INTERPLAN

INTEgrated opeRation PLANning tool towards the pan-European network

Transforming Grid Operation Planning

# Use Case 3: Provision of frequency tertiary reserve based on coordinated TSO-DSO active power optimization

**Objective:** Improving the frequency stability through optimised allocation of frequency tertiary reserve.

**Network operation planning criteria:** Minimising the losses, maximising the share of RES, Optimising the TSO-DSO interaction, maximising the DRES/ DG contribution to ancillary services.

**Use case solution:** Optimised planning (for the next 24 hours) of active power distribution at both transmission and distribution levels with a focus on TSO-DSO collaboration and by involving as much as possible the flexible RES available at both transmission and distribution levels as well as demand side management.

**Operation challenge:**

- Frequency stability

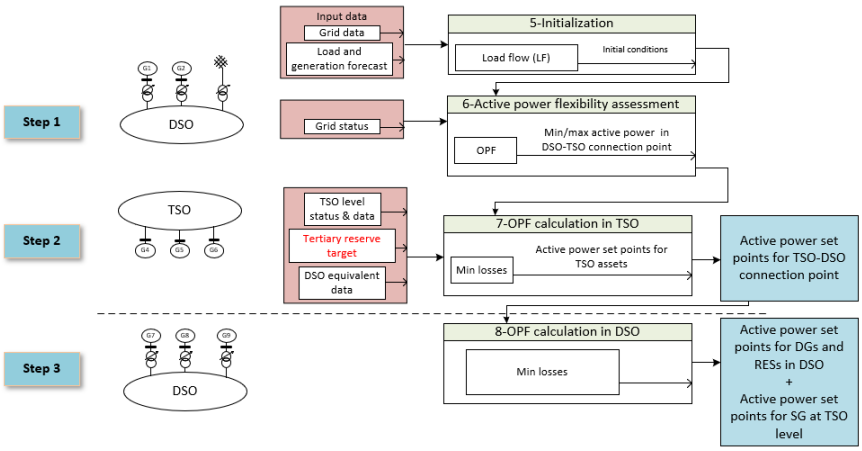
**Actors:**

- TSO
- DSO
- Aggregator

**Controllable units:**

- Synchronous generators
- DRES and DG
- Flexible loads

**Context diagram:**




**Description:**

Step1: The DSO, having an equivalent model for transmission network, identifies the maximum and minimum available active power for the points of common coupling.

Step2: Considering the required tertiary reserve for the moment of simulation and having an equivalent model for distribution network, the TSO identifies the active power set points for the points of common coupling and the TSO generation units.

Step3: The DSO with regards to the identified set points from step2, calculates the set points for the remaining controllable units i.e. generators and controllable loads at DSO level through solving multi-objective optimisation problem (minimising the losses, maximising the share of RES, etc.).

Use case developer: Ata Khavari (ata.khavari@der-lab.net)

Project duration

1 November 2017 - 31 January 2021

Contact

interplan-project.eu

Giorgio Graditi (Project Coordinator)
giorgio.graditi@enea.it

contact@interplan-project.eu

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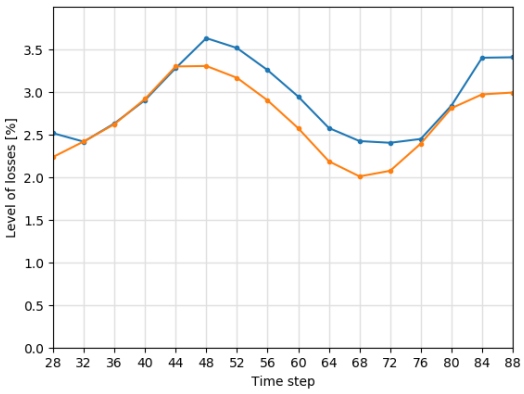
## The key results of implementing use case 3 control functions:

**Level of losses in transmission and distribution networks:**

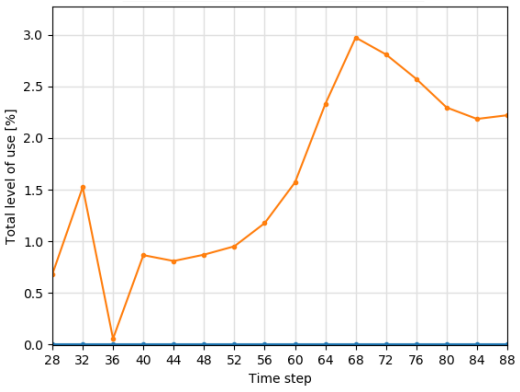
- This diagram presents the level of active power losses without use case 3 control function (blue curve) and with the presence of control function (orange curve).




- The simulation is performed for the time range of 7:00 to 22:00 with the resolution of one hour. As the curves show, in most of the time steps the active power losses are decreased (maximum 0.5%).

**Level of distributed RES participation in ancillary services (provision of tertiary reserve):**

- This diagram presents the level of distributed RES utilisation in ancillary services without use case 3 control function (blue curve) and with the presence of control function (orange curve).




- The simulation is performed as mentioned above. As the curves show, the use case 3 control function is able to involve the renewable energy sources available in the distribution level in providing tertiary reserve and supporting the TSO in ensuring the frequency stability of the system.

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