

## Electricity market

# Market reform can prevent blackouts

Europe should consider reforming the electricity market to make sure the transition to renewable energy does not cause black-outs.

“The system relies on a continuous balance between demand for and supply of electricity, on a second-to-second basis,” explains Stefan Jaehnert, research scientist at SINTEF, one of Europe’s largest independent research organisations.

”Without such a balance there is a great risk of a blackout.”

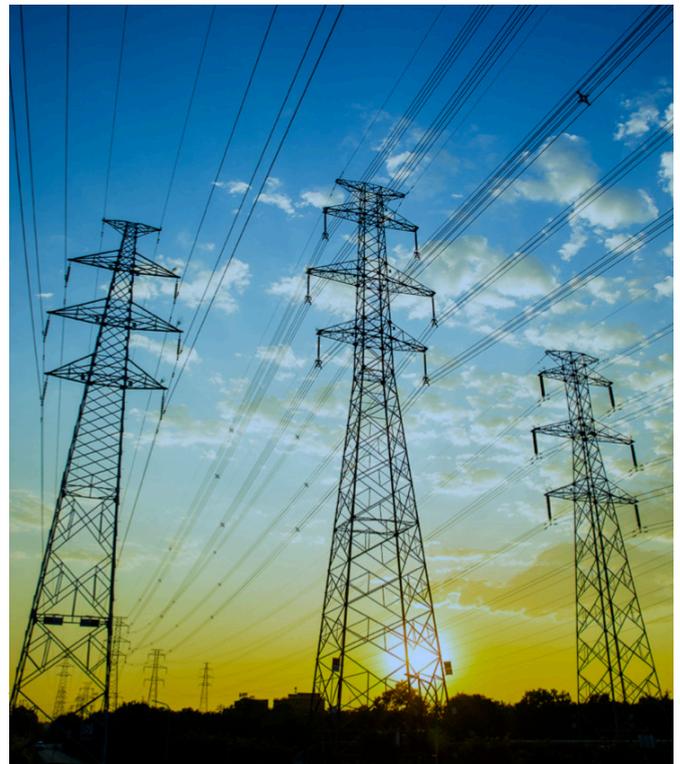
This risk of the lights going out and industry being forced to shut down is due both to the inherently unpredictable supply of solar and wind power, and to the way electricity is traded.

The electricity market is designed as day-ahead clearing system, where buyers - such as consumer-focused utilities and industry - declare how much they want delivered tomorrow.

In turn the sellers, whether nuclear, gas or coal fired power plants, or solar, wind and hydro electric suppliers, declare what they can offer.

The supply and demand, expressed as bids, determine the price under a system called price coupling of regions.

European exchanges cooperate, and this is where the quantities that the different bidders are going to dispatch are determined.



*An improved grid system will help alleviate electricity shortages on calm and shady days.*

“Buyers of electricity are reasonably clear about how much they want to buy tomorrow,” explains Mette Bjørndal, professor of management science at NHH Norwegian School of Economics.



*Renewable energy is desirable, but it is also unreliable as it depends on natural forces that are difficult to predict.*

Currently, the sellers include gas and coal fired power stations, and they too know roughly how much electricity they'll produce.

“But if you have wind turbines or if you rely on solar power, you don't really know how much you can deliver, because you don't know whether it's going to be windy or whether the sun will shine tomorrow,” says Bjørndal.

Consequently, renewable energy generators might wake up to find that they quite simply cannot deliver electricity as promised.

This makes it difficult to operate a market a day ahead, with prices that reflect these true, unquantifiable scarcities.

Currently, this is not a big problem, as flexible gas and coal fired power stations can generally turn up the heat to cover the shortcomings in a real-time electricity market.

But once we have a predominantly renewable energy system in Europe, cold winters with little sun and high pressure resulting in

low wind will result in the supply of electricity falling, just as the system really needs extra capacity for heating.

Hence, once nuclear capacity is shuttered in Germany and much of the coal capacity has been removed across Europe, the system will feel the strain, observes Lasse Torgersen, head of department, corporate strategy and analysis, Hydro.

“This will be the main challenge for the European power market in the years to come,” he says.

### **Flexible supply and demand**

The solutions can be developed both on the supply and the demand side of the market.

Tactical supply-side solutions include energy storage, ranging from batteries or hydrogen production, to hydro power delivered via a sophisticated grid system with more inter-connectors to Norway, Sweden and Finland.

“But the challenge is big. So much energy is

needed,” says Bjørndal.

Recent studies have found that it's very difficult to build inter-connectors to deal with this situation.

This is because we can have a situation with the same weather pattern in large parts of northern Europe.

“So Norway, Sweden and perhaps Finland cannot solve this problem for Germany or Central Europe,” Bjørndal explains.

In theory, it is also possible to retain gas fired power stations that are only used very occasionally to provide flexibility

In practice it is an unlikely scenario, however, as existing price caps would prevent them from charging enough to make them commercially viable.

“Everyone agrees that polluting energy generators should be removed from the system,” Bjørndal points out.

”But we must also ask ourselves whether we are closing the right ones, and whether they are closing because the market is flawed or

because we really don't need them anymore.”

There are also demand side solutions that are encouraged by new business models that pay consumers to be flexible.

These range from offers of savings to consumers who refrain from charging their cars or heating their buildings when electricity is scarce, to direct payments to manufacturers and other large industrial consumers that halt consumption until energy production returns to normal.

### **Our recommendations:**

- Examine the market and the regulatory system to identify reforms that can facilitate flexible electricity suppliers.
- Modernise the grid, with more interconnectors between the Nordic region and the rest of Europe.
- Develop flexible demand reduction strategies, in partnership with industry and aided by smart technology.

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