Federal Ministry
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and Energy

MITTELSTAND
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ENERGY SOLUTIONS
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PROJECT PROFILE

# A digital solution from Germany for distribution grid operators is driving the energy transition in Estonia

**The expansion of renewable energies is crucial for achieving climate protection targets and is often at the heart of the energy policy debate. However, the increase in fluctuating energy sources, such as wind and solar energy, poses major challenges for grid operators. Furthermore, the ongoing electrification of the heating and mobility sectors will connect additional consumers to the power grid. As part of the RES Programme, an innovative software-as-a-service solution for the digitalisation, automation and optimisation of distribution grids was demonstrated in Estonia.**

The irregular feed-in of electricity from renewable sources can affect grid stability. At the same time, distribution grids must be expanded and bolstered to cope with fluctuating feed-in, and sufficient balancing energy must be available to compensate for the fluctuations and ensure that the energy supply is secure.

A number of factors are required for the energy transition to succeed. The ageing power grid needs to be expanded, for one; much greater grid transparency is also necessary to ensure that new connection points are planned and distributed more efficiently. Consequently, power grids need to be digitalised on a much larger scale to optimise integration and enable intelligent energy management. This was the starting point for a project in

Planning of a new photovoltaic system with evaluation of the impact on the grid in the Intelligent Grid Platform (IGP


The Intelligent Grid Platform (IGP) enables grid operators to digitalise their processes

Estonia that was part of the Renewable Energy Solutions Programme (RES Programme); the project involved demonstrating a German software-as-a-service solution for the digitalisation and automation of distribution grids.

Estonia is considered one of the pioneers of digitalisation in Europe. The country is also making significant progress in the expansion of renewable energies. The share of renewable energy sources in its electricity mix is growing significantly and is even expected to reach 100 per cent by 2030. The largest Estonian grid operator, Elektrilevi, is pursuing a strategy of utilising digital solutions based on state-of-the-art technologies to future-proof the distribution grid for new renewable energy generation plants and loads such as charging stations or heat pumps. The aim is to expedite sector coupling and the decarbonisation of the Estonian economy. This project was supported by a highly innovative software-as-a-service solution for the digitalisation of distribution grids provided by German company envelio GmbH.

The core of this digital solution is the Intelligent Grid Platform (IGP). The platform combines all grid-relevant data in a computable grid model and also offers complete digital mapping of the distribution grid, giving grid operators detailed real-time insights into their grids and enabling them to achieve grid transparency and more accurate grid forecasts. Geographical grid data, operating data and smart meter data from the entire Elektrilevi medium- and low-voltage grid were processed in this digital twin. As part of the project, a customer portal was also made available on the grid operator's website; the portal makes it quick and easy for households to check whether their location is suitable for connecting a new system, and what technical specifications would be required to do so. In addition, all the application forms necessary for registering new generation and consumption points can be downloaded from the portal. The project covers Elektrilevi's entire grid area, which is approximately 95 per cent of Estonia.

*'Further automating Elektrilevi's grid planning processes will enable us to process the increasing number of new connection requests more efficiently while ensuring that we can provide the best grid service for our customers.'*

Meelis Melder, Head of Planning and Project Management, Elektrilevi

The IGP was implemented in planned stages over the course of 2022. A function for querying the conditions required to connect to the grid followed in 2023.

To publicise its innovative technology, the German start-up primarily focused on demonstrating its technology and associated services to potential new customers, such as other distribution grid operators in the Baltic region and Scandinavia. The German Energy Agency (dena) helped envelio expand the reach of its marketing campaign to target distribution grid operators in the countries in question. Shortly after completion of the project, envelio acquired a new customer – Glitre Nett AS, Norway's second-largest grid operator.

## Company Description

envelio

**envelio** is a spin-off of RWTH Aachen University; its Intelligent Grid Platform (IGP) empowers distribution grid operators to master the next phase of the energy transition. envelio's IGP digitalises and automates grid planning and operational management processes, allowing renewable energy generation and charging points for electric vehicles to be integrated into the energy system more quickly and cost-effectively. At the heart of envelio's technology are optimisation and machine learning algorithms based on the founders' five doctoral theses. envelio was founded in 2017 and employs about 70 people. envelio's more than 35 customers include grid operators such as Westnetz, E.DIS (both part of the E.ON Group), Helen, Vattenfall, Enel, Iberdrola, EDP and now Elektrilevi.

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