

NETS SQSS Review Panel – Modification Proposal
Modification of Clause 7.8.1.1 to Allow Single Transformer Offshore
Substations of Capacity Greater Than 90MW

Date Raised: 27th October 2014

A Panel Paper by Nigel Platt
Siemens Power Transmission

Summary

Siemens along with other manufacturers are developing new systems to provide lower cost export of offshore windfarm power to shore. A common feature of these systems is the simplification of the offshore equipment and in particular a reduction of the number of transformers on each offshore installation. The current NETS SQSS regulations appear to prevent the use of single transformer installations at power levels above 90MW: this is hampering the introduction of the lower cost solutions.

Siemens has compared a state of the art two transformer offshore substation with an installation using two of the lower cost single transformer modules and can show a positive cost benefit analysis over the lifetime of the windfarm.

Siemens would request a review of the relevant section of the NETS SQSS to allow the compliant use of the new lower cost solutions.

Users Impacted

High

Transmission System Owners and Windfarm Developers who are following the Generator Build option for their transmission links will benefit from lower capital and operational costs. These lower costs will ultimately reduce the levelised cost of offshore wind energy and benefit the consumer.

Medium

Low

Description & Background

The cost of manufacturing the structures that support offshore power transmission equipment and the transport and installation of these structures represent the largest proportion of the capital cost of an offshore substation.

As wind turbines grow in size their foundations are increasing in size and load bearing capacity. It is now possible to use a wind turbine foundation to support an optimised “mini” substation platform and to use the foundation installation vessel to install the substation module saving the cost of designing and constructing a one off foundation for the substation and also saving the cost of hiring a separate heavy lift vessel.

To create the “mini” substation, the equipment that would have been put onto one larger platform is broken down and mounted on smaller modules that are placed on their own foundation or share a foundation with a wind turbine. By breaking down the equipment into smaller modules it is possible to save a significant amount of structural steel. To enable the construction of the smaller modules it is necessary to incorporate only one large power transformer per module. This does impact the ability to cross couple circuits to provide redundancy in the event of equipment failure however the lifetime cost of the system can be shown to be lower than conventional offshore substation designs even considering the additional energy that is lost due to potential equipment failure.

At present Clause 7.8.1.1 of the NETS SQSS states that, in the case of offshore power park module only connections, and where the offshore grid entry point capacity is 90MW or more, following a planned outage or a fault outage of a single AC offshore transformer circuit on the offshore platform, the loss of power infeed shall not exceed the smaller of either: 50% of the offshore grid entry point capacity; or the full normal infeed loss risk.

The definition of offshore grid entry point capacity is stated as: the cumulative registered capacity of all offshore power stations connected at a single offshore grid entry point and/or the cumulative registered capacity of all offshore power stations connected to all the offshore grid entry points of an offshore transmission system.

This is being interpreted to mean that an offshore substation with a capacity of 90MW or greater has to have two transformers. This would prevent the use of low cost "mini" substations containing only one transformer.

Proposed Solution

We ask that the definition of the offshore grid entry point capacity is clarified to allow the use of multiple single transformer modules so long as the failure of a single module does not reduce the overall system transmission capacity by more than 50%.

We also ask that the 90MW limit stated in clause 7.8.1.1 is removed and the clause modified to allow the use of innovative solutions where it can be shown that these solutions offer the lowest overall lifetime cost of power transmission for the windfarm.

Assessment Against NETS SQSS Objectives

[Will the proposed changes to the NETS SQSS better facilitate any of the NETS SQSS objectives?]

(i) facilitate the planning, development and maintenance of an efficient, coordinated and economical system of electricity transmission, and the operation of that system in an efficient, economic and coordinated manner;

The proposal would allow the use of lower cost solutions for the transmission of power from offshore windfarms, so lowering the overall cost of energy to consumers.

(ii) ensure an appropriate level of security and quality of supply and safe operation of the National Electricity Transmission System;

Not Applicable

(iii) facilitate effective competition in the generation and supply of electricity, and (so far as consistent therewith) facilitating such competition in the distribution of electricity; and

Not Applicable

(iv) facilitate electricity Transmission Licensees to comply with their obligations under EU law.

Not Applicable

Impact & Assessment***Impact on the NETS SQSS***

We request that clause 7.8.1.1 of the current NETS SQSS be modified.

Impact on the National Electricity Transmission System (NETS)

None

Impact on greenhouse gas emissions

The use of smaller power transmission modules will result in the reduction in the quantity of structural steel used and this in turn will reduce greenhouse emissions through lower material use and lower emissions from the transport of material.

Impact on relevant computer systems

None

Impact on core industry documents

None foreseen

Impact on other industry documents

None foreseen

Supporting Documentation

Have you attached any supporting documentation: [YES/NO] (Will be presented in person at the NETS SQSS Review Panel Meeting)

If Yes, please provide the title of the attachment:

Recommendation

The NETS SQSS Review Panel is invited to:

Progress this issue to a Working-Group for further analysis and discussion.

Document Guidance

This document is used to raise a Modification Proposal at the NETS SQSS Review Panel. Incomplete forms will not be processed and the Proposer may be asked to clarify any information that is not clear.

Guidance has been provided in square brackets within the document but please contact the NETS SQSS Review Panel Secretary: Nick Martin (nick.martin@nationalgrid.com) and/or box.SQSS@nationalgrid.com) if you have any queries.