

No more grid congestion

The ever-growing number of solar panels in the Netherlands is causing congestion on the power grid. To address that problem, PhD student Frank Kreuwel developed a programme that anticipates the congestion.

Problems on the grid arise as soon as more energy is generated than consumed. Grid operators try to solve voltage problems by creating more infrastructure. But that is not enough, says Kreuwel, who works for the energy company Liander.

To prevent problems arising, the existing network needs to be used in a smarter way by anticipating bottlenecks in good time. And that is just what the computer programme Kreuwel developed can do. It predicts down to the minute how much solar radiation there will be and therefore how much energy will be generated. Quite a feat, given that the best weather models can only predict an hour ahead.

The problem is that you still don't know exactly when during that hour the sun will shine and how big the power peaks will be. Those peaks also depend a lot on whether it is

cloudy. If it is, a power peak can be up to 22 per cent higher than it is if there are no clouds. This cloud effect was discovered by Wageningen meteorologists a few years back. It is not just direct sunlight that falls on solar panels, but also indirect light in cloudy weather.

Peaks

That additional light makes for extra-high peaks in supply in certain weather conditions. Which is good for the yield of the panels, but difficult for the grid manager who has to deal with them. Kreuwel applied a trick so he could make minute-by-minute predictions. He taught the computer to link the hourly forecast with the corresponding radiation intensity per minute, sourcing the latter data from the Royal Netherlands Meteorological Institute (KNMI).

'The hourly weather forecast is processed so that it provides an estimate of the solar radiation from minute to minute within that hour,' says Kreuwel. And that seems to work well. The method is already being used in numerous places around the country. RK



PhD candidate Frank Kreuwel designed a program that forecasts solar radiation levels to the minute, and therefore how much energy can be generated. Here: solar panels on the roof of the Werkspoorfabriek in Utrecht. ♦ Photo Jeroen van de Water/Unsplash