

Öresundskraft – Continuous cable monitoring

Participants: Öresundskraft, DNV GL

Category: Wide-area monitoring and control, Distribution management

Time plan: Started 2017

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Location: Helsingborg

Possible to visit: Yes

Background

By installing Smart Cable Guard (SCG), Öresundskraft aims to decrease downtime that results from faults in medium voltage cables and in secondary substations. The grid contains about 1 100 km of high voltage cable, and they experience around 20 cable faults per year. By installing partial discharge monitoring at select points in the network, the goal is to minimize both duration (SAIDI) and frequency (SAIFI) of downtime in the medium voltage grid. With better monitoring capability, Öresundskraft also gains knowledge about the health in their grid, which is vital when planning maintenance and reinvestments.

Implementation of the project

The two first installations of the smart cable guard were carried out in 2017. After successful trials, Öresundskraft decided to expand to a total of twelve installations. The SCG monitors the pulses coming from partial discharges (PDs) or faults at two locations within a cable loop. The system also injects small pulses for time synchronisation. Data from the sensors are then transmitted wirelessly and analysed in order to evaluate the type, severity and location of the PD-activity or fault. The time synchronization allows for the owner to locate the PD-activity or fault with high precision (1 % of the cable length).

Öresundskraft gets an instant warning when partial discharges or a fault are detected and in addition to that receives information about the severity of PD-activity. There is also a monthly report containing information about what faults have occurred during the time period and system performance data, which can be used for long term analyzes.

Benefits

The most straightforward benefit of the system is that cable faults are detected with a high degree of precision and that the location of the fault is pinpointed to a short stretch of cable. This makes it easier for the grid operator to limit the service interruption when a cable fault appears. The system is also able to detect faults at an earlier stage than traditional monitoring, that gives the grid operator the opportunity to work proactively to avoid power outages.

Other benefits are that the grid owner gets an overview of the health status of the grid, which is information that is very useful for long-term planning regarding maintenance and investments. Warnings with a lower level of urgency also gives the owner an opportunity to keep an eye on areas of the grid that are at a risk of future failure.

Scalability

The system is scalable, in that it is possible to use for any number of cables in a grid.

Interoperability

As the sensors collect data by way of induction, they can be installed at a cable that is up and running. This means that the system itself is interoperable with any cable. Its potential to interact with other systems in order to increase automation has not been evaluated in the Öresundskraft project.

Investment horizon

The investment cost of a single smart cable guard is manageable, and the payback time in terms of decreased SAIFI and SAIDI is short if cable faults can be avoided.

International potential

The Smart Cable Guard is already used internationally. It could be utilized by the grid owner in different ways, depending on the local conditions and needs.