Novo Nordisk Foundation

New research initiative will utilise AI to optimise Nordic energy grid capacity, improve resilience and prepare for future needs

A new Nordic research initiative will develop artificial intelligence-based solutions to help power grid operators optimise the use of existing grid infrastructure, handle growing uncertainty, and keep power grids resilient as electricity demand increases.

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The Novo Nordisk Foundation is awarding up to DKK 100 million (EUR 13.3 million) over four years to establish AI4GRIDS, a Nordic research initiative led by universities in Denmark, Sweden and Norway. The aim of the project is to optimise the use of the existing Nordic energy grids, thus enabling the safer and smoother integration of renewable and weather-dependent energy sources such as wind and solar power.

As societies electrify and electricity demand rises, power grids must accommodate far more renewable energy sources, alongside a growing number of batteries, electric vehicles, heat pumps, data centres and other electricity assets. These developments are putting increasing pressure on existing infrastructure and making power systems more complex to operate safely and efficiently, while potentially increasing the risk of so-called brownouts and blackouts.

“The increasing energy demand challenges the current energy grid, which was built to meet entirely different needs. Until we scale up the capacity of the energy grid, there is an urgent need to optimise the use of the existing grid. At the Novo Nordisk Foundation, we see AI as an obvious enabler for achieving this, as it can help us make critical decisions on how to balance energy production and demand so that our energy systems become more resilient and ready for future needs,” says Lene Oddershede, Chief Scientific Officer, Novo Nordisk Foundation.

New operating methods for a changing electricity system

Most operational power system principles and methods applied today were originally developed for systems with a relatively small number of centralised power plants. Today’s systems are increasingly decentralised, weather-dependent and complex.

Building on the Nordic countries' closely connected electricity systems, AI4GRIDS will bring together leading researchers in power systems, AI, energy data and control theory to develop new methods for optimising the operation of future grids. By combining AI with mathematical models of how electricity grids behave, the project aims to make grid operation more reliable and better suited to safety- and time-critical decisions.

The Technical University of Denmark (DTU) is leading the initiative in partnership with Lund University in Sweden and the Norwegian University of Science and Technology (NTNU).

"The electricity grid is becoming vastly more complex, while society is becoming more dependent on it. We want to fundamentally rethink how power systems are operated. Our vision is a self-operating grid where trustworthy AI can help make decisions at a speed and scale beyond what is possible today, while humans remain in a supervisory role," says Spyros Chatzivasileiadis, Professor at DTU Wind and Energy Systems.

The ambition is to equip operators with the best possible response options when imminent risks arise from a range of potential scenarios. Human operators will remain in charge, supported by AI-based tools that can perform computations up to 100 times faster, enhance power controllers and energy markets with safe autonomy and unlock demand-side flexibility.

Nordic expertise with a shared challenge

AI4GRIDS builds on complementary expertise across the Nordic region. DTU contributes expertise in power systems, trustworthy AI, energy data and computing. Lund University brings expertise in mathematical statistics, forecasting and control, and NTNU contributes expertise in energy markets, optimisation and decision-making under uncertainty. Together, the partners aim to develop technologies and operating principles that can scale across Europe's interconnected electricity systems, energy markets and varying grid conditions.

The collaboration builds on the close links between Nordic electricity systems and the region's cross-border cooperation in energy research and innovation. Over the next four years, AI4GRIDS will train more than 30 PhD students, postdoctoral researchers and other specialists across the partner institutions. The initiative will also bring researchers together with power system operators, technology

developers, regulators and other stakeholders to ensure that the research remains connected to future needs. By building the scientific foundation for more resilient and efficient power system operations, AI4GRIDS aims to help prepare electricity systems for the demands ahead, strengthening Nordic and European leadership at the intersection of energy, AI and critical infrastructure.

Watch CSO Lene Oddershede and Professor Spyros Chatzivasileiadis explain more about AI4GRIDS in the video here: [link will follow].

The project is expected to begin in the first quarter of 2027.

About the Novo Nordisk Foundation
Established in Denmark in 1924, the Novo Nordisk Foundation is an enterprise foundation with philanthropic objectives. The vision of the Foundation is to improve people's health and the sustainability of society and the planet. The Foundation's mission is to progress research and innovation in the prevention and treatment of cardiometabolic and infectious diseases as well as to advance knowledge and solutions to support a green transformation of society.

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