Innovation type:
Model

Innovation:

TRL: # 5
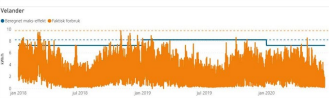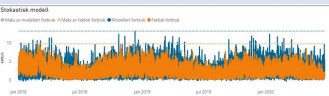
Year: 2024

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Potential users:

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

Result from comparison of Velander's method, time-of-use, stochastic method and actual power consumption

Pilot project: Risk-based distribution network planning

The pilot provides insight into the variation of electrical power consumption at two different points in the grid; for end customers and in secondary substations.

Challenge

Today's methods for grid dimensioning usually rely on empirical calculations for power, such as Velander's formula or utilization time. This is a well-tested methodology that is sufficient in many cases, but in some situations, it gives incorrect results. The hypothesis in this pilot is that, based on measurements and suitable models, one can describe and understand the actual power demand much better, thereby forming a more accurate basis for dimensioning.

Solution

In the first part of this pilot, a stochastic method was investigated, analyzed, and improved. The conclusion was that it is time-consuming to find a tailored probability model per customer, and the analyses found no probability model that stood out as 'a good fit' for all. Furthermore, various other methods for estimating maximum power consumption (hourly values) have been analyzed, with linear regression emerging as the best method. The pilot also shows how instantaneous power demand varies within an hour, and that hourly values conceal significant variations. It is also demonstrated that 5-minute values provide significantly more insight into power variations than hourly values, but that 30-second values only offer marginal gains over 5-minute values.

Potential

The pilot provides significant new insights into the variation and dynamics of electrical power demand. This forms the basis for developing new models that can replace Velander's formula as a method for estimating maximum power consumption.

Reference in CINELDI

- Pilot "Risk-based distribution network planning" report (in Norwegian)