of the overhead transmission line and the reconstruction of Alytus transformer substation will create new jobs, while local construction, engineering, accommodation, catering and other businesses will be able to absorb foreign investment. As I have already said, new technologies will also be used in this project, so Lithuanian specialists will gain fresh knowledge about how to operate these devices. Finally, the overhead transmission line between Lithuania and Poland will interconnect our region's electricity transmission system with the European Continental Network (ECN). This will not only ensure Lithuania's energy independence from the eastern neighbours that are currently our largest electricity suppliers, but will also enable the supply of electricity at competitive prices. Such reforms will first and foremost be beneficial to electricity consumers. Where can the public find out more about this project? To begin with, they can contact the institutions responsible for this project, which are electricity transmission system operator Litgrid and the LitPol Link company. A lot of useful information is also available on the Litgrid and LitPol Link websites (www.litgrid.eu and www.litpol-link.com). We actively cooperate with the municipalities of Alytus and Lazdijai districts and their neighbourhoods, so the public can also contact them if they have any questions.



Alytus transformer substation after its reconstruction

Suggestions from local residents taken into account when building the new Kretinga-Benaičiai transmission line

In response to suggestions from local residents, several planning decisions have been adjusted in the segment between Kretinga transformer substation and the intersection with the 330 kV Klaipėda-Grobinė transmission line (approximately 2.5 km in total) when choosing the route for the 110 kV Kretinga-Benaičiai transmission line. Electricity transmission system operator Litgrid proposed building the new line without constructing additional pylons. A double-circuit overhead line is to be built, replacing the existing pylons with new ones. The remainder of the line will stretch next to the existing 330 kV overhead transmission line.

Electricity system is a complicated engineering feat and every related project is therefore an important and highly responsible task for the people and companies involved. When planning the Kretinga-Benaičiai route in Kretinga district, many factors were taken into account. Most importantly, the company sought to minimise interference with local residents' welfare and their farming and economic activities and not cause undue harm to the environment. The Environmental Impact Assessment procedure has shown that the planned overhead transmission line route complies with all hygiene and health norms and safety requirements approved in Lithuania, and that the electric field will not exceed permitted safety levels. We have chosen the high-voltage route between Kretinga and Benaičiai transformer substation that is best for local residents and the environment and stretches through the least-populated areas. New technical solutions that enable the building of fewer new pylons for the transmission line were presented by Litgrid specialists in response to suggestions from local residents and after considering technically possible alternatives.

When planning the Kretinga-Benaičiai route line in Kretinga district, many factors were taken into account. Most importantly, the company sought to minimise interference with local residents' welfare, farming and economic activities and avoid causing undue environmental harm.

The Kretinga-Benaičiai overhead transmission line is one of western Lithuania's key projects, helping to create a safer and more reliable electricity transmission grid.

The Kretinga-Benaičiai overhead transmission line will significantly increase the flexibility of the Klaipėda-Mažeikiai route management in the event of power failures and will ensure a non-stop electricity supply for customers during repairs. The new transmission line will also help prevent losses occurring in the transmission grid, which in the past had to be compensated for in energy tariffs. This will save some LTL 1.3 million each year.

There are no plans to connect additional wind farms to the transmission grind after completing the project.

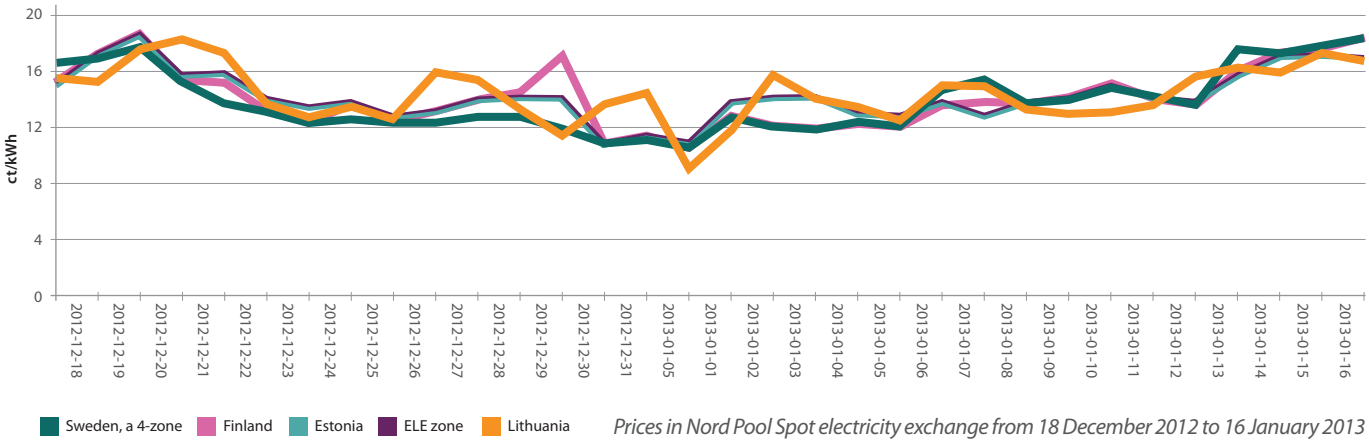
Most of Lithuania's transmission grid was built three to four decades ago and its renovation and development is essential to ensure a safe and reliable energy supply for consumers throughout Lithuania. Construction of the Kretinga-Benaičiai overhead transmission line will cost about LTL 7.5 million. Its total length is approximately 27 km.

The Kretinga-Benaičiai overhead transmission line is one of western Lithuania's key projects, helping to create a safer and more reliable electricity transmission grid. The company responsible for implementing the project is Litgrid, Lithuanian electricity transmission system operator.

A double-circuit overhead transmission line is proposed in the most complicated segment of the Kretinga-Benaičiai line

ENERGY SECTOR NEWS

Drop in prices in Nord Pool Spot



Prices in Nord Pool Spot electricity exchange from 18 December 2012 to 16 January 2013

Nord Pool Spot electricity exchange news

The average electricity price in Nord Pool Spot Lithuanian bidding area (NPS LT) rose from 13.6 ct/kWh in November to 15.3 ct/kWh in December. By comparison, the average electricity price in Lithuania's power exchange in December 2011 was 12.4 ct/kWh. The price rose this December because of an increased electricity demand due to cold weather: the average temperature in December 2012 was -4.3 °C, which is about 2 degrees below the average of many years. As in previous years, intraday electricity prices in NPS LT fluctuated this December because of differences in trading volumes among market participants trading between Lithuania and Estonia. The price also rose because of the changing trading volume of electricity from Latvia to NPS LT. This was mostly conditioned by changes in the output generation of Latvia's hydropower plants on the one hand and electricity supply volumes from Russia to Estonia and Latvia on the other.

Electricity demand fell between Christmas and the New Year, when the weather became warmer and the holiday began. Electricity prices on the power exchange therefore fell and remained at those levels until the end of the year. Due to the relatively warm first days of January and an increased Russian electricity supply, electricity prices in the Baltic States and Finland also remained low for the first ten-day period in January 2013.

50 years' successful operation of the Lithuania Power Plant

The date of 30 December 2012 marks the 50th anniversary since the Lithuanian Power Plant's first unit in Elektrėnai became operational. This unit comprised a steam boiler with a capacity of 500 t/h, a 150 MW turbine, a 150 MW generator and a transformer.

Today, the power plant built 50 years ago no longer operates at full capacity. However, it remains an integral part of Lithuania's energy system, producing the country's base electricity load, ensuring energy security and serving as a reserve source.

The power plant started to expand in 2009. A new combined cycle unit was built in its territory, along with another eight. The power plant controlled by Lietuvos Energija continues to be renovated and modernised.

Baltpool finishes the year successfully

Within the first few months of Baltpool's energy exchange operation, two transactions were agreed and 21 companies became energy exchange participants.

Biofuel exchange currently trades wood chips. Trade orders are accepted from Monday to Thursday and auctions are held every Thursday. Biofuel trade in the exchange is organised in eight Lithuanian regions: Vilnius, Kaunas, Utena, Alytus, Šiauliai, Panevėžys, Rietavas and Klaipėda port. Heating and electricity producers that use biofuel and biofuel producers (irrespective of their size) are invited to trade at the exchange.

LESTO customer satisfaction score higher than European and global averages

Lithuanian distribution network operator LESTO AB conducted an annual customer satisfaction survey using GCSI methodology. The company's results show that its customer satisfaction index is higher than both European and global averages in the provision of electricity and other utility services. The company's index in 2012 was 75 points, while the average among European energy providers was 65 and the global average 71.

In the survey, LESTO customers identified the company's website (www.lesto.lt) and self-service website (www.manoelektra.lt) as sources of the most positive changes. According to respondents, information on these websites is presented clearly and conveniently and all questions are promptly answered by the company's staff. In addition, customers' assessment of the quality of the electricity supply is also positive.

LESTO AB currently serves more than 1.577 million customers.

This newsletter is based on information that has been made public by Litgrid and other energy companies, Lithuanian and foreign electricity exchanges, and energy analysts.

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