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Lithuania: a new vision for national energy security by 2050

In Lithuania, the government has adopted a new energy security strategy with a vision extending to 2050. The document, known as the National Energy Independence Strategy, is currently awaiting parliamentary approval. This new strategy is expected to enhance energy independence and enable the export of surplus electricity. The energy transition process is anticipated to accelerate economic development and guide Lithuania towards becoming a climate-neutral country. The outlined goals are aligned with those set by the European Commission, aiming to achieve European Union climate neutrality by 2050.

Structure of the energy sector. Since 2009, Lithuania has been a net importer of electricity, a situation brought about by the closure of the second reactor at the Ignalina nuclear power plant. By 2023, the country's electricity generation capacity allowed it to produce almost 45% of its energy needs from renewable energy sources (RES). The largest contributions to this renewable energy come from wind farms, biofuels and waste, hydropower, and solar power. Natural gas also continues to play a significant role in energy generation. The rapid development of RES, coupled with planned investments, suggests that Lithuania will be able to meet all of its energy needs through domestic production by 2027¹. In terms of electricity consumption, the industrial sector accounts for the largest share at 33%, followed by the services sector at 32%, and the residential sector at 26%. Over the past few years, there has been a notable increase in electricity demand from both the industrial and service sectors. Looking forward, energy consumption is expected to rise in the transportation sector, primarily due to the electrification of the vehicle fleet, which currently stands at just 1%².

Lithuania, like the other Baltic states, participates in the international Nord Pool exchange, where it buys and sells electricity alongside various players from Northern and Central European countries. However, the flow of energy is limited by transmission capacity. Currently, Lithuania has electricity connections with the Russian Federation, Latvia, and Sweden via the undersea power cable NordBalt, and also with Poland through the onshore line LitPol Link. The entire regional market operates under a market coupling mechanism, which determines the direction of energy flow based on the lower price (["IEŚ Commentaries", no. 512](#)).

New assumptions and expectations. According to the provisions (article 9) of the Energy Law (Lietuvos Respublikos energetikos įstatymas)³, the Ministry of Energy is required to update the National Energy Independence Strategy at least every five years. The document currently under review was first presented in March 2024 at the Seimas Economic Committee. In May 2024, it received government approval and is now expected to be debated and adopted by parliament.

The presumed goal of achieving climate neutrality in Lithuania will necessitate radical reforms and changes to the energy system, including a shift away from fossil fuels (mainly natural gas and crude oil) towards zero-carbon energy sources. In the coming years, as is currently the case, the energy mix is expected to be dominated by renewable energy sources (RES). In the context of developing modern industries, the government plans to initiate the production of hydrogen, synthetic fuels, and ammonia, among other initiatives, as well as expand electricity generation and storage capacity.

¹ Lietuvos Respublikos Energetikos Ministerija, *Energetinės nepriklausomybės link: pirmą kartą per 15 metų paros elektros gamyba viršijo poreikį*, 12.03.2024, <https://enmin.lrv.lt/lt/naujienos/energetines-nepriklausomybes-link-pirma-karta-per-15-metu-paros-elektros-gamyba-virsijo-poreiki/> [19.06.2024].

² International Energy Agency, *Lithuania 2021. Energy Policy Review*, <https://www.iea.org/reports/lithuania-2021> [18.06.2024].

³ Lietuvos Respublikos energetikos įstatymas, 2002, <https://e-seimas.lrs.lt/portal/legalAct/lt/TAD/TAIS.167899> [19.06.2024].

Demand for energy is expected to increase sixfold, from the current level of about 12.6 TWh to 74 TWh by 2050, with the largest consumption projected to come from hydrogen production (35.5 TWh), followed by the industrial sector (12.6 TWh) and transportation (6.3 TWh). The supply side will be bolstered by the development of the wind power sector, generating electricity both onshore (targeting 28.1 TWh) and in the Baltic Sea (18.8 TWh). Solar power is also expected to play a significant role, contributing 9.5 TWh. According to the new strategy, the development of the nuclear power sector (11.2 TWh) is being considered, primarily through fourth-generation small modular reactors (SMRs). The Ministry of Energy has previously announced that a political decision on the construction of SMRs should be made by 2028, with the first reactors potentially becoming operational by 2038.

According to the Energy Ministry's assessment, the current energy transition will result in the creation of an additional 140,000 jobs by 2050. The benefits to Lithuania's economy could reach as high as EUR 6.3 billion, which is approximately 11% of Lithuania's GDP as of 2021. Besides achieving energy neutrality and self-sufficiency, it is anticipated that Lithuania will be able to export surplus electricity to Central European countries, including Germany.

Conclusions

- Lithuania has been a net importer of electricity since 2009, mainly due to the closure of the Ignalina nuclear power plant. According to the new strategy, the government is placing significant emphasis on domestic generation capacity, not only to reform the energy sector but also to leverage new, promising technologies, primarily hydrogen. Interestingly, this new strategy projects that the largest energy demand will come from hydrogen production, which is expected to be nearly three times that of the industrial sector. However, considering existing and future generation capacities, Lithuania could achieve climate neutrality in the coming years without necessarily investing in hydrogen technology.
- Lithuania is confronted with several challenges, with the most critical being the development of domestic generation capacity, particularly in renewable energy sources (RES), to meet the expected substantial increase in energy demand leading up to 2050. This effort aims to lessen dependence on electricity imports. Additionally, expanding domestic transmission capacity and maintaining as well as enhancing electricity import capacity is crucial. These efforts are supported by ongoing work towards synchronizing Lithuania's electricity systems with Poland and other European Union countries, with completion anticipated by February 2025.
- The National Energy Independence Strategy, crafted by the Ministry of Energy and subsequently endorsed by the government, is notably ambitious. Crucially, it relies not only on established methods of generating electricity like solar and wind energy but also on nascent technologies that are still in their early developmental stages. Given this context, there may be delays in the implementation and application of certain solutions.
- The new National Energy Independence Strategy necessitates substantial financial resources, and its effective implementation will hinge on several factors. These include capital contributions from companies, both domestic and international, support from the national budget, and project funding from the European Commission. Similar to other Central European countries, the energy transition is expected to incur significant costs.
- The document was approved by the government ahead of the European Parliament elections, with its assumptions known well in advance. Considering the outcomes of the June elections in Europe, the direction of the new European Commission's climate policy will be crucial in determining whether specific sub-targets toward climate neutrality will be maintained or revised. Nevertheless, it is expected that certain projects such as the construction of wind farms in the Baltic Sea, and support for the expansion of solar and wind energy, will continue regardless of any adjustments made to the goals of the European Commission.