



# Case study

## Electrical network studies: connecting a 50MW CHP biomass plant

### THE CHALLENGE

A papermaker was planning to install a Biomass Combined Heat and Power Plant (CHP) to replace their existing on-site generation. This new plant would be capable of generating 50MW of electrical power; part of which would be consumed by the plant with remainder being exported to the National Grid.

The various stakeholders involved in building the plant needed assurance regarding the electrical feasibility of the project, and its ability to meet the constraints of both the Distribution Network Operator (DNO) and the papermaker client.

### OUR SOLUTION

Using advanced mathematical modelling techniques, Frazer-Nash conducted an electrical power system analysis of the initial concept design, and studied the potential impact of the proposed plant on the fault levels of both the industrial client and the DNO. We then constructed a computer simulation of the electrical power architecture at the client's premises using the IPSA™ modelling technique (see Fig 1). We then simulated extreme operating conditions to this model, along with a series of switching events, to analyse the load flow and maximum fault levels.

Using fault current analysis (see Fig 2) we were able to recommend to the client the size and positioning of fault limiting reactors on their network. This enabled our client to better manage the fault levels at the connecting substation within switchgear limits, and set operational restrictions resulting from the new arrangement.

### BENEFITS

Using our detailed systems analysis technology, Frazer-Nash was able to provide independent expert advice as to the overall feasibility of this concept. In particular, we were able to identify the limit of operation of the proposed design for the various operating regimes, and recommend the best options available to overcome their system's limitations, e.g. sizing of suitable fault limiting reactor devices.

### Client

Papermaker

### Business need

Validate the feasibility of the concept solution of connecting a 50MW CHP plant in an industrial site with export facilities to the National Grid

### Why Frazer-Nash?

Electrical network study capability using industry standard modelling tools such as IPSA, Amtech and Simpower.

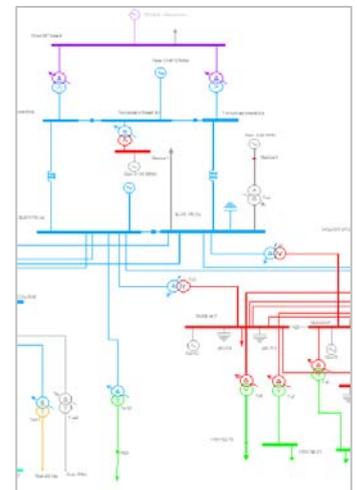


Figure 1: Electrical power system analysis of client site – using IPSA™

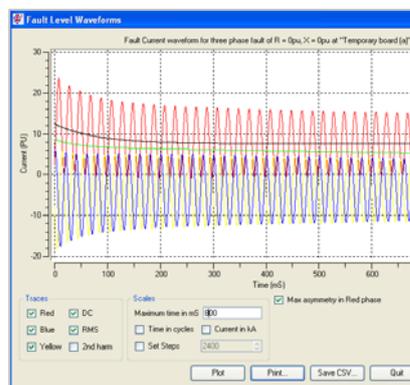


Figure 2: Fault current analysis using IPSA™

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