

Innovation type:
Models

TRL: 5

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Target group:

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

Model framework for industrial flexibility in constrained grids

Challenge

Industrial decarbonization requires substantial electricity and grid infrastructure. Expansion of the transmission grid, however, is lagging. Even though grid capacity limits may be critical only for a few hours annually, industries ready to make large energy-intensive decarbonization investments may be refused grid connection due to security-of-supply requirements.

Solution

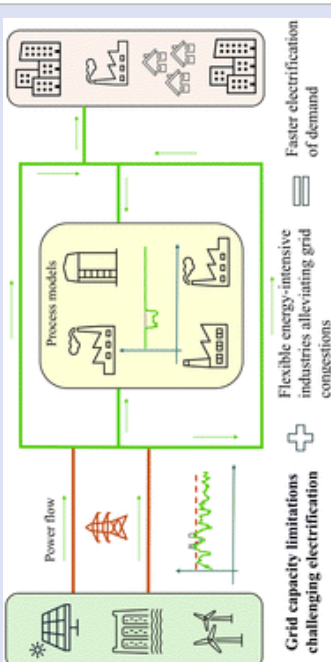
We have developed a modelling framework for assessing the potential flexibility activation in energy-intensive processes located in an area with constraints in the transmission grid. The framework includes operational optimization of the flexible resources coupled with a power flow model for system reliability assessment. The framework is used to evaluate the cost of this flexibility, for increasing grid hosting capacity while ensuring grid reliability constraints.

Potential

There is a lack of suitable tools for analysing the practical potential of using industrial flexibility to utilize the existing grid better. With this model, it is possible to get a better understanding of how industrial flexibility can prevent grid overload, and how much this will cost with respect of the processes that are controlled. The information we get out of the model can help the grid companies and the process industries to plan for more electrification even when full grid capacity is not in place. This is a common problem in many areas with electrification plans. Ultimately, the successful assessment of industrial flexibility using such tools can speed up decarbonization while waiting for grid upgrades.

Reference in CINELDI

S.S. Foslie, B.R. Knudsen, S. Bjarghov, M. Korpås: "[Faster decarbonization of heavy industries in low-carbon power grids: Using process flexibility for handling grid congestions](#)", Energy & Environmental Science 17 (22), 8838-8854, 2024.



Overview of the model framework.