

# PROMAPS

## A short introduction

**PROMAPS is the only available tool developed specifically for conducting risk management in large and complex power systems. PROMAPS provides decision support by comparing the probabilities and impacts of power system failures with the cost of alternative corrective actions.**

### Connection of new production, power lines/cables or loads (electrification of offshore installations to the onshore power system)

When new production, power lines/cables or loads are connected to the grid, an impact analysis compares risk level and probable outage costs before and after the connection. A cost benefit analysis will reveal which mitigating alternative that will have the best life cycle profitability taking into consideration fault statistics and load profiles.

### Operation and maintenance planning

During operation and maintenance planning PROMAPS calculates the state of risk in the network. With the possibility to include outage costs in the calculations, PROMAPS will indicate when purchase of spinning reserve is recommended or if other power system action is necessary.

### Substation design

PROMAPS is a tool for analyzing substation design taking into account regularity and outage cost when selecting the redundancy level of the substation. Techno-economical results will justify when simpler configurations can be used for the substation design.

### Online power system operation

The highest potential of PROMAPS lies in its online capabilities. It can be integrated in the power system operator's workplace to provide a direct risk calculation based on the current state of the power system. With an intuitive user interface, PROMAPS can advise when corrective actions are needed and compares different possible actions. PROMAPS calculates the cost of the current risk level and compares this with the cost of purchasing spinning reserves, activating system protection, or other power system actions.

### Technology

PROMAPS is the only known application that has solved the intricate Markov equations for large complex power systems. By incorporating fault statistics and outage costs, a techno-economical calculation transforms the result in terms that serves as input to important decision making regarding the power system.

### Benefits

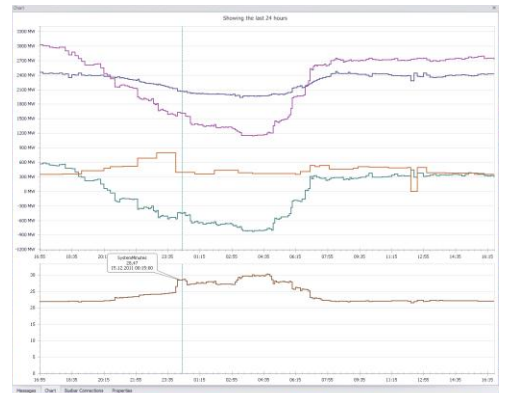
- Improved risk management support.
- Results in techno-economical terms.
- Comparison of technical solutions, risks and outage costs.
- Unsurpassed support of the operator in evaluating risk level.

### Development

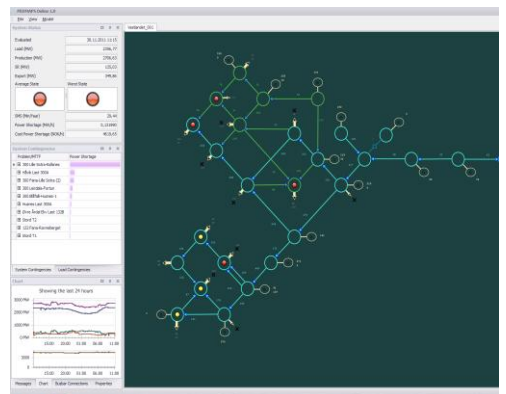
The method was developed in cooperation between Tørris Digernes, Arne Brufladt Svendsen and Yngve Aabø in 2004. Since then, the theory has been further developed by Tørris Digernes Mathconsult and Troll Power, while the use and application has been developed by Troll Power, in cooperation with Landsnet and Statnett. The development of PROMAPS is now continued by Goodtech due to the acquisition of Troll Power in 2010.

### PROMAPS references

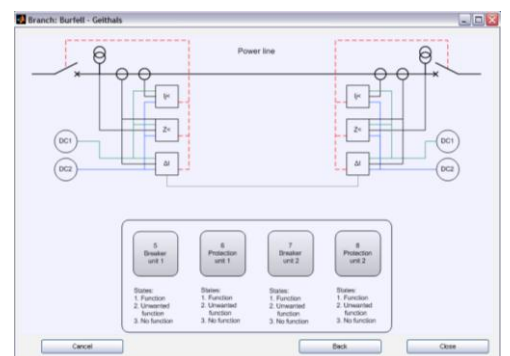
Statnett, Statoil (Troll A 3&4 pre-compressor), National Grid (UK), Eni Norge (Goliat) and Landsnet.



**Visualization of online risk data curve (brown) together with power system data curves**



**Graphical grid representation**



**Interface for data entry**

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