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# European Research Infrastructure supporting Smart Grid Systems Technology Development, Validation and Roll Out

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## TRANSNATIONAL ACCESS PROVISION

### RESEARCH INFRASTRUCTURE DESCRIPTION AND TRANSNATIONAL ACCESS CONDITIONS

# ORMAZABAL Corporate Technology



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Project Duration:	<b>54 month</b>

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## 1 Research Infrastructure

Name of Infrastructure/Installation	<b>Demonstration &amp; Experimentation Unit (UDEX)</b>
Location	ORMAZABAL Corporate Technology, Amorebieta, Spain
Web Site	<a href="http://www.ormazabal.com/en/about-us/our-own-technology/technological-innovation-center">http://www.ormazabal.com/en/about-us/our-own-technology/technological-innovation-center</a>

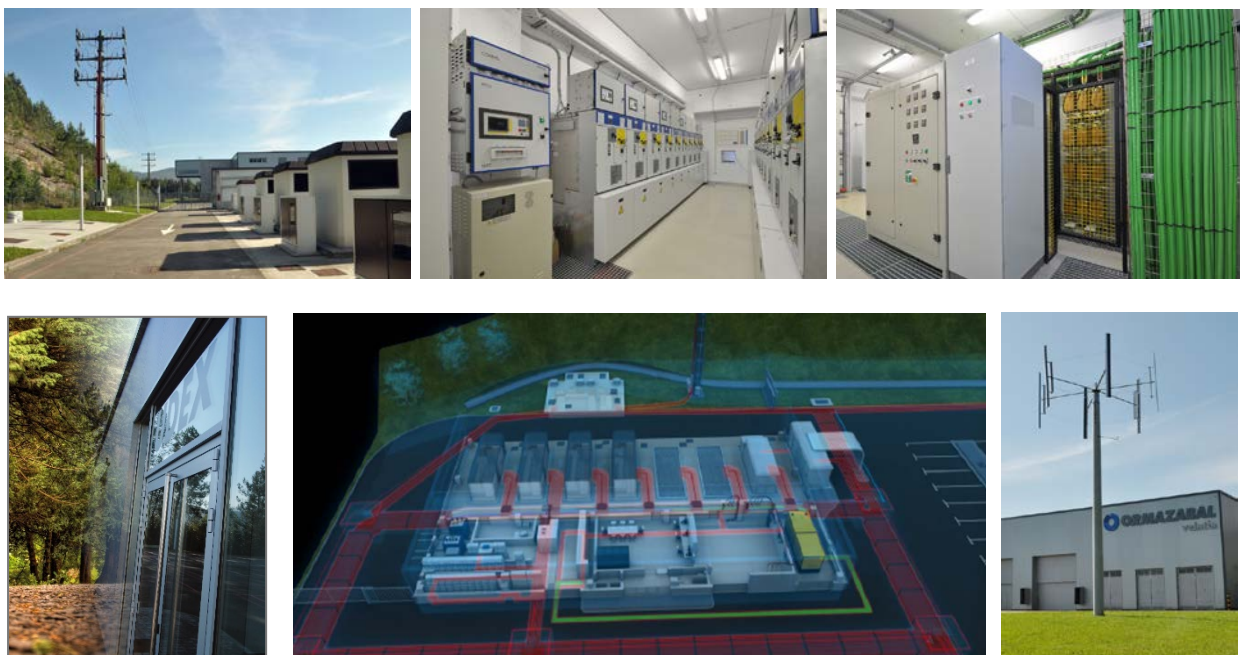
## 2 Description of the Research Infrastructure

**Demonstration and Experimentation Unit (UDEX)**, consists of an Experimental Grid designed as a platform to research, develop and verify equipment and systems in a real grid in a non-risk environment: 3500 m<sup>2</sup> real-time experimentation network with over 15 km of underground cable and 450 m of overhead line.

This configurable autonomous grid permits the reproduction of normal conditions and anomalous situations to produce real medium voltage operating conditions independent from the grid and at different power frequencies.

The main purpose of the UDEX is to facilitate access to a smart grid network having a high degree of flexibility, independent of the utility network, for the development and testing of new technologies. It is able to reproduce real conditions of existing worldwide grid topologies at different voltage levels and at different power frequencies.

The UDEX management system (UMS) controls the operation of the infrastructure to run according to a certain strategy, physically connects/disconnects the elements, and changes the network topology, by means of fully automated operation. The facility allows the research and development of the connection, integration and validation of new technologies, assessment of the impact on the network, and the investigation of operation of the complete network.



In addition, in the UDEX there are five special test cases with singular capabilities in the specific fields of voltage regulation, MV network compatibility, network diagnosis, powerline communications, and smart metering:

- **Regulation of network voltages to maintain quality of supply affected by integration of renewables and/or significant intermittent loads:** Functional validation of MV/LV voltage regulating systems (e.g. on-load automatic tap changer) in real MV network environment, with different MV Network Configurations and voltage levels - including Neutral configuration, Power Frequency (50-60Hz) MV Network Voltage Level (0-36kV)-.
- **Validation of correct functioning of IED systems in a real network in the face of transient overvoltages / overcurrents occurring during typical switching operations in the MV network:** Functional validation of IED's in real network environment tested with different MV Network Operations, especially during and after transients occurring during network switching. Neutral configuration, Power Frequency (50-60Hz), MV Network Voltage Level (0-36kV) are can be controllable parameters.
- **Asset management of network and its components through online technologies:** Functional validation of network diagnostic equipment and systems, from simple detection devices to complete monitoring systems, in real MV network environment. Especially focused on validation of systems to do all or some of the following: Detection, analysis, identification, localization and evaluation of defects arising from PD sources and the communication of this data to supervision interface. Network and neutral configuration, Power Frequency (50-60Hz), MV Network Voltage Level (0-36kV), Measurement Bandwidth, defect type and location being controllable parameters to perform the assessment of the system.
- **Testing of functional compatibility of combined sensors with MV & PLC signal measurements in the Medium Voltage Networks:** Simultaneous Compliance of Precision & communications performance of combined sensors, using a real distribution network with different components under test (Combined sensors, RTU, PLC modems, measurement cables, MV Network Configurations). Network and neutral configuration, Power Frequency (50-60Hz), MV Network Voltage Level (0-36kV), and Communications Bandwidth can be controllable parameters.
- **Testing of functional narrowband powerline communications in distribution networks:** Compliance with communications performance requirements, using a real distribution network with different components under test (PLC modems/Data concentrators, Meters, Network Configurations, MV/LV Transformers, Switchgears, Sniffers). Network and neutral configuration, Power Frequency (50-60Hz), MV Network Voltage Level (0-36kV), and Communications Bandwidth can be controllable parameters. This system allows also to change the length and type of the LV lines and network topology, the number and type of meters, in such a way that not only individual meters can be tested but also entire meter systems and the interoperability performance.



### 3 Services offered by the Research Infrastructure



Important tool for the research, development and evaluation of new technologies for the future grid and for anticipating problems, which may appear under the most realistic conditions.

UDEX's concept consists of a highly configurable distribution network independent from the grid which allows the development and testing of new technologies, products & services in a safe and controlled environment, positioning Ormazabal at the high-end of world-class R&D capabilities, providing the following services (but not limited to):



- Electrical protections and network automation.
- Network diagnostic systems.
- Power Line Communications (PLC).
- AMI (Advanced Metering Infrastructures)
- Active demand management.
- Integration of distributed and renewable generation in the grid.
- Bidirectional power flow.
- Dynamic configuration of the distribution network.
- Electric vehicle integration in the distribution network.
- Integration of energy storage systems.
- Power electronics.
- Power quality and efficiency.
- Impact on the safety (EMF, step and touch voltages, short circuit behaviour)





#### 4 Brief description of the organization managing the Research Infrastructure

From the time Ormazabal was founded in 1967, we have been aware of the strategic importance of research applied to own technological development, and in this way offer quality products and services to the customers and consolidate the leading position in the world's technology sector.

The Research and Technology Center, managed by Ormazabal Corporate Technology (OCT), represents an important leap in the company's track record; a project that has long been desired and aspires to become a technical reference at an international level, in the field of electrical power distribution networks.

The Research and Technology Center becomes an essential element in R&D projects, with the purpose of acquiring and improving existing technologies and researching new ones.

OCT's facilities offer their services to the technological scientific sector for performing research testing and for developing and type testing products the electrical sector.

Ormazabal is very active in national and international recognized electrical product and services for the distribution networks relevant for ERIGrid, contributing to the development of common visions, roadmaps and strategies for the energy sector and having an excellent perspective and vision of the future challenges. This networking structure is complemented by a large experience in national and international research projects based on the research and technology development capabilities of OCT. In addition to the UDEX infrastructure offered in ERIGrid, OCT has a high power laboratory, a high voltage laboratory and a low voltage laboratory for equipment testing, being an accredited laboratory according to EN ISO/IEC 17025 for many testing activities.

#### 5 Transnational Access conditions offered by OCT

All the offered experimental systems included in the UDEX are located in the research and technology center of ORMAZABAL Corporate Technology in Boroa (Amorebieta-Etxano), near Bilbao, Spain.

For **safety reasons**, for **critical applications**, the users are not expected to operate the systems by themselves; even when safety instructions will be provided, tests will be carried out by staff of OCT. For **the rest of applications** and after ad-hoc training, the user group will have full access to the related facilities for the duration of the stay (with the support of OCT's researchers and laboratory technicians when necessary). The **scheduling of the experiments** will be agreed and booked prior to the stay according to the availability of the involved staff and equipment.

Administrative documentation for the access (contract, non-disclosure agreement, etc.) will comply with ERIGrid common indications.

In addition to the general corporate services (Internet connection, canteen, etc.) and the support and advice on accommodation and transportation to OCT's infrastructure, the access being offered includes supervision and help of OCT's staff:

- As a complement to the pre-access contacts between the user group and OCT, the stay will start with an introductory meeting with a senior researcher for confirming the stay conditions (confidentiality, safety indications), scheduling the activities, explaining the on-site procedures, clarifying the logistics and technical details.
- Preparatory work: a laboratory technician will assist the users for the installation of the devices, electrical connections, use of the specific instrumentation, preparation of a test procedure (if necessary) on the basis of the user's requests, and programming of the experimental conditions.
- OCT's researchers will support the realisation and follow-up of the experiments.
- OCT's researchers will support the results interpretation, data processing and analysis, and test report preparation

In principle, a typical stay of 1 month is foreseen for a single user group but this period could be extended depending on the concrete user project. The user group (usually 2 persons) can use the infrastructure for the defined time.

#### Reimbursement of expenses:

User expenses for the Transnational Access are paid by ERIGrid (EU H2020 Programme). This includes travels to UDEX (OCT) by plane, accommodation, daily subsistence, and daily transportation during the stay.

For the user projects taking place in UDEX, OCT will refund the stay expenses when the stay is finished: the user must declare the incurred expenses and present the invoices/receipts to OCT in order to get the refund.

Logical expenses must be made by the user: travels will be made in economy class and conventional hotels (not luxury) or equivalent accommodation will be used. As an indication (it is not a daily allowance), a maximum subsistence fee of 160 €/person must be considered per day.

## 6 Contact details for Research Infrastructure

<b>ORMAZABAL Corporate Technology (OCT)</b> Address: Parque Empresarial Boroa · parcela 24. 48340 Amorebieta-Etxano. Bizkaia (Spain) Website: <a href="http://www.ormazabal.com/en/about-us/our-own-technology/technological-innovation-center">http://www.ormazabal.com/en/about-us/our-own-technology/technological-innovation-center</a>			
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