INTERPLAN

INTEgrated opeRation PLANning tool towards the pan-European network

Transforming Grid Operation Planning

Use Case 5: **Power balancing at DSO level**

Objective: Minimization of the energy flow between transmission and distribution network by optimal power flows at DSO level.

Network operation planning criteria: Minimizing losses, maximizing share of RES, Optimize TSO/DSO interaction.

Use case solution: For each time step in a chosen time-frame, the algorithm performs multi-objective OPF so that the UC goal is met in the best possible way.

Operation challenge:

- Local energy usage

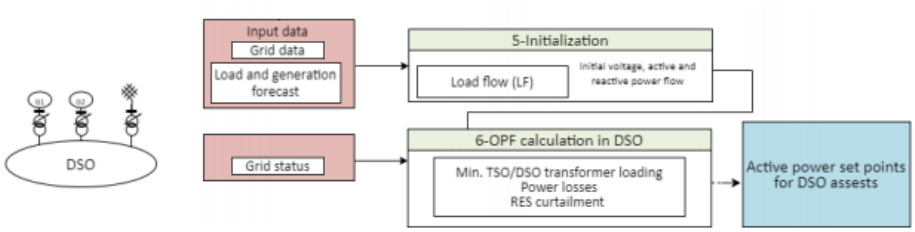
Actors:

- DSO

Controllable units:

- Storage
- RES

Context diagram:



Description:

Step1: Grid model is initialized in PowerFactory.

Step2: Load flow is performed in order to evaluate the grid state at a given time step.

Step3: OPF is performed to find the best possible solution, considering given objectives and their weights (minimize losses, maximize RES utilization and minimize power exchange with TSO).

Project duration

1 November 2017 - 31 January 2021

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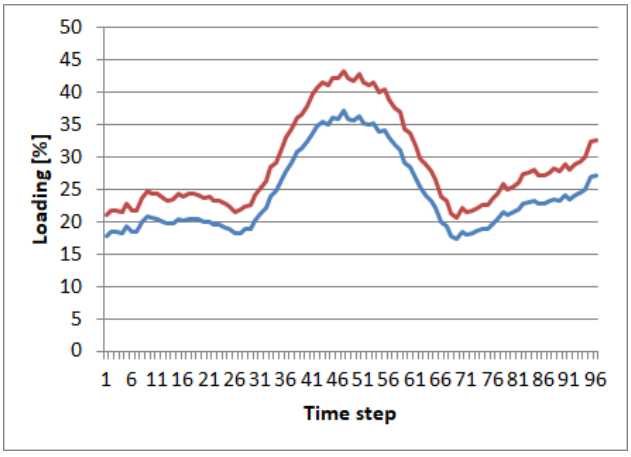
The key results of implementing use case 5 control functions:

TSO/DSO transformer loading:

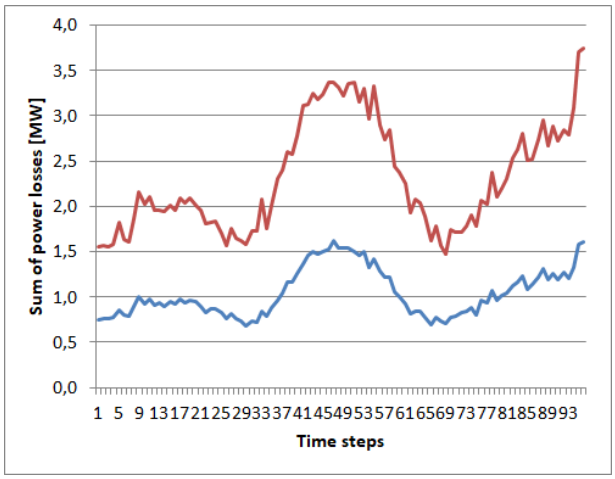
- This diagram presents the level of TSO/DSO transformer loading without use case 5 control function (red curve) and with the presence of control function (blue curve).



- The simulation is performed for the time range of 24h with the resolution of 15 min (96 time steps). As the curves show, in all of the time steps the TSO/DSO transformer loading has decreased.

Power losses:

- This diagram presents the sum of power losses without use case 5 control function (red curve) and with the presence of control function (blue curve).



- The simulation is performed as mentioned above. As the curves show, the use case 5 control function significantly reduces active power losses in the distribution system.

INTERPLAN Tool Use Case 5:

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