Synchronous Condenser in Canarias

November 2023

Synchronous Condensers technical capacities

- A synchronous condenser is a DC-excited synchronous machine (large rotating generator) whose shaft is not attached to any driving equipment.

- This device provides mainly:

  - **Improved voltage regulation**

  - **Additional short-circuit strength**: it provides real short-circuit strength to the grid, which improves system stability with weak interconnections and enhances system protection.

  - **System inertia**: Inertia is an inherent feature of a synchronous condenser as it is a rotating machine. Limits ROCOF. Inertia provided depends on if a fly-wheel is added to the synchronous condenser

- The first two have a local focus (Depend on the ubication) and a global the third.

- In conventional power plants, the turbine-driven generator can be decoupled from the turbine by a clutch and operate as a synchronous condenser. This solution ensures maximum operating flexibility and economical efficiency by making two operating modes possible:

  - Power mode (turbine engaged);
  - and Synchronous Condenser mode (turbine disengaged).

New regulation for Access & connection and voltage control to the grid in Spain and Synchronous Condensers

- New regulation for Access & connection in Spain from 2021 (1) changed the way short circuit power ratio is considered as a criteria to award access to the grid to non-synchronous generation and regulated the way these generators can provide short circuit power by adding synchronous condenser in their generation projects.

- Besides, it is ongoing the definition of local voltage control markets. In fact, a sandbox was launched in 2022 in order to get a fine tuning of the regulation (2)

- Therefore, many solar pv and wind projects are adding synchronous condensers as it makes economic sense because the investment allows getting access to the grid and might provide in the future additional revenues in voltage markets. Additionally, it makes easier the accomplishment of network codes.

- **This means investment in synchronous condenser by generators is already happening based on market signals**

(1) Resolución de 20 de mayo de 2021, de la Comisión Nacional de los Mercados y la Competencia, por la que se establecen las especificaciones de detalle para la determinación de la capacidad de acceso de generación a la red de transporte y a las redes de distribución.
(2) https://www.cnmc.es/prensa/DCOOR-sandbox-20220808

The particular situation of Canarias

- Because there is a problem of supply security in Canarias, tenders to award new licenses for conventional generation are being organized.
  - These new generation will be able to provide short circuit power and voltage control capabilities.
  - Besides this generation can include a clutch to work just as a synchronous condenser when needed making possible the maximization of renewable generation integration
  - Conventional plants that are closing could be converted to synchronous condensers with less specific investment
- Under the Recovery Fund, aid is being provided to new renewable generation in the Islands.
  - These aids consider specific technical capacities as awarding criteria . Is enough valuing the inclusion of synchronous condenser in theses pv or wind plants to get the capacities needed in the island.

- The decision about the Synchronous condensers assigned to the TSO in the Spanish Islands should wait to the allocation of new generation capacity and after that analysing if it is still necessary
- Otherwise the investment could turn inefficient