

Pilot project: Transmission and Distribution coordination via Hierarchical clearing

The project has demonstrated how hierarchical TSO-DSO coordination can be used to increase the use of flexible resources in the distribution grid, for balancing the power system. In the pilot, load flow analyzes have been carried out, based on a grid model where both distribution grids and transmission grids are included. There have been some challenges related to the convergence of load flow analyzes based on these two different grid models, overall, due to different formats and different versions, but this has been resolved during the project. The pilot has been carried out on realistic cases from the Trondheim area, where a grid model consisting of both distribution and transmission grids has been created.

Challenge

There is a growing need to make use of flexibility at different grid levels in the power system - both for DSO and TSO. Flexible resources located in the distribution grid will contribute to increased liquidity and reduced costs, but this requires coordination between DSO and TSO, to avoid new problems being created in the power system (e.g. new bottlenecks occur in the distribution grid as a result of activating reserves).

Solution

With the hierarchical market clearing methodology, restrictions in the distribution grid are included in bids made on the TSO's reserve markets. In the pilot, this is defined as "residual supply function (RSF)". This function ensures that bids in the reserve markets that come from resources connected to the distribution grid can be activated by the TSO without this creating new grid problems.

Potential

Methodology for hierarchical TSO/DSO coordination, which enables increased use of reserves connected to the distribution grid, has been demonstrated in the pilot project. This enables both DSO and TSO to use the flexibility, and overall, this will contribute to a more efficient reserve market and better utilization of the existing power system.

Reference in CINELDI

- [Pilot "Transmission and Distribution coordination via Hierarchical clearing" report](#) (in Norwegian)

Innovation type:
Method

Innovation:

TRL: # 5

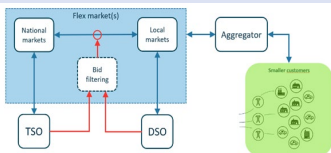
Year: 2024

Contact:
Hanne Sæle, Statnett

Maren Istad, SINTEF Energi

Potential users:

User	X
DSO, TSO	X
Technology provider	X
Member organisation	
Market operator	X
Research/consultancy	
Teaching	



Example of hierarchical coordination where grid restrictions are included in flexibility bids and further used to solve local or national grid problems.