Innovation type:
New/improved processes finalized

Innovation:
Integrated information from SCG-system about fault locations into the fault restoration process of the operations team (without the R&D team having to be involved). This extra information leads to reduced outage time due to more precise switching operations and helps the repair crew with the fault localization.

TRL:
Since the technology is commercially available TLR is 8-9 on technology level. On system integrations level it is more 6-7. Full integration into SCADA has not been done.

Year: 2021

Contact:
Elvia (Åshild Vatne)

Potential users:

- Use case 1: Control room, fault recovery team
- Use case 2: Maintenance, grid planning

Pilot project: Cable monitoring testing

The aim of this pilot project was to test Smart Cable Guard (SCG) which can detect partial discharges in MV cables (paper insulated and XLPE). Two use cases were tested:

1. *Operation: Detection and localization of faults to reduce the outage time.*
2. *Grid planning /maintenance: Condition monitoring of the cables. This will potentially enable better reinvestment strategies for managing the existing cables.*

Challenge

The cable network in the Oslo area consists of several older cables. Many of them are old paper insulated cables. However, no online monitoring of these cables is conducted. The cables are therefore replaced on a pure operate-to-fail basis. Partial discharges (PD) are an indicator for weak spots on the cables or cable inter-connections. Smart Cable Guard (SCG) is a commercially available technology for the detection of PDs based on detecting high-frequency electric pulses caused by the discharges. Two important features of SCG are a) that it can be used for online monitoring of the cable in operation and b) that it is independent of the cable type; it can therefore monitor older paper insulated cables that are more prone to failure.

Solution

This pilot tested the SCG system on both XLPE and paper insulated cables on strategic connections in Elvia's grid. For paper insulated cables it will aid quantification of the remaining lifetime. In XLPE cables it was tested if a warning system can be established that is dynamic enough to disconnect the cable in a controlled way before an unplanned outage occurs.

Potential

Use case 1: SCG indicated five faults during the testing period, and three were actual faults (the other two were planned switching). Use case 2: no recorded cases of weak spots before a fault. Since only use case 1 could be confirmed during the test period, the economic viability of the system is not given as of today. Based on the economic analysis Elvia decided not to scale up the system. The costs were greater than the observed savings, given the current CENS-scheme and fault frequency (based on historic fault statistics), but in areas with high CENS and/or high number of faults SCG can be an option. If one in addition identify additional use cases for SCG, the economic analysis might be different.

Reference in CINELDI

Pilot sluttrapport: Smart Cable Guard (in Norwegian)