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Newsletter #7

InterFlex hot news before Christmas holidays!

Edito	Introductory words from Prof.Dr.Ir. Han Slootweg, Director of Asset Management, Enexis Netbeheer
Visit of Avacon's grid control center	The InterFlex community visited Avacon's grid control center, where were explained the functionalities of the Smart Grid Hub in the control of residential flexibilities
Control of small hydropower plant	Voltage regulation functions were implemented at the small hydro "Vydra" installation, in the Cez demo
Field visit of the Dutch demo at TC #11 in Eindhoven	InterFlex partners visited the Dutch demo site during the Technical Committee meeting #11 in Eindhoven
Use of commercial heat pump as a flexibility asset in Malmö	A commercial heat pump provides local flexibility for the InterFlex demonstration in Malmö, Sweden
Islanding test in the French demo	Islanding tests were conducted prior to battery installation in the French demo, Nice Smart Valley

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement n°731289

PROF.DR.IR. HAN SLOOTWEG

Flexibility to keep electric vehicles on the road

With more than 2.5 million customers one of the three large Distribution System Operators of The Netherlands, Enexis is strongly committed to the transition towards a more sustainable energy supply and considers this a corner stone of its corporate strategy.

As a result, Enexis in recent years has initiated numerous innovative pilots with concepts such as smart grids, demand side management, controlled charging of electric vehicles and electricity storage. These pilots have paved the way for the roll out of Enexis' groundbreaking concept for Distribution Automation which is currently well underway and have enabled The Netherlands to become the leading country in Europe with respect to the number of charging points for electrical vehicles which has mounted to over 30.000.

Enexis is clearly determined to contribute to the success and impact of Interflex as the leader of the Interflex pilot project at Strijp S in Eindhoven. Together with our partners E-LaadNL, TNO and in close collaboration with Eindhoven University of Technology we develop and implement a concept in which flexibility is acquired through auctions where parties such as Sympower, Jedlix en CroonWolter&Dros submit bids. All partners are confident that our excellent cooperation and complementary profiles will contribute to Interflex by yielding methods and solutions that can be generically applied and transferred to similar situations elsewhere. And in this way to the urgent transition towards a more sustainable energy supply!

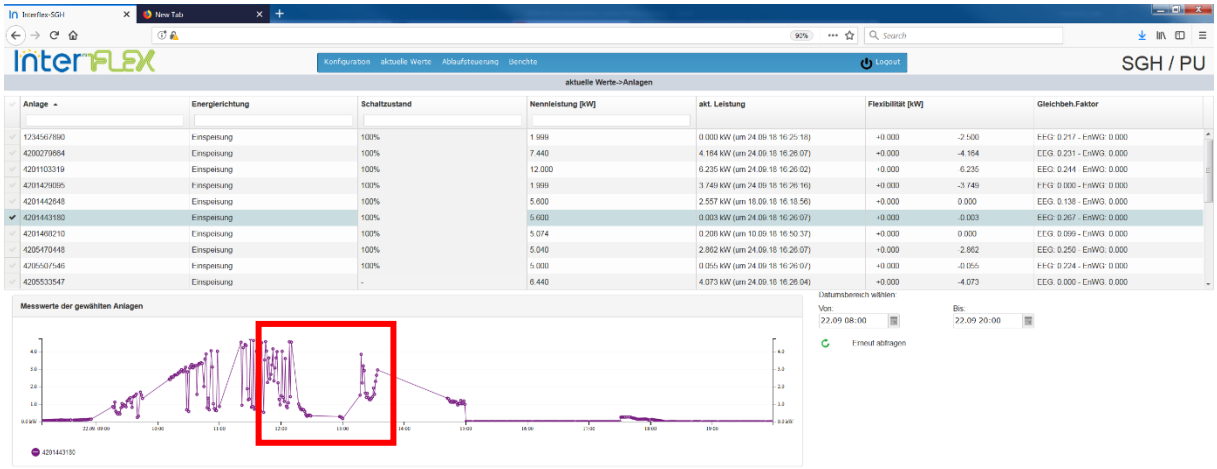
Prof.dr.ir. Han Slootweg
Director of Asset Management, Enexis Netbeheer
Professor in Smart Grids, Electrical Engineering, Eindhoven University of Technology

SMART GRID HUB LIVE DEMONSTRATION IN AVACON'S GRID CONTROL CENTER

As part of the surrounding program of the InterFlex annual Community Meeting on October 11th in Hanover, guests and project members had the opportunity to visit Avacon's grid control center in Salzgitter and witness a live demonstration of the Smart Grid Hub remotely controlling small scale flexibilities.

The group of 50 visitors visited the grid control room and could watch the operating engineers look after Avacon's power and gas networks. After a quick peek into the control room for high and medium voltage networks the group followed the demonstration of the Smart Grid Hub (SGH).
The SGH is designed as a control solution to make small scale flexibilities with smart meters directly controllable for the grid operator. In Germany, where feed-in by renewables has to be curtailed frequently to avoid critical overload of the grid, this technology is expected to increase the performance of curtailment mechanisms and reduce the volume of curtailed energy, subsequently increasing the share of renewables. The SGH is fully integrated with the national smart meter framework and offers superior scalability across the German market while guaranteeing a very high degree of privacy and cybersecurity for connected customers.

The picture below shows a screenshot of the operator interface with a list of connected flexibilities and realtime meter data below, including a flex activation between 1 and 3 pm.



Operator Interface used to remotely control small scale flexibilities

CEZ DISTRIBUCE HAS STARTED THE DEMONSTRATION OF VOLTAGE REGULATION AT SMALL HYDRO PLANT ”VYDRA” 6,4MW

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 DER owner (CEZ Obnovitelne zdroje s.r.o.) and its service partner EGÚ Praha Engineering, a.s., CEZ Distribuce has launched the demonstration of voltage regulation systems at the small hydro ”Vydra” installation with 6,4 MW of installed capacity.

Small hydro ”Vydra” is connected to the high voltage distribution network in case of normal operation and to the medium voltage distribution network in case of power outage in high voltage line. The solution aims to reduce voltage fluctuations caused by small hydro in medium voltage distribution networks in 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 fibre optic communication path via primary substation to the DER control system. The targeted regulation of reactive power on 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 developed and installed by EGÚ Praha Engineering, a.s., is in regular operation today and its performance will be evaluated in detail in the upcoming months.

CEZ Distribuce also successfully continues with the demonstration of volt-var control systems at Wind park Koprivna 4,6 MW and at PV park Zamberk 1,1MWp. Based on the results, CEZ Distribuce already proposed and standardized an update of the actual DER hosting capacity evaluation process in order to allow connection of more DERs to the medium voltage distribution networks (if DERs are equipped with volt-var control system).

Small hydro Vydra with 6,4MW of installed capacity

THE DUTCH PILOT PRESENTED ON THE TECHNICAL COMMITTEE MEETING #11 IN EINDHOVEN.

On November 26th and 27th, the InterFlex Technical Committee meeting was hosted by Enexis, the Dutch demonstration leader for InterFlex, in Eindhoven. This meeting was the occasion for InterFlex project members to visit the Dutch demonstration site in the Strijp area.

The Dutch demonstration investigates the possibilities to develop a market place on a DSO level for flexibility to avoid network congestions due to Electrical Vehicle (EV) charging. For gaining this flexibility and testing the market model, Enexis installed 13 charging stations and one 250 kW battery in the Eindhoven Strijp area. These assets are used for real time testing in an operational environment of the market. Together with the ICT systems built by Enexis and its subcontractors, scenarios are rolled out to test the possibility of getting real flex on a DSO flex market in competition with the TSO market. For this purpose EV customers living and working in Strijp are involved in the project.

InterFlex team members visiting the battery used in the Dutch demo

Furthermore, a solar car called the Stella Vie, takes part in the Dutch demonstration, which will use its vehicle-to-grid capability to deliver energy back to the grid when needed. The Stella Vie is a car driving on self-generated solar energy. It was designed and built by students of the Technical University of Eindhoven and won the Bridgestone World Solar Challenge 2017 in Australia, the world's largest competition for solar cars.

One of the most interesting features with respect to InterFlex is the car's energy management system. A solar car can be seen as a mobile solar roof that can generate energy wherever you want. To make optimal use of this energy, the user is able to share a surplus of energy with the grid to, for example, power his house.

InterFlex team members in front of the solar car the Stella Vie

Stella Vie can seat 5 persons and is fully road legal in Europe. The car has two highly efficient in-wheel motors and can reach a top speed of 125 km/h. On the battery of 12,5 kWh, it can drive 600 to 700 km. The roof is covered with 326 solar cells that can deliver 1,3 kWp. The range of the car can therefore be extended up to a 1000 km with energy produced by the solar cells. Next to this, the team developed several concepts that help the driver to drive as efficient as possible. An example is the solar navigator and parking system. This system helps the driver to pick the most efficient route based on weather data and to park the car in the sun as long as possible based on data of the position of the sun and the built environment. Besides, a driving assistance system can give feedback on the driving style in terms of colour signals (red to green).

COMMERCIAL HEAT PUMP IN SWEDEN PROVIDES LOCAL FLEXIBILITY

The heat pump at the demo site in Malmö is installed to increase the energy efficiency at a local energy center in an industrial park. Low temperature waste energy, i.e. heat removed from the data center, is upgraded to a temperature useful for comfort heating in a couple of commercial buildings, while simultaneously producing cool water that is used to cool off the stacks of a data center. Although electricity is used for the heat pump, the overall efficiency of the energy solution improves as it enables a decrease in the size of the cooling machine and to turn off a cooling tower.

The heat pump is utilized to deliver two necessities at the same time, both heating and cooling. If there is a constraint in the electricity grid, or an excess of district heating energy in the thermal grid, the heat pump will be turned off and the system will run in a mode, providing:

- Cooling to the data center by using a cooling machine and a conventional cooling tower
- Heating to the commercial buildings by the district heating grid.

The system is up and running connected to a control system, Ectocloud, that can be set in a "power control" mode if there is a need of change of energy carriers. A series of test runs are being developed and will be carried out during the cold heating season.

Heat pump at demo site in Malmö

A 3-DAYS ISLANDING TEST FOR NICE SMART VALLEY, THE FRENCH DEMO

One of the use cases explored by Nice Smart Valley is the islanding of a portion of the distribution network. The Lérins Islands in front of Cannes have been chosen for the field tests. During the islanding period, the Lérins Islands will be disconnected from the main grid and customers will be supplied by a back-up on site storage system. Moreover, this solution avoids the use of more polluting gensets which need to be brought by ship to the islands. Local renewable energy could then be used to ensure electricity supply in case of an accident on the main network and contribute a great deal to energy transition.

In 2019, batteries will be installed and tested on the Lérins Islands network in order to begin the islanding experimental phase. But before that, islanding tests had to be conducted at Concept Grid (EDF R&D full-scale smart grid test facility) to test and confirm the correct functioning of the installation and validate the implementation of the entire system including two storage systems.

Concept Grid smart grid test facility

The first islanding trials were held after Socomec, also present for these tests, updated one of the two storage systems, making it identical to the one Enedis will have on the Lérins Islands. The first results' analysis validate the stability of the islanding under extreme conditions of consumption / production variations. This seems to confirm that islanding can be started at any moment of the year while the consumption is not over the power capacity of the main storage system. The protection plan was tested by voluntarily creating faults on the low voltage and medium voltage networks to check that the Enedis storage (grid-forming unit) detects them quickly and stops the islanding. The expected needs of the Enedis storage are strict and rigorous, they ensure the absence of danger for people and goods, the tests had to be conclusive for the progress of the NSV project.

The results were positive because they detected every tested fault and validated the protection plan that Enedis has planned to install. Half of the tests have been completed. The next ones will test automatic islanding without blackout that will be implemented on the 5 distribution substations of the islands (4 on Sainte-Marguerite island and 1 on Saint-Honorat island) to which 56 customers are connected.

The next tests will take place at the beginning of January and will validate the stability during automatic islanding without blackout.

Thank you very much for your interest in our project

The entire InterFlex team wishes you a very merry end of the year

This is the end of our 7th Newsletter!
Next one in two months!

Do not forget to visit our website:
http://interflex-h2020.com/

And to stay tuned by following us on twitter:
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