Newsletter #5 – June 2021

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Editorial

Insights into the German projects “moew.e”

Ralf Wagenitz
WP7 leader (E.DIS)

We at E.DIS are very happy to have had the opportunity to be a part of the European research project IElectrix. Due to the comparatively large share of renewable energy generation, the German context offers an ideal opportunity to test innovative new technologies in the field.

E.DIS contribution to IElectrix is the conceptualization and development of a mobile battery storage system in a distribution grid and the practical demonstration thereof. This is an important part of the goal of strengthening the creation of local energy communities.

Within the larger framework, the German demonstration has specific goals: the development and demonstration of functions in the area of grid interface communication, i.e. a plug-and-play solution, grid operation, i.e. automatic control algorithms, and a grid planning tool to provide more security in future grid planning.

The mobile battery storage concept put forward by E.DIS fills the gap between grid planning and the grid reinforcement and expansion proper. The temporary deployment of the battery storage system optimizes grid reinforcement measures, facilitates the local use of locally generated renewable energy, and increases energy supply security.

One of the project's main challenges was the tendering and procurement of the battery itself. Coordination with the local authorities for operating permits, and establishing grid and communications connections can be added to the list. Successfully handling all these processes has allowed us to put the battery storage system into service as a prototype and start with tests. The support of our partners in IElectrix have helped make this possible.

As it stands, we are working exactly within the project plan timeframes. We've reached our third milestone and can begin monitoring the battery and our use cases. In such a project, it is critical to keep to the planned schedule. We've managed this so far and thus have created the conditions to provide our partners with all the necessary data from the battery storage system. This is something we can all be proud of.

E.DSO Innovation & Research Commitee

10 June 2021

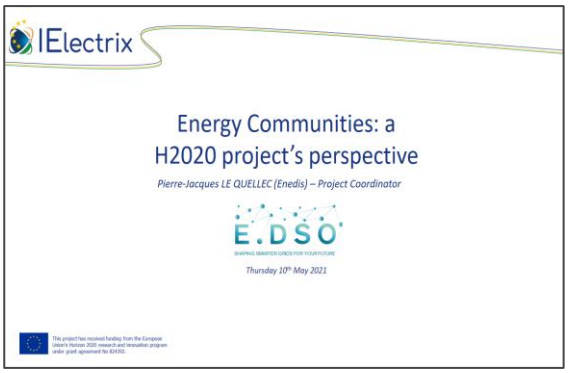
Online event

European Distribution System Operators (E.DSO) is an association of 41 leading European electricity distribution systems operators, which seeks to be the key-interface between those distribution system operators and the European institutions and stakeholders. E.DSO promotes and enables customers' empowerment and the increase in the use of clean energy sources through electrification, the development and large-scale testing of smart grid technologies in real-life situations, new market designs and regulation.

In particular, E.DSO focuses on guiding EU research, demonstration and innovation (RD&I), policy and Member State regulation to support smart grids development for a sustainable energy system.

For this reason, the IElectrix project was invited to share its perspective and experience during the second E.DSO Innovation & Research Committee meeting of 2021, an internal meeting that took place on the 10th June 2021. The discussion turned around consumers with a specific focus on Energy Communities.

During a 15-mins presentation, Pierre-Jacques Le Quellec, IElectrix's Project Coordinator, shared the project's approach to customers' engagement and the key challenges and lessons learnt up to date. The presentation was then followed by a round-table discussion with the other speakers and E.DSO members, focusing on the DSOs' perspective and role for the development of Energy Communities.



IElectrix's presentation at the E.DSO Committee

S2E2 Webinar – “Micro-grids: A challenge for the future of renewable energies

15 June 2021

Online event

In the context of increasing renewable energies integration and electricity-for-all, micro-grids have gain significant attention and interest in the recent years, but their development still faces various challenges, may it be regulatory, technical or economic.

For this reason, S2E2, a French competitiveness cluster, organised the webinar *“Micro-grids: a challenge for the future of renewables energies”,* with stakeholders from across the energy industry to share their point of view and vision for the implementation and development of micro-grids. In particular, a member of the CRE, the French national regulatory authority for Energy, participated to the event and reminded the new regulatory framework around this innovative concept.

IElectrix, as a Research & Innovation European project implementing micro-grids, was invited to take part to this webinar and provide an experience feedback on the conception and testing phases for the LV micro-grid demonstrator in India.

This online free event in French attracted more than 80 participants from various backgrounds (academic, industry, regulatory …) and was concluded by a Q&A roundtable session where every speaker was invited to debate.

Roundtable at the end of the Webinar

Moew.e – What is the IP-tool?

What is the IP-tool and what can it do?

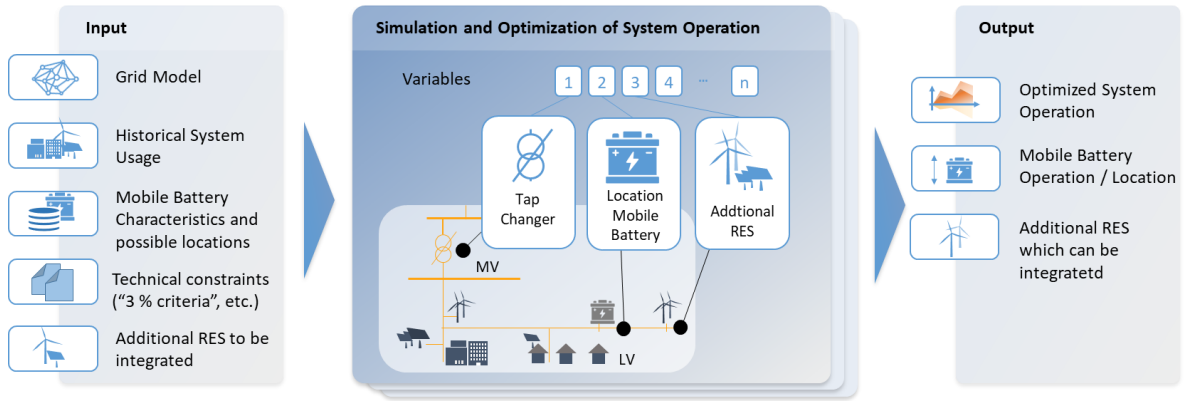
CIRCE, the Spanish research institute and IElectrix project partner, is developing an IP-tool for Moew.e demonstration.

This tool can calculate investment postponement for network reinforcement measures depending on the curative impact of the battery on the network. To be more specific, the tool will consider the impact of the battery on the avoided network congestion and the increase in renewables hosting capacity in MV network.

Depending on this, the tool can compare the replacement measures in network expansion and calculate the amount of investment postponement.

At the same time, the tool can examine the mobility of the battery or the sensitivity of the battery location. To do this, the battery will be simulated in different network hotspots (locations with larger amount of congestion) and its curative effect is investigated.

The following graphic shows, which information is provided by E.DIS to develop the tool and what are the outcomes of the simulations.



High level methodical approach of the pragmatic planning tool developed by CIRCE

IElectrix demonstrators

HELGA

Demo in Hungary led by E.on EED

The finishing touches are being put to the Zánka energy storage system and soon it will be handed over to the "business as usual" fields.
At Dúzs the BESS's installation process is ongoing and site test will start soon.
As the project's progress is moving forward, there is more time to us to continue developing the existing components to further improve IElectrix results. For example, create an IT module which will increase the digital maturity of the solution. Can't wait to show you in a later newsletter!

Strom Güssing

Demo in Austria led by Energie Güssing

In the further course of the project, possible deviations in the planning of the demo activities need to be carefully monitored and addressed. Therefore, a continuous exchange between the demo partners and the participants at the demo site is established. The final schedule for the provision of equipment critical to the implementation of the use case will be finalised in the current period as partners prepare for on-site installation and commissioning. As the delivery day of the BESS approaches, exciting weeks and months are thus ahead for the partners of the Austrian demo.

Moew.e

Demo in Germany led by E.DIS

E.DIS has finished with software implementation and is starting to test the application itself. Power feed-in is necessary in case of the situation where the transformer in the HV substation is overloaded. Further tests with the battery are planned for mid-June. E.DIS will alter the reference values for active and reactive power of the storage system and will then measure changes at various network nodes in the distribution grid. E.DIS will present the project itself and the results at upcoming meetings.

SHAKTI

Demo in India led by Enedis

Thanks to the easing of curfew restrictions in Delhi, the civil works phase has been launched. It started with the construction of a shed for the battery container to prevent high sun exposure and will continue with the refurbishment of the technical building. In parallel, the electrical components have started their trip to India. The Schneider transformer and the SNA are now at the India IElectrix site while the battery cells and the switchboard are still on their way to Mumbai port, they should arrived on site for the end of July.

Focus: Shakti demonstration

Shakti testing phase at Concept Grid

Watch the tests online

On the 15th April 2021, the live demonstration at Concept Grid concluded successfully three weeks of testing, and set an important milestone for the Shakti demonstration.

The Shakti demonstration is a pilot project, which experiments new innovative solutions not yet existing on the market. Moreover, various equipment provided by different suppliers have to interact with each other. As a result, the demonstration leader Enedis identified a high risk of errors in the interoperability of the equipment and in the Sequence of Operations, which might highly impact and delay the demonstration that will be implemented in Delhi.

In order to mitigate the risks of malfunction at the Indian site, the partners of the Shakti demo decided to add a testing phase in France before shipping the equipments to India. Indeed, it is easier to solve any problems in France, in the presence of Schneider Electric, Enedis, EDF R&D and Socomec's experts.

The tests were performed at Concept Grid Lab, an EDF R&D facility, located in the southeast of Paris, dedicated to the testing of electrical equipment under actual conditions. This testing platform is particularly adapted to assess smart grid solution integration in a real Medium Voltage/ Low Voltage (MV/LV) power system (Battery Energy Storage Systems - BESS, renewable production up to the MV scale), prior to field deployment.

- *Planning*

Most of the tests took place over the span of three weeks, during March and April 2021.

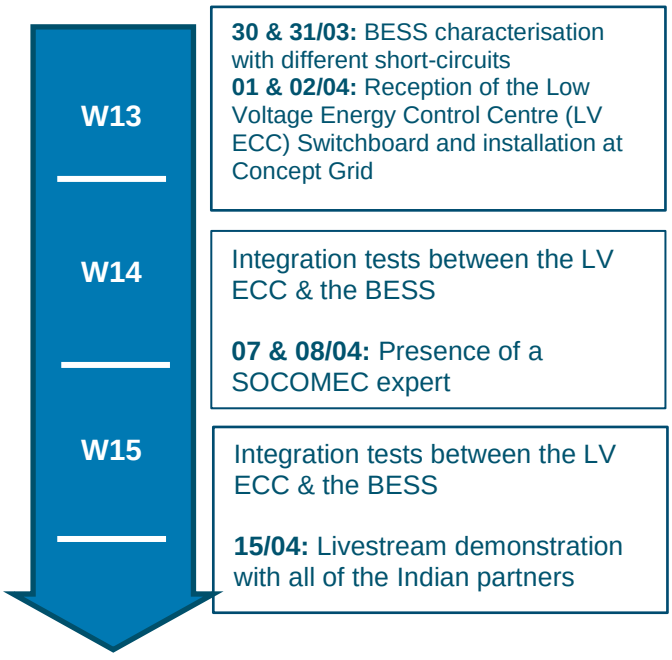


Figure 1 - Planning of the testing phase

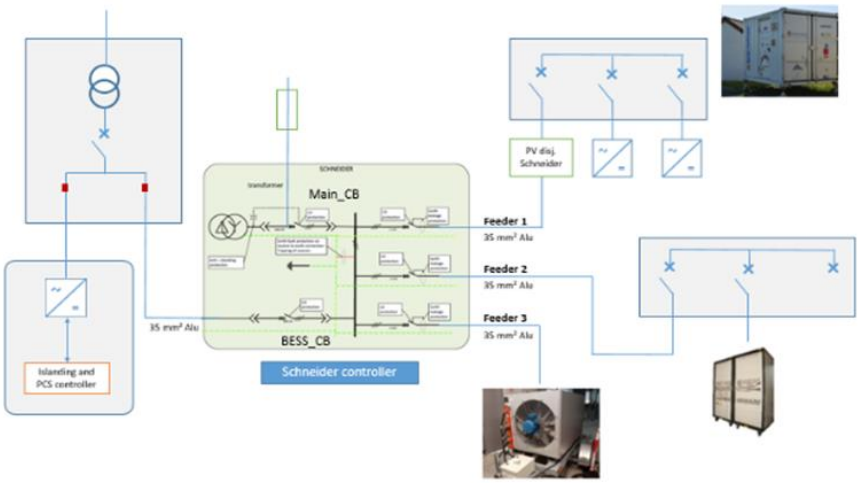


Figure 2 - Testing installation at Concept Grid

There were two main objectives:

- Investigating the behaviour of the Battery Energy Storage System during defaults (short-circuit and overload conditions).
- Validating the interoperability of the equipment and the Sequence of Operations.

➢ *Short-circuit and overload tests*

The purpose of those tests were to characterize the Concept Grid SOCOMEC BESS behaviour during short-circuit and overload events, especially during islanded mode where the BESS is acting as the generator. Those tests were significant because the observed behaviour at Concept Grid should be very similar to the one to be expected from the BESS sent to India.

A variable resistor was connected to the BESS and various defaults were tested (L-L-L, L-N, L-L). Enough data were collected to adapt and improve the protection study. Short-circuit currents were not significantly impacted by the loads connected to the BESS.

➢ *Interoperability tests*

Only the LV ECC Switchboard was sent to Concept Grid to be tested. This equipment contains the main communication & control modules of the Shakti solution.

The first step was to validate the serial communication, then the TPC/IP link between the switchboard and the BESS.

Secured communication with external cloud servers, following the defined cybersecurity criteria were then set up accordingly.

Once the communications were verified, the expert teams could begin the testing of the most crucial point, the Sequence of Operations. The main focus was to ensure a good transition between the grid-tied state to the off-grid state, during a power outage.

Figure 3 – Schneider Electric & EDF R&D teams testing equipment interoperability

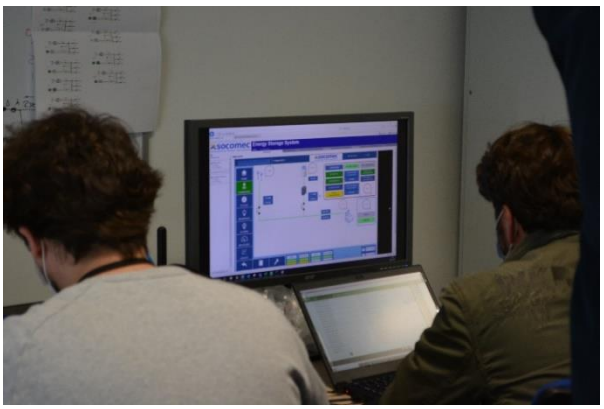


Figure 4 - Testing of the Sequence of Operations

Production and consumption scenarios with the loads connected to the LV ECC switchboard were also tested. After some tuning of the algorithm inside the Remote Terminal Unit (RTU), the Sequence of Operations was successfully validated.

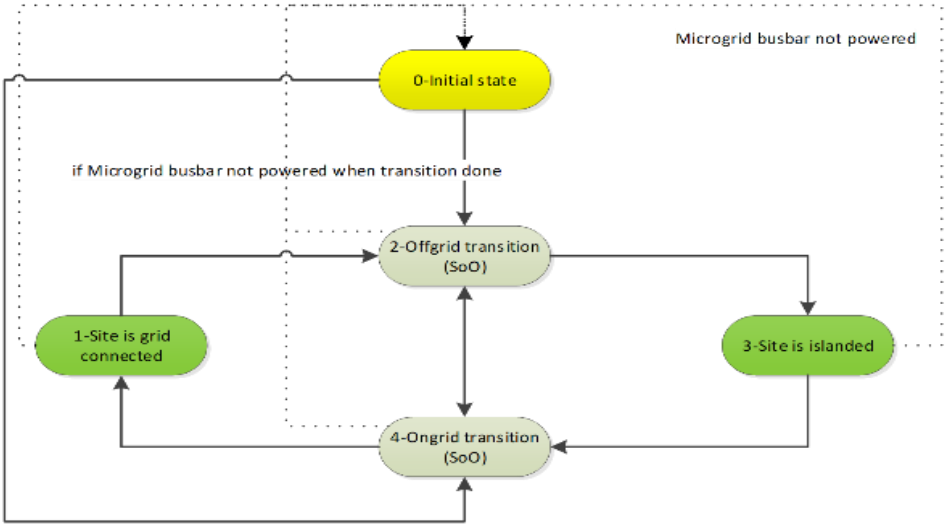


Figure 5 - Basic Sequence of Operations for the Shakti demo

➢ *Live demonstration*

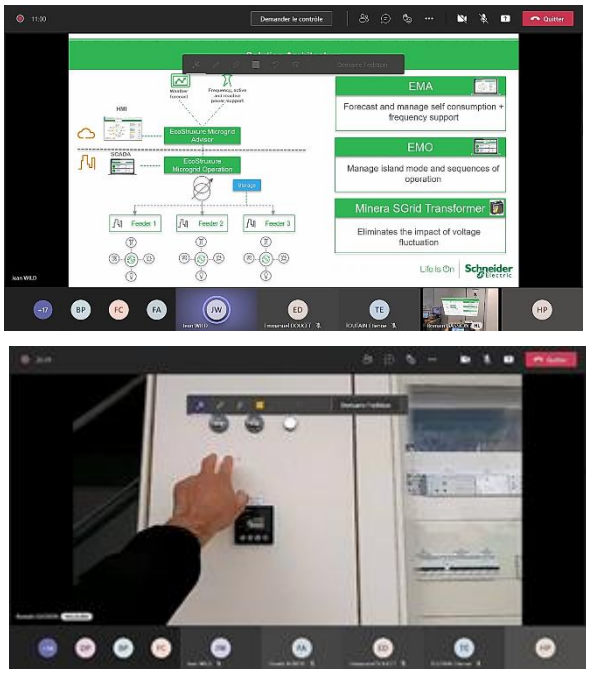


Figure 2 - Screenshots of the live demonstration

The live demonstration of the equipment interoperability and Sequence of Operations took place online on the 15th April 2021. All the demo partners were invited to participate to this online event.

After a short presentation of the project, Schneider Electric successfully demonstrated the main scenario of the Shakti demo, with the transition from the grid-following mode to the off-grid mode and vice-versa.

The live demonstration was made possible by the use of an augmented reality helmet (Hololens), which provided the audience with an immersive experience of the testing phase. This innovative technology proved to be all the more important during this sanitary crisis, paving the way towards remote interventions.

➢ *Conclusion*

This testing phase was crucial to ensure a good interoperability of the equipment and will contribute to a reliable and efficient installation and commissioning phase in India.

The next step for the Shakti demonstration is the reception of all the equipment on the Indian site. The last equipment should arrive at Delhi by mid-June 2021.

IElectrix

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