Non-firm Network Connection Agreements: Benefits and Recent Regulatory Developments in the Netherlands and Germany

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Overview

The energy transition to renewable energy sources with intermittent generation profiles leads to large peaks of electricity flows through electric transmission and distribution networks. These networks were often not designed for such large peaks, which now leads to network congestion problems. In addition, large-scale battery projects have become commercially viable and there is a long pipeline of such projects that have requested network access in the Netherlands and Germany. Due to limited availability of free switch bays on the high-voltage network, these cannot all be granted access at the moment and there is a long waiting line for receiving access.

Thus, there are two different but related problems for connecting new large scale battery storage projects: the first is limited number of available switch bays, the second is limited network transmission capacity. The second problem here is about the capacity of network elements such as power lines and transformer stations which are required to transmit and distribute the electricity over long distances, while the first problem refers only to the physical connection of projects to the network. Even if the first problem could be solved and storage projects would be connected to the network, the expected resulting peaks of an unchecked operation of these storage projects in terms of withdrawal and feed-in to the network would likely lead to unmanageable peaks in network flows, exacerbating the second problem.

In light of these problems, this contribution discussed one proposed remedy: Non-Firm connection Agreements (NFA's). These are an alternative to the traditional firm connection agreements, where network capacity was guaranteed to be available (notwithstanding unforeseen outtages due to equipment failure or system splits). In NFA's, network users receive some kind of benefit in exchange for their network connection to be *non-firm*, meaning their network capacity is not always available. In particular, the network operator can reduce network capacity of these NFA's to a contractually specified level (possibly even down to zero), when this is required by network conditions. This can be used to manage network congestion. The limitation to network access may exclude some customers who require steady network access, such as certain industrial customers, from these agreements, but they are well suited to customers who have high inherent flexibility in their operation, such as battery storage projects. The benefit can be in monetary terms, such as reduced network fees, or as in-kind services, such as faster access to switch bays. In this way, NFA's can create a win-win situation where network operators get another tool to manage network congestion while network users get a monetary benefit or faster network access.

Methods

In this contribution, we look at recent innovations in regulation in the Netherlands (Autoriteit Consument & Markt, 2024) and Germany (Bundesnetzagentur, 2024), where the transmission system operators TenneT operates. We review texts from regulation and showcase relevant real-world example cases where non-firm connection agreements have been applied already or can be applied. Lastly, we show the benefits of non-firm agreements for network congestion in a stylized toy model and give a brief estimation of the impact of network limitations on the business case of battery storage projects.

Results

Regulators in the Netherlands and Germany have recently added, or are considering to add non-firm connection agreements to the network code as an innovative tool to help connect more customers to the grid and to incentivize network users to be operated in network-friendly ways.

In the Netherlands, these contracts are already legal and network operators are starting to gather first experiences with them. A first product specification, a completely non-firm connection agreement has been developed and is offered by the TSO in congestion areas. A second product, the so-called TDTR ("Time-Duration-bound Transport Right") is also approved by the regulator and can be offered by the TSO from 1 April 2025. In Germany, the regulator is currently considering adding these contracts to the network code, but the framework conditions (allowable interruption frequency and duration, discounts on network tariff etc.) still need to be developed.

A toy model analysis shows significant benefits of non-firm connection agreements in terms of congestion management while having limited impact on the business case of battery storage projects.

Conclusions

Non-firm network connection agreements can play an important role in accommodating additional connection requests and leading flexible network users to behave in more system-friendly ways.

We recommend regulators to further adopt this innovation. Harmonized framework conditions could also be recommended by the EU to simplify the process for companies operating in multiple countries.

Outlook: as a further innovation, it could also be possible for multiple network users to share a single connecting switch bay, as limited number of switch bays are often the limiting factor for allowing additional network connections.

References

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