

ENEXIS IS MOVING TOWARDS A FLEXIBLE AND SMARTER GRID

The first version of Grid Management System (GMS) - a smart grid tool developed by Enexis for the Dutch Interflex (Strijp-S) project - has been released, meeting all requirements that were set for this version.

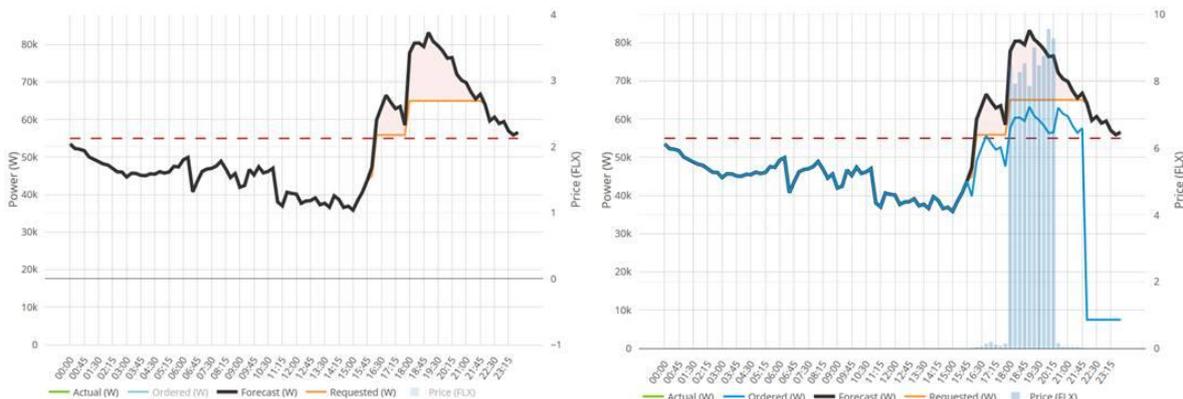
Enexis developed the first version of GMS in order to address the congestion problem in the grid. Congestion refers to capacity problems on a transformer or feeder level. This happens as a result of an unexpected increase in local demand or supply and consequently overloading or overgeneration. A check for congestion is automatically performed each morning for the upcoming day and is based on forecasting of inflexible and flexible loads. The forecasting module takes into account various kinds of factors and data including, weather data, transformer loading / DALi (Distribution Automation Light) data and prognosis data (flexible load forecast) from commercial aggregators which manage Electric Vehicle (EV) charging poles or solar panels.

Time	Type	Flex Provider	Responded
13:00:00	Prognosis	TNO (Commercial Aggregator)	✓
10:35:07	Prognosis	TNO (Commercial Aggregator)	✓
10:35:01	FlexOrder	TNO (Commercial Aggregator)	✓

Screenshot of Enexis GMS Platform

Using this daily load forecast as an input, a flex decision module was built, which checks for grid constraint violations (e.g. capacity limits). In fact, the flex decision module determines how much flexibility is needed in order to mitigate the congestion on a certain congestion point in a specific period of time.

When there is a demand for a flex supply, the GMS starts an auction, similar to a marketplace mechanism. The system sends a flex request to all commercial aggregators that manage private energy sources connected to the congestion point. The flex request contains the requested power to produce or consume for every 15 minutes on that day and the price the grid operator is willing to pay for the period. The aggregators connected to each congestion point have the possibility to respond with a flex offer in case of finding the flex request interesting. The flex offer contains the power values the aggregator is able to produce or consume (again, for each 15 minute period). If the grid operator accepts the flex offer, then the GMS sends a flex order.



The red dotted line shows the capacity of the transformer / feeder
 The black line shows the forecast made by Enexis
 The yellow line shows the forecast that is requested
 The blue line shows the forecast after ordering
 The vertical bars show the price that was paid by Enexis for that Ptu (15 minutes) in FLX (Flexcoin).

Management of the grid congestion at the transformer thanks to the activation of local flexibility.

At the moment this process is limited to one run once a day (day-ahead). However, Enexis is developing the next version of GMS, which is also capable of ‘intraday’ functionalities. This will make it possible to repeat the flex decision process multiple times during a day, further increasing compatibility.

In short, the GMS is able to reduce congestion in a sustainable way - for instance by using solar panels with a battery storage in a parking garage equipped with Electric Vehicle charging poles. Enexis is actively investigating cases where this solution can be applied.

Within the Dutch Interflex (Strijp-S) project Enexis is working together with other partners such as TNO, Sympower, Jedlix, ELaad and Croon Wolters & Dros. Enexis has adopted the USEF protocol - a messaging protocol built mainly for the smart grid market - for communication between the grid operator and connected partners. All messages are synchronized to a single research database, enabling further research in the (inter)flex program.