

Best marketing for renewable energies

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Transmission system operators must assess precisely the supply of electricity from renewable energies for the next day in order to market this electricity on the European Power Exchange as effectively as possible. The sharply fluctuating supply of solar and wind energy makes reliable forecasts even more difficult. For this reason, Fraunhofer researchers, working jointly with TenneT TSO GmbH, developed a high-performance software that takes multiple forecasts and combines them with each other to generate one single, highly reliable projection.

To most of us, electricity is a matter of course. At the push of a button the light turns on and the TV starts. In reality, a tremendous amount of effort lies behind a secure supply of [power](#). Because of the demand fluctuations, specialists must calculate precisely how much power is needed and when. Weekends, for instance, when offices and stores are closed, require less energy than Mondays. And when it is gray and rainy outside, the lights get turned on earlier than on sunny days. More than anyone else, [transmission grid](#) operators have to know in time, when electricity from renewable energies is being generated because they have to transport it across Germany, and partly market it by themselves.

Sun and wind power fluctuate sharply

This is why transmission system operators try to forecast, as accurately as they can, how much [renewable energy](#) will be stored for the upcoming day. In this respect, the growing volume of solar and [wind power](#) is a challenge, because they are subject to strong natural fluctuations. So the stored volume of [wind energy](#) at, for example, TenneT TSO, a German

transmission grid operator, can fluctuate from just a few hundred [megawatts](#) up to about 9,000 MW within a few days. With photovoltaic, these power increments can happen within hours, which is comparable to the difference in performance between one small [gas turbine](#) and nine large conventional power plants. For some time now, services have been available that can precalculate the production of green power resulting from the weather. To achieve the best possible prediction, forecasts from multiple suppliers are used. For the respective next day (day ahead), these are summarised into an optimized "Meta-Forecast". Added to these forecasts are predictions for other renewable energies, such as biomass, hydroelectric and geothermal power and landfill gas. The collective result represents the entire projected volume of green electricity. Now that this amount can be estimated in a timely manner, eco-power can be marketed in advance on the EPEX – the European power exchange.

The Fraunhofer Application Center System Technology AST in Ilmenau, with its new energy management solution, EMS-EDM PROPHET®, shows that these forecasts – and thus, sales on the EPEX – can be improved even more. From a large number of individual forecasts, the software generates an optimized overall projection. The entire computing process consists of roughly 15,000 individual steps – a massive challenge that requires a high degree of automation from the software.

Quarter-hourly forecasting possible

The software can offer even more. Not only can it calculate the power for a day in advance, it can also provide precise forecasting every quarter hour by correcting the day-ahead marketing every 15 minutes, with partial assistance from short-term projections on the spot market. This means that TenneT TSO GmbH is able to respond to shifts in storage volumes with great alacrity. Another advantage: Using the optimized

marketing of [green energy](#) quotas on the EPEX, revenues from green energy are maximized, and the utilization of balancing energy is minimized. This, in turn, helps to reduce the share of costs from green energy that every consumer has to pay with the [electricity](#) bill.

Currently, the program is used for the spot market for photovoltaic, wind, water and geothermal power. The software will soon be able to consider other energy sources, such as biomass. The data from EMS-EDM PROPHET® can also be used for Internet websites. This information is made available to services such as www.eeg-kwk.net or www.transparency.eex.com. "A flexible software solution is particularly important, considering the framework conditions that are changing at an ever faster pace," explains Dr. Christian Schulz, responsible for the green energy issues in grid management at TenneT TSO GmbH. Thanks to the high degree of automation of EMS-EDM PROPHET®, the user can quickly respond to regulatory changes.

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