Modelling the system dynamics of islanding asynchronous generators

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Asynchronous generators are often used for small hydro power stations with an installed power capacity of under $1\,MW$. The reason for this is their robustness and low cost. In order do be able to produce active electrical power with an asynchronous generator once needs to provide enough excitation by means of reactive power provided by either the electrical grid or additional capacitors.

But in asynchronous generators we can also find the phenomenon of self-excitation which allows the asynchronous generator to operate as a standalone unit. Investigation of the self-excitation process shows that significant over-voltages can occur if a generator with sufficient capacitors is suddenly disconnected from the utility grid. The precondition for a successive voltage build-up is that the generator is left with enough capacitive power and a low load after the disconnection.

The *Lønnestad* radial in *Seljord, Norway*, is a distribution radial with both asynchronous and synchronous generators connected. In order to investigate the system dynamics in the radial after it is disconnected from the rest of the $22kV$ distribution grid, the radial was modelled and simulated using Modelica as modelling language.

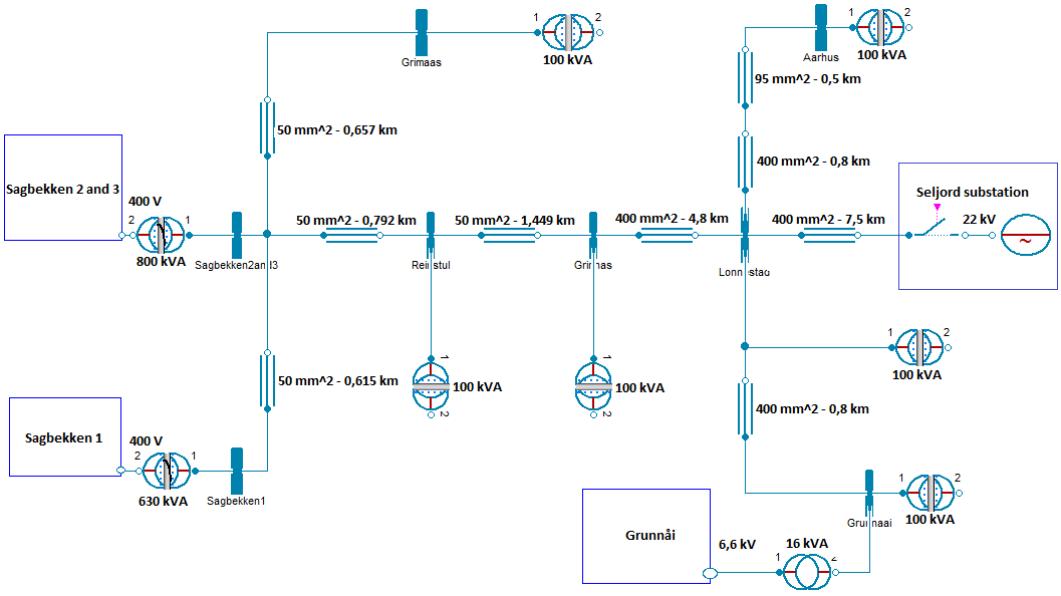

Figure 1: Overview of the Lønnestad radial