Grid connections

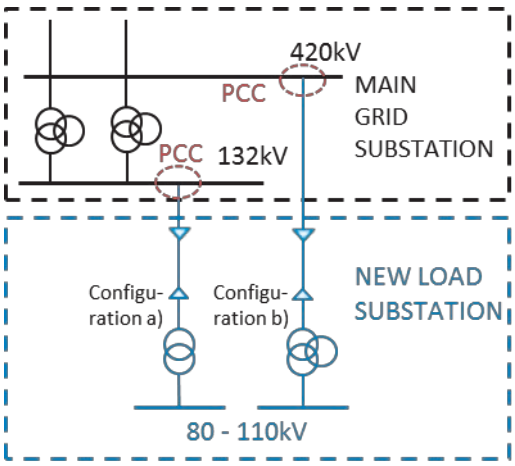
Connection of offshore installations to the onshore grid is becoming increasingly common. The general attention to sustainable use of energy and reduction of carbon emissions favors power grid supply over local, thermal generation.

In Norway, the national power system has a power surplus dominated by hydropower generation and new, renewable generation projects. Further, taxation on greenhouse gas emissions, helps in making power from shore (PFS) projects economically viable. Troll A, Valhall and Gjøa fields are already supplied with PFS. Goliat and Martin Linge fields are under construction and will also rely on PFS. Also, regulations prohibiting the use of gas turbines to drive gas compressors directly in onshore gas plants in Norway, solidify the need to connect power hungry onshore gas plants to the national, electric grid.

Onshore grid regulations differ from offshore regulations. In general, the permission and licensing processes for connections of large plants to the grid are slow. The grid connection processes may involve the local grid company, the regional grid company, the transmission system operator (TSO) — in Norway, Statnett — and the regulator — in Norway, NVE (Norwegian Water Resources and Energy Directorate). The number of grid companies involved varies with the location of the grid connection point. A connection directly at the main grid involves the TSO, only.

Several evaluations and permissions are required: License for the electrical installation (NVE), approval of the functionality of the installation (TSO), assessment of total power system: is the system strong enough to handle the new installation? If not, grid reinforcements may be required.

The land grid is an important infrastructure for all connected customers, consequently there are several legal requirements to connecting installations. Voltage performance and reactive power exchange at point of common connection (PCC) are important parameters. Reactive power exchange and the voltage quality must be within specified limits. In some cases, reactive power compensation; static, dynamic or a combination; may be necessary to fulfill the requirements.



Grid connection and point of common coupling (PCC)

Normally, the new installation is located in the proximity of the existing grid, but not at the grid connection point. The power grid solution between the grid connection point and the new facility should be evaluated.

The onshore grid characteristics and technical design differ from traditional self-supporting offshore electrical systems. Onshore, the transmission lines are exposed to forces of nature, resulting in rather frequent voltage dips and other disturbances affecting the power supply. Onshore power system neutral earthing varies with voltage levels and regions. Directly, low reactance, Petersen coil, resistive or isolated system neutral earthing.

Unitech Power Systems provides competence and knowledge regarding onshore grid connection; legislation, formal processes and technical aspects. Contact us for more information and to discuss how we can serve your needs.

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UNITECH POWER SYSTEMS

Grid connections

Application areas and services

INDUSTRIAL CONNECTIONS	MVAR COMPENSATION	WINDPOWER	APPROVAL SUPPORT	POWER GRID SOLUTIONS
• Onshore (gas) plants • Power from Shore	• Voltage performance, THD • Reactive power exchange	• Fault ride through capability • Voltage quality	• TSO requirements (FIKS) • Legal framework	• Voltage level selection • Reliability assessments

Selected project references

Year: 2013-2014
Customer: Kvaerner Stord / Norske Shell AS

Nyhamna Expansion Project

The number of very large VSD drives at Nyhamna is doubled from 3 to 6 units.

Conducted Electrical System Studies: Voltage performance during normal operation and fault conditions, dynamic and transient analysis, harmonic analysis including THDv, reactive power exchange with onshore grid and need for reactive power compensation.

Advisory services regarding grid connection.

Year: 2011-2012
Customer: Statoil

Hammerfest LNG—train II

Conducted Electrical System Studies: Voltage performance during normal operation and fault conditions, harmonic analysis, reliability assessments, grid connection voltage selection and voltage dip mitigation.

Year: 2011-2012
Customer: Total

Martin Linge Power From Shore

Conducted Electrical System Studies: verified the feasibility of a 160 km long ac cable supply, grid connection voltage selection, reactive power compensation and voltage performance at platform and grid connection point.

Year: 2013
Customer: BG Norge

Bream Field Power From Shore Study

Grid connection point selection assessment. Conducted Electrical System Studies: Grid connection voltage and need for reactive power compensation.

Year: 2014
Customer: Fred Olsen Renewables

Lista Wind Power Plant

Advisory services related to reactive power exchange with local grid and contact with local grid owner.

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