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

Norwegian Centre for
Environment-friendly
Energy Research

Innovation type:
Software tool

TRL: 4

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Contact:
Oddbjørn Gjerde
oddbjorn.gjerde@sintef.no

Target group:

Actor/ purpose	x
DSO, TSO	x
Technology provider	x
Member organisation	
Market operator	
Research/ Consultancy	X
Teaching	X

Graphics generated in the "connection analysis" module of the program, using the Python package NetworkX.

The program can analyse a time series and the power transfer capacity to find the need for flexibility in the grid

Flexible Load Analysis – a code platform for load modelling and analysis

Flexible Load Analysis is a Python code platform for modelling and analysis of load-timeseries and power grid data. The current implementation is developed with a focus on grid connection analysis and assessment of the need for flexibility.

Challenge

New power-intensive industries and electrification of existing industrial processes put pressure on electric distribution grids. New grid customers make connection requests, and the distribution system operators (DSOs) first need to understand the behaviour of the existing load in the grid, whether there exists capacity in the grid, or whether measures need to be taken. If measures are needed, the DSO needs to choose between traditional measures (grid reinvestment) or active measures such as procuring flexibility to defer grid investments.
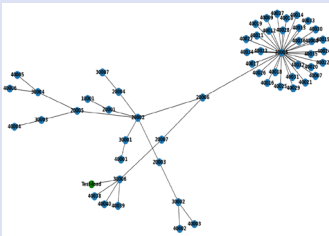
Solution

The code platform developed helps the DSO in the decision making described above. It includes modules for pre-processing and managing historic load demand time series in a grid area (smart meter data, e.g.), analyse load demand time series, apply load modelling of future load demand, and run "what-if" analyses. Given available data, the DSO can add a new customer to the grid with a given load behaviour. Then, the DSO can visualize the load in the grid, and how it develops with time, with respect to the power transfer capacity of the power line.
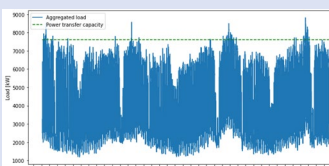
Potential

The code platform has a large potential for making the DSOs connection analysis process easier. A hypothetical customer with a variety of load behaviours can be added anywhere in the grid. Also, any number of customers can be added successively. The code platform is flexible in the sense that it can process several different smart meter time series formats based on specifications given by the user. The program requires only very basic understanding of programming to be used, and slightly more advanced level to customize and adapt.

Reference in CINELDI

The code was made available to the public on GitHub through the following link:
https://github.com/SINTEF-Power-system-asset-management/flexible_load_analysis