HOW TO GUARANTEE THE LONG-TERM CAPACITY OF THE ELECTRICITY GRID?

1. Background to the Challenge

The electricity system is the backbone of modern society[1]. Basically, it is the critical infrastructure on which almost all other systems or economic sectors depend in their day-to-day operations.

The decarbonization of our society, of our energy model, implies the electrification of many energy consuming sectors and, with it, the integration of renewable electricity generation technologies. This distributed generation increasingly requires a stable, robust and at the same time flexible operation of the electricity grid, which in turn implies new and larger investments[2].

As a result, **grid management in the foreseeable scenarios** of intensive integration of renewable generation, self-consumption and storage, together with the electrification of industrial processes and new demands (electric mobility, heat pumps, data centers, etc.), **is evolving from a traditional model of grid capacity management**, based on simultaneity coefficients and quasi-vegetative growth in demand, towards the DSO (Distribution System Operator) model, with increasingly complex proactive management to **optimize the capacity of its regulated assets**.

The DSO needs to successfully plan and operate a **system of flexible accesses to the grid with new tools** that, based on its knowledge of regulated activity, technology, data available on the smart grid for accurate knowledge of changes in electricity delivery and demand, **can better forecast electricity flows** on the grid.

This context requires improved decision-making on the investments to be made and, given the timeframes for the processing and development of these infrastructures, to achieve the necessary grid capacity in time, modernizing the electricity demand forecasting processes, based on the data available from the smart grid and other forecasting sources that can complement them.

The **improvement of grid planning processes** seeks an updated methodology to generate net demand cases (consumption and distributed generation) in scenarios of energy uncertainty, with the support of advanced artificial intelligence techniques and new analysis and calculation tools, applied on **their available data** (*deep learning)*, through guided learning and validation models, on recorded cases or their foreseeable variants.

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[1] Modern legislation establishes the essential nature and general interest of electricity supply for society. In this sense, the Spanish regulation for the distribution agent establishes, among its main obligations, *"to guarantee that its grid has the capacity to assume a reasonable demand for electricity distribution in the long term..."* (art. 40.1.b Law 24/2013 of the Electricity Sector).

[2] In Spain, the 2023 update of the PNIEC 2021-2030 anticipates until 2030 the incorporation of 102.5 GW RES (35 wind, 65 PV and 2.5 TS); 19 GW of self-consumption; 18.5 GW in storage; 11 GW of power consumption in electrolyzers; 1.5 million heat pumps; and 5.5 million electric vehicles (3.2 GW through 120,000 charging points).

2.   Description of the Challenge

In this context, Iberdrola, through its PERSEO Start-up Program, is seeking digital solutions to model new demand and generation scenarios on its grid, with self-consumption, storage and access flexibility, in order to forecast its operational behavior and, with this, plan its investments to guarantee the capacity of this grid, assuming a reasonable demand for electricity distribution, in a time horizon of between five and ten years.

Among others, these scenarios must take into account the evolution and geolocation of:

- Current electricity demand and generation and self-consumption

- Electricity storage (domestic, industrial, utility, bess...)

- New emerging demands (short term): electric mobility, heating and cooling, decarbonization of current industrial processes, etc.

- New medium and long-term demands: digital electrification, new consumption and generations associated with technological developments and/or emerging business models (e.g. artificial intelligence, e-fuels, green hydrogen, etc.)

In this way, solutions will be favorably rated that allow:

- Proposing automatic learning methods or algorithms to generate and validate medium/long-term scenarios for the planning of grid needs based on expected demands with different levels of granularity, foreseeing that the data from the actual network operation will, in turn, allow the information system to be supplied in order to use predictive models.

- Application of these algorithms against current simulations, based on historical data, and simulations with predictive models, including parameterization based on existing and public economic, industrial, sustainability, administrative factors and other factors.

- Analyzing the necessary additional geo-referenced capacity of the grid with different levels of granularity, as well as the best use of existing capacity with the available flexibility.

- Identifying other relevant data that is not being captured, in addition to the current state of digitalization of the grid, which includes everything from smart meters to the control of primary and secondary substations (LV transformation centers).

- Quantifying the necessary investments in the distribution grid in the different scenarios and their probability, in terms of the necessary infrastructure and their cost, introducing a cost-benefit type assessment or analysis.

3.   The prize

The prize will consist of a collaboration and test agreement with PERSEO or any other Group company, which will bear the cost of these activities and **provide the winner with all necessary technical support,** as well as an **environment and real data to test the solution,** providing access to equipment, teams, infrastructure, high technology sites and shared work areas. **The project will be developed in collaboration with technical specialists from the Iberdrola Network area.**

It will also be included directly in the **Global Smart Grids Innovation Hub** registration process, as a collaborator able to benefit from the services, activities and resources that the GSGI Hub makes available.

If the trial or test of the concept is satisfactory, **Iberdrola may offer the winner the opportunity to scale up the solution,** adopting it by means of commercial agreements. What's more, PERSEO will consider investing in the participating company and/or the winner of the challenge.

FAQS

What is GSGIHub?

The challenge is launched within the framework of the new **Global Smart Grids Innovation Hub**. Iberdrola will make the Hub a worldwide smart grid benchmark through open collaboration and co-working between i-DE technicians, suppliers, start-ups and different organisations from all around the world.

Why are Iberdrola and Perseo the right partners for my company?

Iberdrola is no stranger to working with start-ups and emerging companies: in the last two years, the Group has launched more than 22 Start-up Challenges to address pressing issues in today's energy grids.

Working with Iberdrola presents a unique opportunity: winning this Challenge will reward you with the signing of a collaboration agreement for the development of a Proof of Concept (PoC). The PoC will be developed in collaboration with the technical Grid specialists. In addition, PERSEO covers the costs of the pilot activities and provides you with the necessary technical support, giving you access to real infrastructures and data to test your solution. Finally, PERSEO may consider investing in your solution!

What are the key benefits of the challenge for me?

- o Collaboration Agreement and Pilot Test: The prize for the winner consists of a collaboration and test agreement with PERSEO or any other company of the Iberdrola group. The group will bear the cost of pilot activities.
- o Access to all areas: Iberdrola will provide the winner with all necessary technical support, as well as a site and real data to test the solution. This includes access to equipment, hardware, infrastructure, high-tech sites and shared work areas.

o Scale your technology: If the pilot test is successful, Iberdrola may offer the winner the opportunity to scale the solution by adapting it through commercial agreements.

o Investment: In addition, PERSEO will consider investing in the participating company and/or the winner of the challenge.

Who will analyze the proposals?

The team of experts from Iberdrola's grid business will be responsible for selecting the innovative solution or solutions, or the creation of a specific strategic alliance that will help accelerate the launch of new initiatives linked to the prediction of net electricity demand over planned grid capacity, in the context of the energy transition.

How will applications be assessed?

When assessing your proposals, Iberdrola will consider, among others, the following value propositions:

- The maturity, reliability and scalability of the solution.
- The simplicity of maintaining the scenario generation methodology based on public and verifiable information.
- Integration with current monitoring systems.
- The total cost, both initial and recurrent.
- Additional uses that can be made of the technology used.

Who can participate in the challenge?

Entrepreneurs, start-ups, researchers, specialists and innovators able to scale up their solutions and negotiate partnerships and commercial contracts together with a company with global reach.

Can I submit more than one proposal?

You are welcome to submit more than one proposal, just make sure to submit one application form per proposal.

In case of questions that are not listed here or for more information, who should I contact?

Sending an email directly to the following account: IberdrolaChallenge@iberdrola.es