EnergyIP unlocks value of smart meter data

Data analytics leads to grid load predictions

Discovering of a treasure trove of digitalized information

When Danish grid operator NRGi Net began to analyze its smart meter data more than just billing operations, they discovered a treasure trove of digitalized information. With the right set of analytical tools, the data is helping them optimize operations, improve maintenance and predict the loads on their power grid.

The Danish grid operator rolled out smart meters in eastern Jutland between 2010 and 2014 – far earlier than other utility providers. The 225,000 smart meters are exactly the same, which means that NRGi's data management system receives a uniform data stream. It also means that both the meters and the management system can be updated easily. Without visiting a single customer, the grid operator equipped the smart meters with new functionalities several times already.

A closer look at how data might be used to monitor the grid

Every hour these smart meters send millions of data sets from houses, businesses and factories to the transmission system operator Energienet's nationwide data hub. Originally the data was used only to account for a customer's electricity usage and deliver correct bills, but NRGi started to take a closer look at how the data might be used to monitor the grid and predict future changes. In the past, the grid operator didn't really know much about what was happening in the low-voltage grid between its transformer stations. But when NRGi coupled the smart meter data of diverse loads from all three phases of its transformers with the geolocation data from our geographic information system, the grid operator knew how the stations were being used.

Thus, NRGi Net can detect patterns in incoming error messages and use this knowledge to improve the management of the grid. NRGi receives many thousands of events on a daily basis, including numerous indications of over- and undervoltage. And more data is brought in from the interruption statistics that the supervisory control and data acquisition system provides.

EnergyIP Meter Data Management solution
NRGi uses smart meter data to detect and resolve anomalies in the low voltage distribution grid as well as to detect a pattern or a sequence of conditions which could potentially result in equipment failure NRGi is also exploring to combine SCADA and AMI data for micro forecasting which can be used in real-time state estimations.

This well analyzed knowledge is worth real money: Just to know more about how one transformer station on Djursland or five kilometers of cable northeast of Aarhus are charged at different times can save the grid operator huge amounts. This is especially true as more and more energy consumers become producers as well.

Choosing the right data for analysis is key

The analysis of smart meter data helps NRGi Net prepare for upcoming challenges, but choosing the right data for analysis is key. NRGi's smart meters deliver on average around 1.3 billion data sets per month, including data for consumption and production fluctuations over time, maximum and minimum voltage, power and reactive power. Much of the data contained in the meters isn't used immediately, but if the grid operator suddenly needed it due to a fault or an outage, it has it archived for 14 days. The data is also made available for asset management and new installations.

The brain collecting and handling the huge amount of data is the Siemens EnergyIP meter data management application. Siemens, in close cooperation with external partners, is constantly expanding the system to make even more data accessible and useful.

NRGi Net is starting to use the data to make predictions. Based on around five million weather-related data sets collected over a two-year period, they will estimate how the load and the voltage in parts of the main grid will develop if the sun shines tomorrow morning. NRGi's analytical programs are standards that come on top of the EnergyIP meter data management platform and its broad set of applications. The grid operator is moving into the fourth generation and a fully functional smart grid platform. NRGi is good in interpreting data and tying systems together. The grid operator can draw a picture of his power grid and is able to make predictions. To keep up this development and make the operation of the grid better and more cost-effective, direct access to data from the meters is crucial.