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Centre for intelligent electricity distribution
- to empower the future Smart Grid

PhD: Reliability of Electricity Supply in the Future Smart Distribution System

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Motivation

The distribution systems are becoming more complex through the high integration of new smarter components and new technologies such as distributed generation and microgrids. This will change the behavior of the distribution system and will therefore require new ways of analyzing the network.

Objectives

- Build a foundation for how to model and calculate the reliability of electricity supply in the future distribution system.
- How will microgrids, flexible resources, distributed generation, and switches influence the reliability of electricity supply in the distribution system?
- How will the changes in the distribution system influence the reliability of supply in the microgrid?

Methods/Approach

- Build realistic models of the distribution system and the microgrid.
- Use features from analytical approaches such as OPAL and RELRAD to calculate the reliability.
- Use backward-forward sweep concept to calculate the electrical consequence.
- Extend the model to investigate the impact on the reliability through simulation models such as Monte Carlo simulations.

Current research topic

So far, the current research topic is oriented on investigating how a microgrid connected to the grid will influence the reliability of electricity supply in the distribution system. The topic also includes how the reliability of electricity supply will be influenced in the microgrid if an outage happens in the distribution system.

The work focuses on building a model based on analytical approaches where load flow methods will be applied for calculating the electrical consequence in the active distribution system.

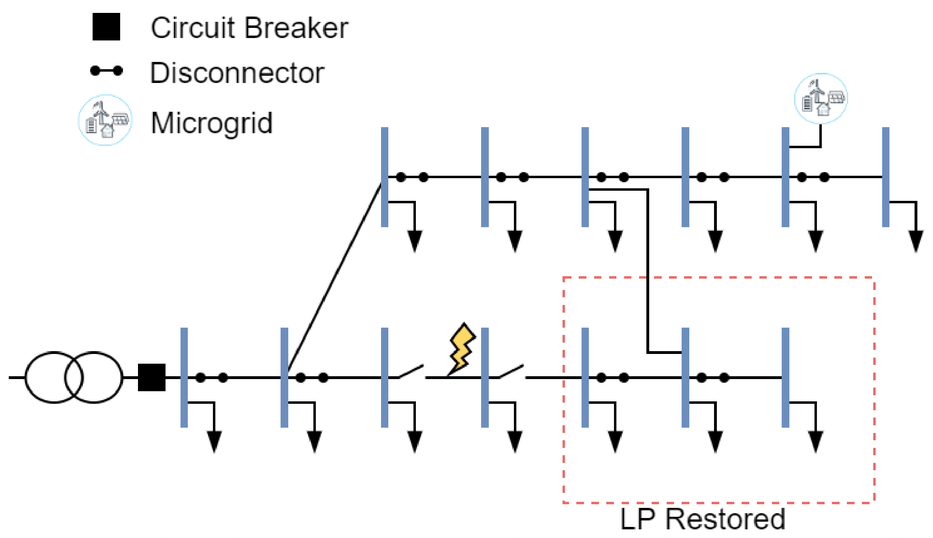

Fig. 1: A distribution system with restored load points when the microgrid is grid connected.

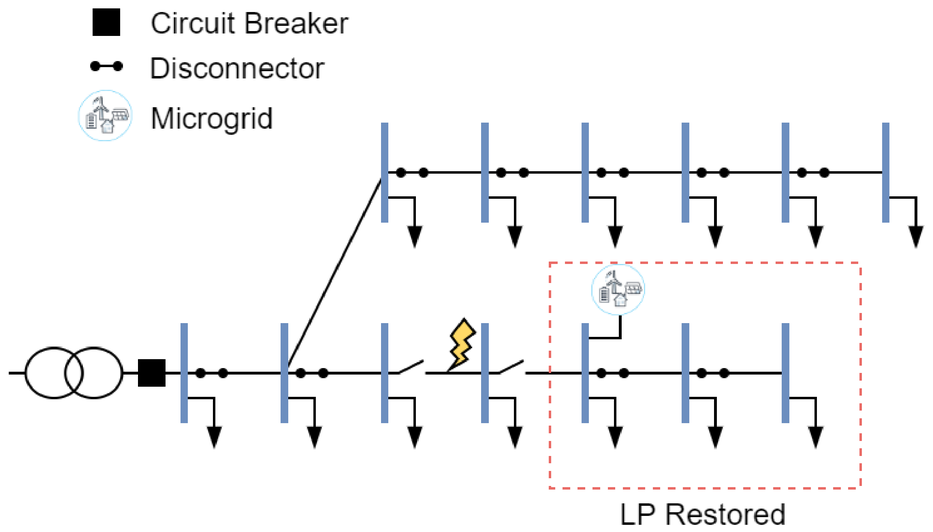

Fig. 2: A distribution system with restored load points when the microgrid is islanded with the disconnected distribution system.

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