

Title of project

Aggregation, Linking, Integration, Evaluation and Forecasting of Distributed Energy Resources in Wholesale and Local Markets (ALIVE_DER)

Teams

Subproject 1.

Leader: Carlos M. Álvarez Bel

Co-leader: Manuel Alcázar Ortega

Subproject title: Aggregation, Linking, Integration, Evaluation and Forecasting of Distributed Energy Resources and Demand in Local Energy Markets

Subproject 2:

Leader: Antonio Gabaldón

Co-leader: María Carmen Ruiz-Abellón

Subproject title: Aggregation, Linkage, Evaluation and Forecasting of Distributed Energy Resources in Markets and Services

Subproject 3:

Leader: Luis Alfredo Fernández-Jimenez

Subproject title: New Forecasting Models for Aggregation, Linking and Integration of Distributed Resources in Energy Markets

Summary

Future Power Systems need to be more flexible and innovative on the demand side (DS) if the "controllable" generation mix is going to decrease while the share of renewables (RES) grows (according to EC forecasts for the energy horizon 2030-50). If more flexibility is not achieved through Demand Response (DR), Energy Efficiency (EE) and Storage Systems (ESS), neither the objectives of RES integration, nor the energy sustainability policy of the UE will be credible, at least from the points of view of efficiency, reliability, and network security.

The new design of the EU internal energy market is focused on the empowerment of the consumer, and this requires its active participation through the development of new products and a greater relationship between wholesale, retail and local energy markets. Some barriers have been broken down or will disappear, such as a different consideration and revenue for DER and conventional generation resources, if and only if DER resources demonstrate similar capacities. To do this, the EU needs to overcome legislative and technological delays with the USA and other countries (e.g., the figures of DR potential). It is remarkable in this subproject 2 the consideration of small and medium users in the proposal, because they explain more than 50% of energy consumption.

Promoting DER resources means the consideration of the aggregation of demand and energy storage; new more efficient loads and ways of controlling them; the improvement of short-term forecasting (demand, prices and RES); the consideration of "prosumers" and a greater use of ICTs deployed for monitoring and control tasks in Power Systems. From an economic point of view, the viability of DER needs the engagement of customer in new products beyond the traditional options that allow more stable and substantial revenue (capacity or availability fees) at several levels (transmission and distribution). These factors can enhance the economic viability of DER.

Demonstrate that technical capacities of DER resources are comparable to generation, can help to integrate DER, but it is necessary to develop and validate models for very different uses, time horizons and levels of aggregation. Models focused both on wholesale markets, and in local markets. Models able to consider balance and network restrictions (including the distribution level). In other words, a different point of view of Power Systems.

The key idea of the subproject 2 in the coordinated proposal (ALIVE-DER) is to take advantage of the experience of the UPCT research groups in: DR; non-invasive monitoring; short-term forecasting; aggregation of models; development of economic models; actual and future markets, developing, adapting, enhancing and integrating models for demand forecasting and RES; physically based models for loads and ESS elements; and creating common structures (replicable) and recognizable inputs and outputs (i.e. to be included in other tools), and the necessary feedback (linkage) between them, depending on the application. These ideas can build a macrostructure that can help in several task: qualification, verification and evaluation of DER, both in simple or complex products (markets) that will be proposed or redesigned in the future.