

## TRANSNATIONAL ACCESS USER PROJECT FACT SHEET

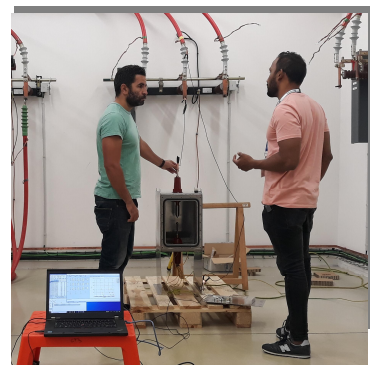
| USER PROJECT             |   |
|--------------------------|---|
| <b>Acronym</b>           | LCA   |
| <b>Title</b>             | Evaluation of non-conventional sensor technologies for use in medium voltage dry-air gas insulated switchgear |
| <b>ERIGrid Reference</b> | 06.008-2019   |
| <b>TA Call No.</b>       | 6   |

| HOST RESEARCH INFRASTRUCTURE |                                       |                          |    |
|------------------------------|---------------------------------------|--------------------------|----|
| <b>Name</b>                  | UDEX (Ormazabal Corporate Technology) |                          |    |
| <b>Country</b>               | Spain                                 |                          |    |
| <b>Start date</b>            | 10/09/2019                            | <b>Nº of Access days</b> | 19 |
| <b>End date</b>              | 04/10/2019                            | <b>Nº of Stay days</b>   | 25 |

| USER GROUP                   |                 |
|------------------------------|-----------------|
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| <b>Organization (Leader)</b> | Nuventura GmbH  |
| <b>Country (Leader)</b>      | Germany         |
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| <b>Country</b>               | Germany         |
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## 1. USER PROJECT SUMMARY (objectives, set-up, methodology, approach, motivation)

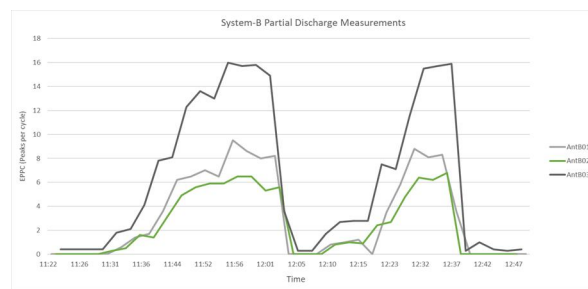
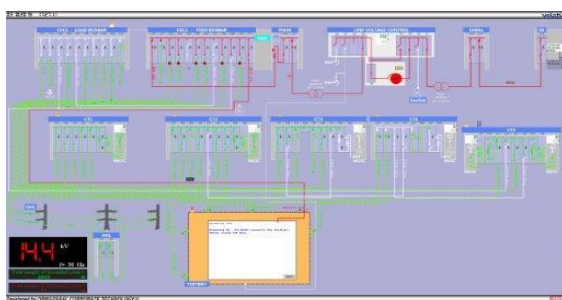
Nuventura has developed a medium voltage (MV) gas insulated switchgear (GIS) in accordance with IEC 62271-100 and -200 standards that uses dry air as an insulating medium. The use of dry air completely eliminates the environmental concerns surrounding SF<sub>6</sub> use and will enable the industry in transitioning to meet Europe's ambitious climate goals. An additional advantage of using dry air is that sensor solutions can be integrated within the GIS core vessel at manufacturing enabling real-time monitoring of critical asset health and providing operators with benefits such as lower maintenance costs, reduced risk of failures and improved asset management. Asset management one of the key strategies identified within Europe and globally for electricity networks particularly for the physical infrastructure and assets, which are subject to regular maintenance programs.



Lifecycle testing has been carried out in the UDEX laboratory to determine whether it is possible to install non-conventional sensor technology within GIS core vessels to ensure that the sensors can continue to operate in real electrical network conditions and do not adversely impact the switchgear operation or safety. The scope of the testing quantified the functional and non-functional performance of the sensors and antennas after they have been subjected to different stresses commonly seen in MV GIS. The outcome of the testing determined the suitability of sensor systems for integration into the Nuventura GIS and any restrictions or limitations that must be noted for safe operation.

The flexibility of the UDEX laboratory allows for the configuration of a real distribution network fulfilling the requirements of the proposed research areas. The use of climatic chambers, high voltage, high power and IEC 60270 partial discharge measurement systems enabled the testing of sensor solutions against stresses incurred in real distribution networks.

## 2. MAIN ACHIEVEMENTS (results, conclusions, lessons learned)



The Transnational Access has provided Nuventura with free access to a laboratory which would not have been able to easily access or would have required complex co-ordination across multiple paid commercial facilities. The UDEX laboratory has a fully operational distribution network for the purposes of research and Nuventura, being a startup, has benefited from learning crucial features of the suitability of sensors for use within MV GIS.

Principal conclusions from the work carried out are:

- Existing temperature and partial discharge sensors are able to functionally measure even after subjected to stresses seen in MV GIS however the reliability of such products could be improved.
- Non-functional testing has shown that the sensors are able to withstand the harsh conditions in MV GIS such as high temperatures, short circuits and impulse voltages without degrading and creating partial discharge within the switchgear.
- The quality of the sensors could impact whether the MV GIS would pass the type test certification as breakdown could occur before the rated lightning impulse voltage is reached.

Lessons learned:

- While both sensor systems were able to pass non-functional tests, the quality of the temperature sensor design have a large impact on whether they will meet the strict qualification requirements (e.g. IEC62271-200 type tests) to be used in MV GIS.
- Long-term tests under load are required to be able to test the stability of sensors as there are fluctuations that could be missed by performing short-term analysis only.

### **3. PLANNED DISSEMINATION OF RESULTS (journals, conferences, others)**

The work carried out during this transnational access is planned to be presented to the CIRED 2020 conference in Berlin.