

Study Committee C2 Power System Operation & Control

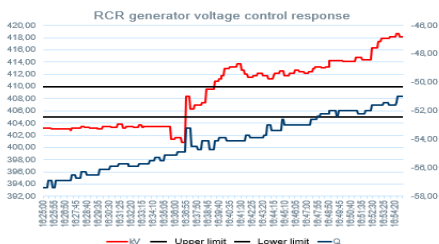
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NEW VOLTAGE CONTROL SERVICE AND VOLTAIREE PROJECT

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Motivation

Nowadays, renewable, cogeneration and waste generation depend fix power factor ranges so its reactive output does not depend on voltage:



This control is not enough to guarantee the security of the Spanish electrical system because it has evolved becoming more capacitive and variable due mainly to the increase of renewable generation and power transfers with neighbouring TSOs.

That is why RE has designed VOLTAIREE, a new automatic scheme which sends voltage, reactive or power factor set points to service providers in real time.

VOLTAIREE Methodology

VOLTAIREE comprises an Optimized Voltage Regulation (OVR) and a Secondary Voltage Regulation (SVR) which operate in adjacent timescales to improve its performance and stability when facing system perturbances.



The OVR aims to maintain pilot nodes voltage inside an appropriate range by running an Optimal Power Flow (OPF) on the real time network state estimation.

The SVR is based on a PI control in charge of minimizing the difference between the voltage setpoint calculated by the OVR and the voltage measure of every transmission substation.



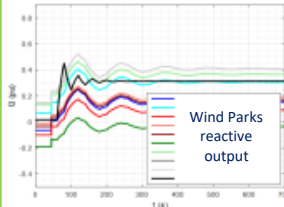
Finally, the SVR can transform the voltage setpoint in BC into a reactive or power factor setpoint if needed, taking in consideration active power and voltage real time measures.

Objects of Investigation

- OVR and SVR
- Proportional voltage control of the service provider
- Reactive capacity zonal markets

Experimental setup & test results

• THIRTIES I+D project: Simulations

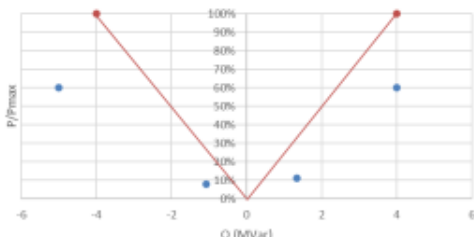


The simulations show how several wind parks respond to voltage setpoints and voltage measures in their bars. These response has an impact in the transmission grid and is correctly damped.

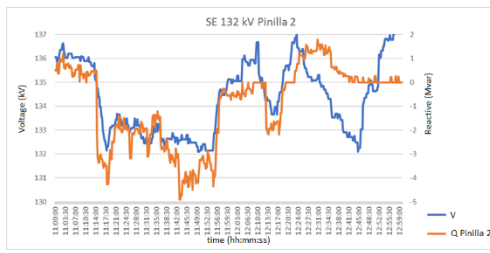
• COORDINET I+D project: Test field results

Qualification tests for the reactive capacity market show the relevant additional reactive capacity which could be integrated to the system. Also, how the response is stable, and the settling time is less than 1 minute.

P-Q curve Pinilla 2



Furthermore, qualification tests show voltage is coherent with the reactive power output.



Conclusion

- A new voltage control service based on real time setpoints is a need for the Spanish electrical system.
- Most providers can follow these setpoints thanks of a relatively small investment in its control system.
- RE has designed a reactive capacity zonal market so providers monetize their investments under competitive conditions.
- RE has launched VOLTAIREE and a new operational procedure 7.4 to support the new voltage control service.