Innovation type:
Algorithm

Innovation:

TRL: # 8

Year: 2024

Contact:
Jan Bergan and Mats Åkerström (Elvia)

Maren Istad (SINTEF Energi)

Potential users:

User	X
DSO, TSO	X
Technology provider	
Member organisation	
Market operator	
Research/consultancy	
Teaching	

Earth fault work process prior and after pilot project

Pilot project: Detection of earth faults based on data from smart meters

Elvia, as a pilot project under CINELDI, has developed a system for detecting and classifying earth faults in the 230V IT distribution grid. This constitutes measurement values collected from approximately 750,000 end customers and 10,000 substations. Through experience from the early phase (2021), Elvia discovered that detecting earth faults requires high accuracy and effective customer communication. The developed solution builds on these experiences and now runs using a machine learning model.

Challenge

All DSOs in Norway spend a lot of time on identifying, locating and repairing earth faults. It is important for the DSOs to rapidly identify if there is an earth fault and whether it is in the DSO grid or in a customer installation. If the latter is true, the customer must be informed about this and repair the earth fault at their own expense. Most of the earth faults in the low voltage distribution grid are occurring in the customer installations. If the earth fault is in the customer installation, it can be quite costly to establish contact, inform the customers about earth faults and make sure that the customer repairs the earth faults. But smart meters is now changing this.

Solution

MSIj is the system developed for ground fault management in the pilot project. The system includes identification, a machine learning model for fault classification, state machine, and user interface. In addition, new modules/adjustments in existing systems has been made. New work processes within Elvia has also been developed.

Potential

There is a large potential for more efficient handling of earth faults in Norway. DSOs use a lot of resources on this today and more data from smart meters has potential for reducing the time and cost of earth faults handling. This makes the grid safer and improve customer relations, as DSOs can inform their customer about the earth fault and not the other way around, which is the case today. The precision in detected ground faults is about 97%, given both by validation of the machine learning model and measured by the number of closed cases versus the number of cases concluded with verified faults.

Reference in CINELDI

- Pilot "Detection of earth faults based on data from smart meters report" (in Norwegian)