Proposal for tackling grid congestion

“From blockade to control”

SUMMARY

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Grid congestion is (in short) a situation in which the demand for transport capacity at a certain point in an electricity network exceeds the technical capacity of the grid at that point.

Grid congestion is a major problem for the Dutch society. More than 14,000 companies are waiting for (the expansion of) a connection for consumption. Some residential areas cannot be built because there is no grid capacity. In the event of grid overload, the social costs are enormous. And according to the grid operators, there will not be any new capacity on the grid for another 10 years.

Despite the declared grid congestion, the utilisation rate of the electricity grid is currently around 30% only. The predicted grid congestion will occur roughly 10% of the time. In other words, grid congestion concerns relatively short peaks in supply and demand. Moreover, it largely concerns grid congestion expected in the future based on high demand growth forecasts.

In the case of residential users, the main cause of congestion is the (expected) increase in consumption due to the heating of homes with heat pumps in combination with the charging of electric cars at home. This occurs mainly between 4 p.m. and 9 p.m. and mainly in the winter months (between November and February). During this period, there is also little supply of solar and (sometimes) wind energy.

For the future, large consumers face the challenge of how to meet their increasing demand for electricity from the varying supply from solar panels, wind turbines and storage.

Our report argues that grid scarcity is a permanent phenomenon and indeed needs to remain so. In an electricity system with renewable sources [sun, wind, etc.] and with increasing electrification of demand [EVs, heat pumps, etc.], there is a structural imbalance between supply and demand. And it is simply not affordable to build a network that can transport all peaks in supply and demand at all times.

In short, an explicit trade-off between more network capacity on the one hand and more flexibility in electricity demand (and supply) on the other hand will have to be made on a permanent and ongoing basis. Making this trade-off should start as soon as possible. This will help to prevent the projected shortages in grid capacity in the long term.

The report outlines various instruments that enable grid users to make the intended trade-off between grid and flex. We show that this approach reduces the social costs of energy supply and even offers companies an opportunity to reduce their own energy costs.

A first instrument for the grid-flexibility trade-off is to make capacity tradable by means of an auction of network capacity at times of congestion. An auction is a proven instrument and has been used for many years at the national borders of the electricity grid.

Participation of both new and existing customers (and not just those who are waiting for a larger or new connection) is essential. The auction will be used if the network operator expects a shortage of transport capacity in the near future (assumed to be within three

days).

As a result, new connections may be permitted because they compete for available capacity without exceeding the maximum peak capacity of the grid. This immediately puts an end to the often paper-based grid congestion.

The proceeds of the auction are used to reduce grid tariffs and/or to construct grids (to be determined by the regulator). The auction can be supplemented by the possibility for customers to trade their transport capacity among themselves.

The objective is that space becomes available on the grid because existing customers offer 10% of their contracted transport capacity for free at auction. If the customer actually needs the capacity at that moment, it is bought back at market price at the auction. In addition, each customer offers a significant portion of their contracted transport capacity at the auction. If a customer needs that capacity themselves, it can be bought back at the same price. Offering capacity ensures that there is sufficient liquidity at the auction. Auctions thus reveal the value of network capacity at a given moment. Customers choose whether or not they want to use the network for a short period of time at a given price. Auctions are mainly aimed at larger customers. It is therefore very important that the auction is based on standard agreements.

A second instrument is the restriction of demand during periods of extreme cold. Such a distribution scheme exists for natural gas. For electricity, this requires further research. Nevertheless, it is desirable to address this issue quickly in order to ensure that national standards are developed for the amount of grid capacity required in extreme cold weather. These standards will help to harmonise and rationalise the projected growth in required grid capacity. This will prevent unnecessary claims on future capacity of the electricity grid. At the same time, it will also be possible to discuss what to do at certain temperature thresholds: who has priority in extreme weather conditions?

A third instrument is the adjustment of network tariffs in such a way that it encourages a reduction in the requested network capacity at times when the network is heavily used. To this end, the functioning of the kW-max tariff component must be improved. This can be done in such a way that, for example, E-boilers and other storage systems can charge at much more attractive rates when the grid allows it. This will quickly lead to better utilisation of the grid. Such change can reasonably take effect on January 1, 2027.

All these instruments can be implemented relatively quickly. This will speed up the resolution of queues caused by grid congestion. By making better use of the grid, these instruments will also reduce network costs.

A calculation example for Overijssel and North Holland shows that a voluntary auction of 10% of capacity for 50% of the time results in annual savings of €6.3 billion. In every scenario of actual revenue, there is a large positive balance.

Because not all actions can be implemented at once, a three-step implementation is proposed.
Firstly, what can be achieved in the short term. Then the second step, followed by the refinement of the solutions once the market has gained experience.
In the first step (horizon: 0-2 years):

- Pilots with voluntary auctions and mutual trading of contract space
- Adjustment of tariff groups in network tariffs for small-scale consumption
- Adjusting the KW-max determination for large-scale consumption
- Frameworks for limiting peak supply for residential users

In the second step (horizon: 2 to 4 years):

- Introduction of mandatory auction system
- Net tariff system for small-scale consumption as envisaged by network operators and the Minister
- Legislation and regulations for peak delivery for residential users

In step three (horizon: 4 years and beyond):

- Development/implementation of optimisations such as implicit auctions.

These instruments ensure better use of the power grid, reduce costs and accelerate the reduction of queues. This sets in motion a permanent improvement for the future: from blockade to control.