

# **RED ELÉCTRICA** DE ESPAÑA

## BENEFITS FROM PARTICIPATION OF RENEWABLES IN SYSTEM BALANCING

**Session 4: Smart Renewable** 

**ESAP IEA** 

SCARCITY, FLEXIBILITY PRICING AND DSM

July 2014



CONTROL SERVICES AND NON MANAGEABLE GENERATION





## **CONTROL SERVICES NOWADAYS**

### <u>1st Steep: Observability and Controllability</u>





#### **Frequency control**

> Wind farms adapt their production to the given set-point within 15 minutes





## CONTROL SERVICES NOWADAYS

#### Voltage control





# CONTROL SERVICES: LAST RESULTS

#### Inside the framework of the Demo 1 of the TWENTIES project

- Demos:
  - 1.1. Voltage Control/Reactive power regulation
  - 1.2. Active power regulation
- Main objective:

On-site test of system control services provided by wind generation, based on new operation strategies using improved systems, devices and tools.





## CONTROL SERVICES: LAST RESULTS DYNAMIC VOLTAGE CONTROL





## CONTROL SERVICES: LAST RESULTS DYNAMIC VOLTAGE CONTROL

#### Wide-Area Voltage tests





## CONTROL SERVICES: LAST RESULTS FREQUENCY CONTROL







## CONTROL SERVICES: LAST RESULTS FREQUENCY CONTROL

#### **Description of the test**





### CONTROL SERVICES: LAST RESULTS FREQUENCY CONTROL

#### Secondary frequency control tests



# CONTROL SERVICES: CONCLUSIONS

#### Wind farms are able to:

- Work coordinately in order to control the voltage in the point of common coupling in the transmission grid, by means of a coordinated control with the SO. They can manage the voltage profile in a 400 kV corridor.
- Control their active power output in real time and in a coordinated way, complying the secondary frequency regulation requirements (PSR) given by the SO.

#### Cost:

- > The additional technology that was used to provide this services have a low cost (lost of profit aside), because the innovation lies in the development of new control algorithms and the deployment of more powerful communication.
- According to the analysis of the forecast system, the more wind farms are grouped and the shorter the forecast period is, the smaller is the amount of energy that has to be spilled.

#### Active power control: Conditions for a high economic impact:

- Systems in which up and down reserve constraints highly condition the resulting generation scheduling.
  - > High share of technologies that do not provide active power control (nuclear, other RES).
  - **Low share of flexible generating sources, such as pumped storage hydro plants.**



### **THANKS FOR YOUR ATTENTION!**

