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The latest news about the Interflex project

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Editorial

DIGITALIZATION AND CUSTOMER INVOLVEMENT HAND IN HAND

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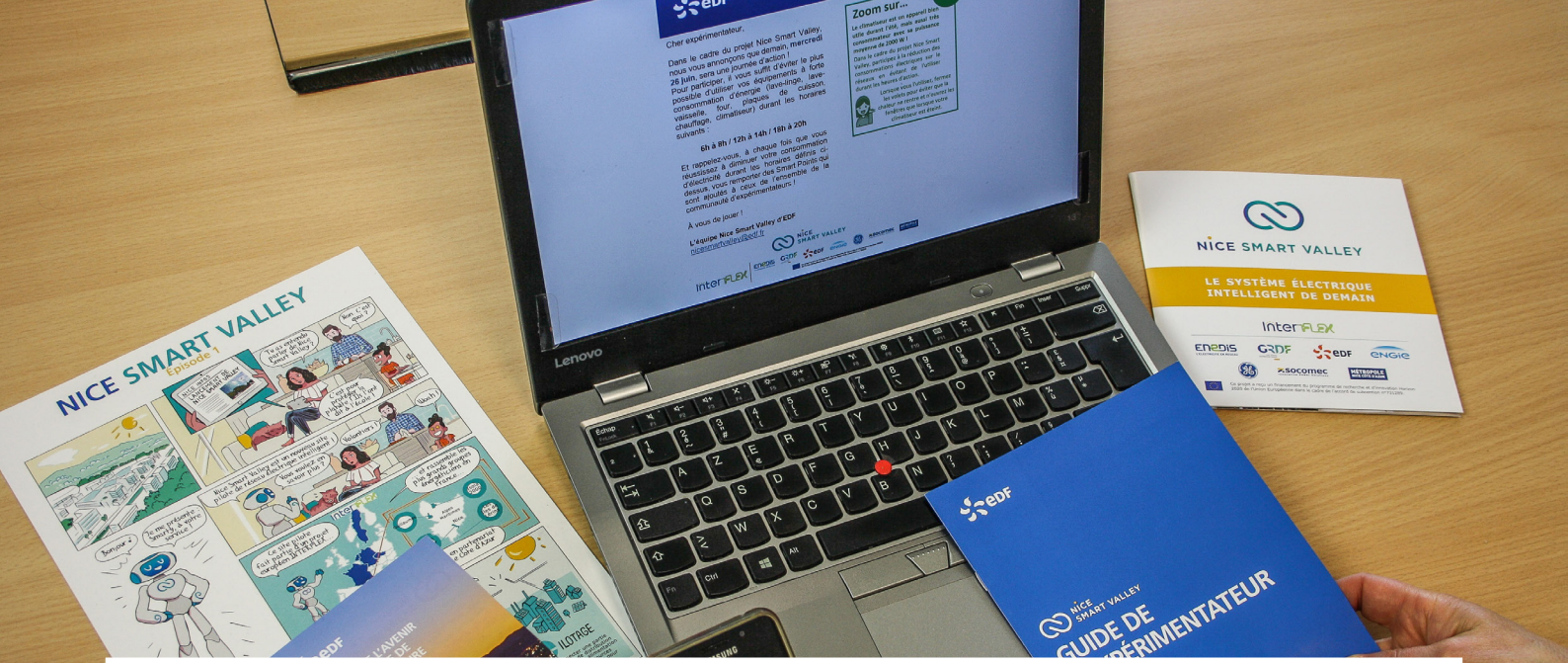
"The InterFlex project perceives the consumer not only as an end-customer, but as a valued partner."

To manage a cleaner and more efficient energy mix and seize the pressing issue of global warming, Enedis is investing in research and innovation in order to come up with concrete solutions to seize the pressing issue of global warming. InterFlex, a 3-years project ending in December 2019, is an opportunity for its 20 partners to imagine tomorrow's electricity grid: innovative, highly respectful of environmental needs and deeply in touch with the customers.

InterFlex aims, above all, to foster the development of renewable energies and their integration into electric networks. Sustainable solutions need to be found for tomorrow's energy uses. The principal challenge is to master both consumption peaks arising from e-mobility and generation peaks from renewable energies. Today, the vast majority of wind and photovoltaic installations is connected to the distribution grids. Enedis and its partners are on the right track when exploring flexible solutions on the local scale.

One of the key challenges for InterFlex has been to focus on the consumer and to find appropriate solutions to integrate new electricity uses. Through the development of local flexibility, the InterFlex project perceives the consumer not only as an end-customer, but as a valued partner. The 6 InterFlex demonstrators have taken different technological approaches to flexibility but have one essential element in common – the conviction that digitalization will give access and enhance the value of a local approach to energy distribution, which makes customers not only more accountable but also mobilizes them to act as true collaborators in the energy transition.



MAXIMISING THE IMPLEMENTATION OF FLEXIBILITY THROUGH A DEDICATED RELATIONAL PROGRAM

In the framework of the European project InterFlex and its French demonstrator Nice Smart Valley, EDF has committed to the challenge of recruiting domestic and business customers alike for implementing active demand side management measures (flexibility) and provide grid services during demand peak hours, i.e., when grid congestions are most likely to happen.

Up to date, more than 470 private customers showed interest for this, while more than 220 experimentation agreements have been signed. In the industrial sector, 6 local companies meeting the set eligibility criteria (Schneider Carros, Sofia Cosmetics, Paindor, Augier, Régie Eaux d'Azur, One too) have engaged in testing such new demand side management solutions. Thanks to these innovations, the project paves the way to the distribution network of tomorrow, which has to become more flexible and responsive to cope more efficiently with the rising share of decentralized and intermittent renewable energy sources.

In the project, EDF supports domestic customers with a dedicated relational program, aiming at maximising the implementation of flexibility actions and its visibility or impact: a tailored user guide has been distributed, recurrent action day announcements are accompanied by the mailing of concrete examples, a specific reward and support program for local associations has been realized (Nice Foundation, Uniscité Habitat and Humanism), newsletters are published periodically and even a dedicated social online platform has been implemented, where participants can easily post and share their motivation, understanding or best practices. EDF offers dedicated training sessions to business customers and their employees aiming at raising their awareness about the demonstration activity by teaching practical every-day gestures improving the energy footprint and answering to grid-flexibility needs. In addition, the involved companies have received a communication guide to advertise their commitment and participation in the Nice Smart Valley project and this for both internal and external communication purposes.

Beyond the actual results for improving the grid flexibility thanks to peak shaving and peak shifting, a specific monitoring device has been deployed for better understanding customers' behaviour. For example, what has been observed is that in order to meet the flexibility demands, in most cases households are ready to decrease the use of heating in winter (setpoint lowered by 1°C) or shift the use of major household appliances such as washing machines and dishwashers. Even more, customers are seen to be attentive to lighting, the use of computer equipment and device standby and some are even changing their dining habits to shift the use of cooking appliances. As the experimentation progresses, a learning effect can be noticed in terms of raising awareness on electrical consumption and the implementation of "flexi-gestures" to respond to network needs.

AVACON ADDS POWER LINE COMMUNICATION TECHNOLOGY TO THE GERMAN FIELD TEST SITE

Among the key learnings of the field test demonstrations in Germany so far was the realization that the coverage with LTE-signal in rural Germany was less reliable than expected.

InterFlex had to turn down a large number of interested pilot customers and project participants because signal strength at the individual smart meter location was insufficient. In many areas the signal was lacking altogether, in others the location of the smart meter inside the house made a poor signal even worse.

Power line communication (PLC) was identified as an alternative technology to provide the data-link between the Smart Grid Hub and the customer. To do so, PLC uses the power cable to transmit data with acceptable bandwidth. For InterFlex, Avacon equips a share of substations with this technology. These concentrator-substations collect data from customer local low voltage networks and then exchange data with the Smart Grid Hub via a stronger LTE-link.

Customers are equipped with state-of-the-art PLC-based smart meter gateways. As such, InterFlex pioneers the deployment of this technology in connection with the smart meter framework in Germany.

52 substations in the Lüneburg area have been equipped with PLC-technology and are currently being connected to the smart meter backbone. Starting in late June up to 30 additional customers can be equipped with PLC-gateways for testing and use case demonstration on PLC technology.

Router and Headend

Coupler

COMPARING OPTIONS FOR FLEXIBILITY PROVISION AT ENEXIS

With the Interflex project in The Netherlands, we have the unique opportunity to evaluate one of the instruments that can provide a DSO with flexibility.

At Enexis we discern different instruments providing flexibility, which can be categorized as follows:

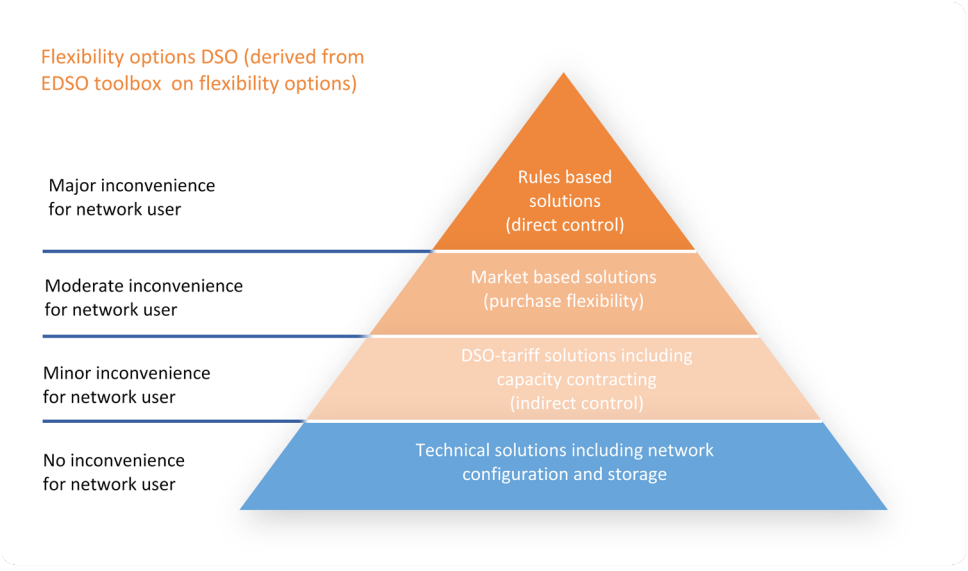
- Rule-based solutions; A DSO directly controls energy sources based on rules in network codes and regulations.
- Market based solutions; A DSO purchases flexibility from flexibility providers driven by competition.
- DSO tariff solutions including capacity contracting; Tariff structures aim to stimulate network users to adapt their usage/generation patterns to efficient network usage.
- Technical solutions, including network configuration and storage.

There are mainly two market based solutions: open market platforms and long-term bilateral contracts. The flexibility market, as implemented in the Dutch Interflex project, uses an open market platform where the DSO trades with commercial parties to provide flexibility.

The market approach implies that the DSO has to compete with other parties that request flexibility in the electric power system. Next to this open market platform, Enexis also experiments with long-term bilateral contracts. For this solution we make a call to generators and/or consumers in a specific area to provide flexibility offering on a long-term contract for flexibility services. This solution avoids the uncertainty related to market trading.

By testing different options in practice, we learn in which way flexibility can be unlocked for different situations in The Netherlands. Additionally, the experiments spur the development of tooling. For example, the lessons learnt from building a grid management system for Interflex are being applied to an improved version and used for the experiments with bilateral contracts.

Good to know: Several aspects of the systems implemented in the Dutch Interflex project were presented at CIRED 2019. Please get in touch if you want to learn more.



RECENT ADD-ON OF A FLOW BATTERY TO ENHANCE THE ISLANDING CAPABILITIES OF THE SIMRIS LES

Enhancing the frequency control of the Simris Local Energy System.

Within the Swedish demonstrator in the village of Simris, E.ON sets up a local energy system, where wind and solar energy generation, in combination with central batteries, local customer involvement and an innovative management system provide islanding capabilities. In the early stage of the demonstrator, one central Li-ion battery was employed to provide grid stability.

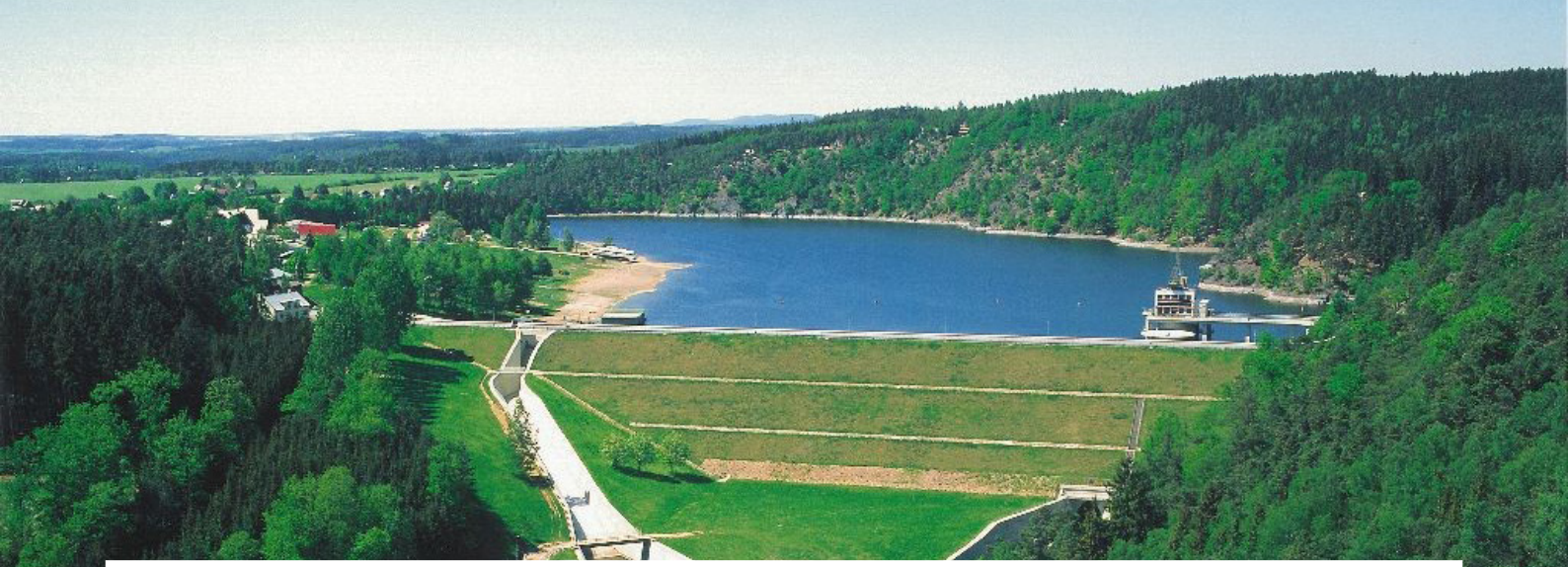
A second battery has been added to the system recently: E.ON made the choice of the redox flow technology. The flow battery is used for two main reasons:

1. To increase the islanding duration;
2. To enable frequency dependent testing.

The increased performance in islanding gives us the possibility of doing island-testing while reducing the need for the biodiesel backup generator.

The battery enables islanding for approximately 2 hours on (flow) battery power alone during maximum load.

Frequency dependent testing means that, by putting the flow battery in a frequency dependent mode, we can support the frequency in the microgrid by responding directly to the measured frequency, minimizing frequency variation within the microgrid and demonstrating how systems could autonomously support the power balance in a microgrid without a central controller.



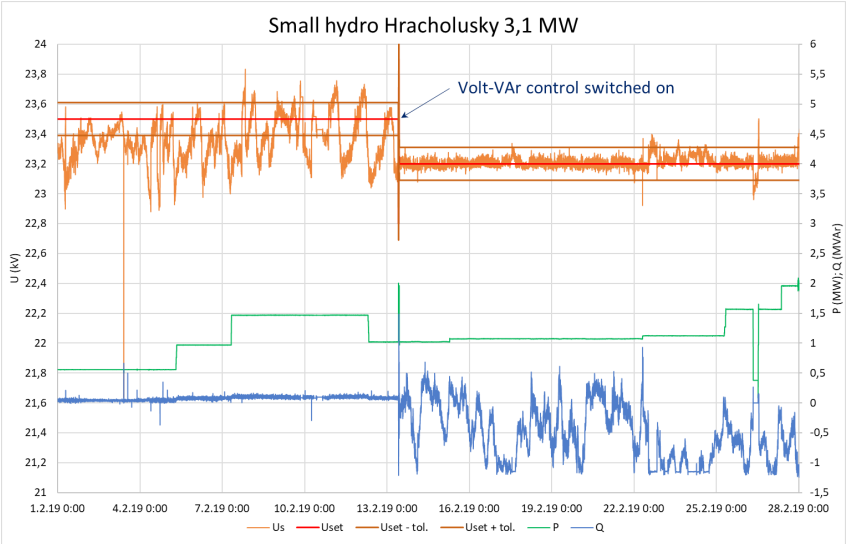
CEZ DISTRIBUCE DEMONSTRATES VOLTAGE REGULATION AT A SMALL HYDRO PLANT HRACHOLUSKY 3,1 MW

CEZ Distribuce is the biggest Distribution System Operator (DSO) in the Czech Republic and the leader of one of the 5 demonstrators of the InterFlex project. In cooperation with the DER owner (CEZ Obnovitelne zdroje s.r.o.), CEZ Distribuce has launched the demonstration of voltage regulation systems at the small hydro plant Hracholusky with 3,1 MW of installed capacity.

Small hydro "Hracholusky" is connected to the medium voltage distribution network. The solution aims to reduce voltage fluctuations caused by the small hydro plant in medium voltage distribution networks in the selected area by targeted regulation of its reactive power ("volt-var control") thus allowing a significant increase of the DER hosting capacity.

Required voltage set points are sent by the Distribution Management System (DMS) through a GPRS/LTE communication path to the DER control system. The targeted regulation of reactive power on the DER side is based on the difference between the required voltage set point and the instantaneously measured voltage at the point of grid connection. The voltage regulation system is in regular operation today and its performance will be evaluated in detail in the upcoming months.

Based on the results, CEZ Distribuce already proposed and standardized an update of the actual DER hosting capacity evaluation process to allow connection of more DERs to the medium voltage distribution networks (if DERs are equipped with volt-var control system).



Small hydro Hracholusky with 3.1 MW of installed capacity (effect of Volt-VAr control on voltage in MV grid)

INTERFLEX SITE VISITS IN NICE

For the InterFlex project partners, it's high time to discuss the technical results and to capitalize on lessons learned. All InterFlex project partners met in Nice on the 13th and 14th of June in the frame of the periodic technical committee meetings, and took the occasion to visit the Nice Smart Valley field installations.

A first visit was organized on the islands of Lerins to present the islanding system set up by Enedis and Engie to secure the electricity supply and to ensure greater resilience in case of an incident on the submarine cable linking the islands to the continent.

The DSO and the aggregator are now studying new business models using their batteries together to allow an energy autonomy of nearly six hours to the islands in case of problems.

The European partners also visited the InterFlex installations in the city of Carros, where GRDF is currently working on a combined heat and power unit which permits to ensure heating and tap water needs and to produce electricity at a local scale.

The demonstrator is set up at Schneider Electrics industrial site in order to study the project in real time and to develop it according to the project findings.

The last demonstrator is installed on the rooftop of a public gymnasium. This unit provides heating in winter and air conditioning in summer by independently alternating between electricity and gas to provide flexibility to the system. This unit could ultimately use biogas to be more environmentally friendly.

For more information about the InterFlex experimentations in Nice, visit the Nice Smart Valley projet website.

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