

Innovation type:
Methods and tools

TRL: 7

Date: Nov 2024

Contact:
Magnus Korpås
magnus.korpas@ntnu.no

Target group:

Actor/ purpose	x
DSO, TSO	X
Technology provider	X
Member organisation	X
Market operator	X
Research/ Consultancy	x
Teaching	

Coordinated non-firm connection in industrial energy communities

Challenge

A significant increase in grid connection requests from industrial customers has led to long connection queues. Combined with long lead times on grid construction, the result is significant socioeconomic losses due to lack of grid capacity. Distribution system operators (DSO) have therefore introduced non-firm connections as an alternative, where the new grid customer may connect on the condition that the DSO retains the right to disconnect the grid customer if necessary. An option to potential disconnection is for customers to leverage flexibility to stay below an agreed capacity level. Unfortunately, many existing grid customers possess flexibility potential but lack incentives to utilise it.

Solution

We propose a “coordinated non-firm connection”, where the new grid customer forms an energy community with existing grid customers to coordinate flexibility and capacity utilisation. The concept is based on capacity coordination with nearby grid customers through a local market. The connection scheme is demonstrated by a new equilibrium optimisation model that can be used to investigate the physical and economic impact (i.e. market outcome and distribution of costs) of how accelerated connection of new industrial grid customers in congested grids can be conducted.

Potential

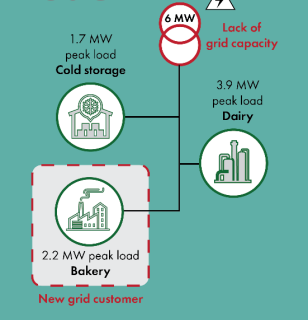
The proposed scheme allows for efficient use of flexibility resources when aiming to increase grid hosting capacity, as (1) flexibility response is not triggered when there is no grid congestion and (2) the cheapest flexibility source is used due to the price-based capacity trading in the local market. These features have the potential to utilize existing grid capacity more optimal than if each customer holds operate their flexible and non-flexible assets on an individual basis. This approach requires no changes in regulation, and the DSO retains the right to disconnect the new grid customer if they fail to stay below the agreed capacity limits, essentially not increasing their risk of violating grid limitations.

Reference in CINELDI

S. Bjarghov, S. S. Foslie, M. Askeland, R. Rana and H. Taxt:

”[Enhancing grid hosting capacity with coordinated non-firm connections in industrial energy communities](#)”, Elsevier Smart Energy, Vol 15, 2024.

Problem



Solution

