



# Power system analysis and consulting

## Staff and expertise

Statnett provides advanced consulting services in the fields of system studies as well as specification and design of major HVAC and DC power transmission projects. Our staff members have academic training at the M.Sc. / Ph.D. levels and extensive experience from Norwegian and international projects.

## System studies and assessments

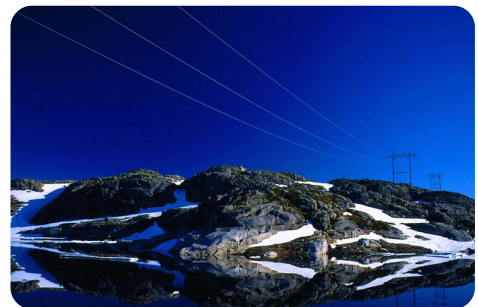
Statnett provides various types of power system studies ranging from analysing a specific technical problem in a local distribution grid or investigation of the overall behaviour of large transmission grids. Our skilled engineers also perform socio-economic and corporate / business profitability analysis of major transmission reinforcement projects.

### Load flow calculations

Analysis of the power system's stationary parameters such as transfer capacity based on thermal- and voltage related conditions, reactive power compensation and transmission losses.

### Dynamic calculations

Investigation of the power system's dynamic behaviour by studying its response to various critical faults and disturbances. The behaviour is investigated by performing simulation in the time-domain (traditional analysis) or by linear analysis in the frequency-domain (eigenvalue calculations).



### Electromagnetic transient simulations

This simulation type investigates phenomena that require a more detailed degree of modelling such as transient overvoltages, transformer non-linearities (i.e. saturation), voltage and current harmonics (generated by SVC, HVDC or other non-linear devices) and voltage imbalance.

### Reliability assessment

Assessment of system reliability by estimating customer interruption costs, for primarily importing regional grid areas.

### Transmission reinforcement planning

Profitability assessment of major transmission reinforcement projects based on investments, grid congestions, transmission losses and customer interruption costs.

## Engineering Division

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## Special expertise on devices

### High-Voltage DC (HVDC) transmission

Statnett provides expertise in integrating HVDC transmission into AC electricity grids. This includes both conventional thyristor-based converters and voltage-sourced converters (VSC). The interaction between the HVDC and the AC system, reactive power compensation, filtering, controls and recovery performance are important aspects of such projects. System studies, specification and design services are offered.

### Flexible AC Transmission Systems - FACTS

Statnett provides services on traditional thyristor-based SVC devices and forced-commutated devices based on voltage source converters with IGBT technology, such as SVC-Light and STATCOM.

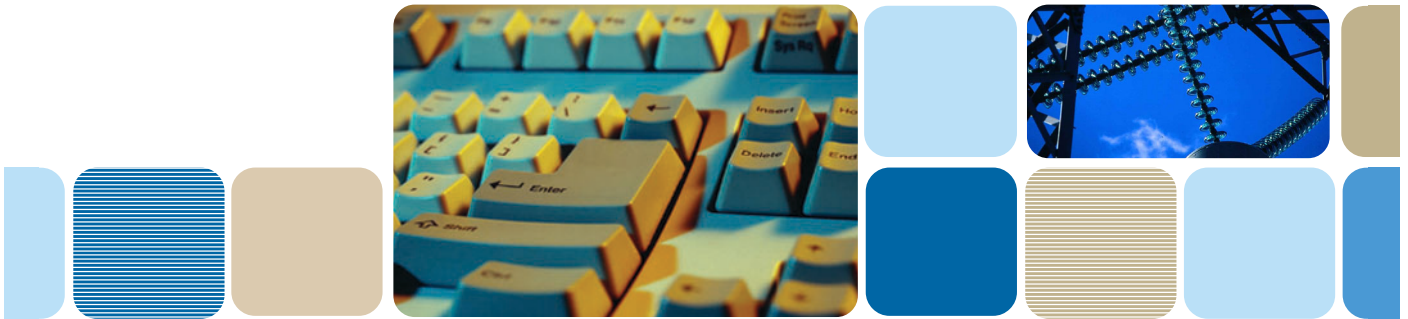
### Power system analysis software

Statnett employs software solutions developed by leading-edge power system analysis providers.

- PSS/E, TPLAN and LARA (Power Technologies Inc., USA)
- PSCAD / EMTDC (Manitoba HVDC Research Centre Inc., Canada)
- PacDyn (Cepel, Brazil)

### Assignments

Statnett offers a wide range of services from feasibility-studies to pre-engineering, as well as procurement assistance including specification and tender documentation.



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