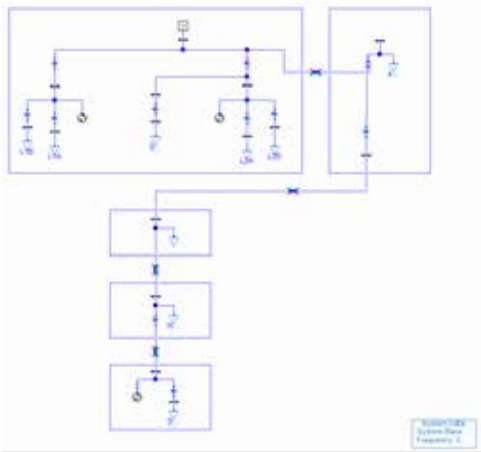
Background

Power system modelling and simulation is crucial to achieve a successful operation and management of electricity networks. It creates an offline working platform for engineers to perform test and scenarios to verify if the operation of the network is safe and reliable. Therefore, to meet this demand, a new modelling and simulation environment, Dymola, which is based on Modelica language will be utilised in this thesis. A power system from another simulation environment, DIgSILENT PowerFactory, will be implemented in Dymola using a power system library called OpenIPSL. OpenIPSL started as a fork of the iPSL from the iTesla project in 2016, and is now actively developing by ALSETLab (formerly SmarTS lab). Two simulation environments, PowerFactory and Dymola, will be compared to check if the physical behaviour of models can give the same response and results.

The power system located in the North of Iceland is planning to upgrade the geothermal powerplant Bjarnarflag to 5 MW. In the light of this upgrade a new opportunity for the delivery of energy has opened. A new delivery point is added at Bjarnarflag and need to be investigated. The figure below shows the distribution between the new line, new user and upgraded Bjarnarflag with a new transformer (a screenshot from Dymola).

In addition to the turbine upgrade of 5 MW in Bjarnarflag, the power station is being connected to a new 220 kV subsystem in Krafla. Krafla is a 2x30 MW geothermal power station close to Bjarnarflag. A new line, Reykjarhliðarlina (B), will be connecting Bjarnarflag to this new 220 kV substation. The investigation is therefore to see much power delivery can be guaranteed for the new user and how reliable is the system. The power flow solution from Dymola will then be compared to the simulation results made by in PowerFactory.



MASTER THESIS

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2016 – 2018

Modelling and simulation of a new power delivery in the north of Iceland

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