i-EM

SUCCESS STORY

Regional Wind Forecast
Terna

W-em
WIND ENERGY MANAGEMENT

Optimize Wind Asset Performance with W-EM

LOCATION

Europe | Italy

KEY SOLUTION

W-EM Wind Energy Management

BENEFIT

Provision to Terna of wind forecast service, for market zone and for relevant wind farm in Italy.

BACKGROUND

The uncertainty of the green energy

Renewable Energy (RE) sources are expanding worldwide, characterizing more and more year after year the power generation in our power systems. However, the nature of REs is stochastic and uncertain because they hardly depend on the future weather conditions; the wind (WD) power generation is the most intermittent energy source among REs, and it represents the 6-7% (2019) of the total energy produced in Italy, and the 5.2% (2019) of share of electricity supply in the world. This uncertainty related to the REs may undermine the stability and the efficiency of the power systems and the grid; consequently, there is an increasing need of implement smart procedures and tools to manage these kinds of sources with their stochastic nature.

CHALLENGE

Maintain the stability of the Grid

The Transmission System Operators (such as Terna in Italy) are the ones in charge to monitor and preserve the stability of the power systems. In order to do that, they need to forecast the future power generation from RE sources, to:

- Correctly manage the energy reserve
- Reduce grid cost investments
- Implement a functional unit-commitment activity

In this context, in Italy, the market zones play a crucial role: these geographical areas represent the spatial aggregation on which the Italian electricity market is based, and the regions of interest of the Italian TSO dispatchment and the unit commitment activities.

The i-EM wind power generation forecast solution

i-EM provides a service to Italian TSO Terna to efficiently forecast the future power generation from WD plants in the whole country, with the spatial aggregation level of the market zones, as required by the dispatch market and the system management, and for single relevant wind farm (also called relevant units).

The i-EM solution is a combination of multiple approaches and methods. The algorithms for the market zones are based on the spatial input features, and directly produce the regional power prediction from the WD plants of each market zone. The focusing on the main relevant wind farms of the country, the service is a combination of machine learning and deterministic models. It processes the meteorological data together with the plant technical specifications and finally gets the future power generation of the single plant, for each wind farm unit considered.

Then, the final regional power prediction can be obtained by combining the output of the two approaches, with the so called "ensemble technique", which foster the strength of each approach to improve the final accuracy. The forecast data are provided 6 times each day, with a time horizon of 4 days ahead (it can be extended or adapted if needed).

CUSTOMER QUOTE

i-EM forecasts help our systems for managing the stability of the grid, with respect to the unpredictability of the wind resource fed into the grid.

Market and System Planning,
Dispatching Department Operator
Terna

Terna
Driving Energy

Find more at **i-em.eu**