

Urgent investment required for battery storage of green electricity

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In the coming years, the Netherlands will have to work hard on Smart Grids, intelligent local networks with new storage capacity for green electricity. It will thus be possible to counter the impending instability caused by the increasing power surges of electricity from wind turbines and solar cells. Large numbers of locally installed batteries should

accommodate the increasing fluctuations in the electricity grid that are inherent to sun and wind energy. If not, the Netherlands will be confronted with the major problems that are currently visible in Germany.

The four percent growth in renewable energy in the Netherlands, rising to 16% in 2023, as laid down in the recent Energy Agreement, makes the issue even more pressing. This is evident from the doctoral research by Stefan Nykamp at the University of Twente. The Smart Grids research topic is a spearhead within the University of Twente's Green Energy Initiative.

Looming blackouts, the shutting down of wind generators or dumping of (almost) free green electricity in neighbouring countries because of the threat that the network will become overloaded. These are the current problems in Germany, which already generates a quarter of its energy from renewable sources. According to PhD student Stefan Nykamp, the Netherlands must learn from this and invest heavily in a stable network for a future with the generation of at least four times as much [green electricity](#). Nykamp's detailed case studies in Germany show that local storage in batteries is the best solution for this. The unattractive alternative involves extending the current network with an enormous number of new thick cables; an expensive investment of many billions that determines the situation for decades to come and requires old coal plants to remain on stand-by (contrary to the Energy Agreement). Local storage in batteries is a much more flexible system that prevents dangerous and costly instability on the network and permits the reduction of old plants.

Problems with green electricity

The German problems with energy from the sun and wind are numerous. First of all, there is a threat that the German power grid will become

overloaded if there is (too) much solar energy and if the winds are (too) strong. Germany regularly 'dumps' excess green power in neighbouring countries such as Netherlands, far below the market rate or even for 'free': a market disruptive phenomenon. Moreover, this is no longer a solution because the neighbouring countries themselves will also generate more green power. In addition, energy is regularly wasted due to the shutting down of wind generators to prevent the grid from overloading. As a country generates more electricity from sun and wind, there is an increased risk of 'blackouts': residential districts and industrial areas without power, with disastrous (financial) consequences. Germany already had a number of 'near-blackouts' this year and will also have to do something in the coming years now the country is heading towards 80% [renewable energy](#) by 2050 with all the additional fluctuations on the grid that this entails. "The Netherlands can and must learn from this", says Nykamp who works at the largest German network operator Westnetz (RWE).

The best solution: Smart grids

According to the research at the University of Twente, local storage of electrical energy is the inescapable solution. On windy and sunny days, the energy surplus can be stored temporarily in batteries near the wind generators and [solar cells](#). The energy can then be consumed during the nights or following days (or be supplied to the main network) when it is cloudy and the wind has died down.

The alternative would be an updated infrastructure with many thousands of extra kilometres of (thick) cables to the highest voltage level in order to prevent overloading. According to Nykamp, some 380,000 kilometres of new cable networks (the distance from the Earth to the Moon) would be required in Germany alone in order to export the surplus green [electricity](#) to major centres or the neighbouring countries. Cost: EUR 27 billion. In the Netherlands too, a multi-billion euro investment in cables

would be much more expensive than the construction of additional [energy](#) storage in [smart grids](#). On the basis of his detailed case studies, Nykamp expects that the tipping point at which the smart grids are the most cost-effective solution will certainly also be reached in the Netherlands.

Moreover, with the 'infrastructure with new cables only' alternative, the existing generation capacity has to be kept in reserve. However, if you cannot reduce the number of gas and coal plants, but have to maintain them at minimum in standby mode, this also involves extra high costs. Nykamp: "I am convinced that storage in smart grids is the best solution for Germany and the Netherlands. But if we don't invest in good time, we will be in real trouble."

Provided by University of Twente

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