GUIDANCE NOTE:

USE OF SINGLE TRANSFORMER OFFSHORE PLATFORMS FOR OFFSHORE GENERATION CONNECTIONS GREATER THAN 90MW

SQSS definition of offshore grid entry point capacity

Issue: 2.0

Author(s): Charles Balderston (EDF-ER), on behalf of NGET GSR020 Working Group

Publication date: August 2015

Review period: Annually

This note provides guidance on interpretation of SQSS to parties intending to submit an application in relation to an offshore generation connection for a capacity greater than 90MW.

For information related to a specific connection, please contact transmissionconnections@nationalgrid.com

For additional information related to the contents of this guidance note please contact BOX.SQSS@nationalgrid.com

NATIONAL GRID INDUSTRY GUIDANCE NOTE					
Document number:	SQSS GSR020 – GN01				
Document title:	Use of single transformer offshore substations greater than 90MW				
Issue. No	**Date [DD-MMM-YY]**	**Description**	**Prepared**	**Checked**	**Approved**
1.0	16-JUL-15	ISSUED FOR COMMENT	CB	NP	BS
2.0	31-JUL-15	ISSUED FOR TO SQSS PANEL	CB	NP	BS

Scope:

This note provides basic guidance to parties intending to submit a connection/design application in relation to an offshore generation connection. It explains the concept of offshore grid entry capacity, how it is defined and the changes to the design variation requirements. It provides a methodology a potential connectee may use to assess the impacts of design solutions that arise from using single transformer platforms and examples for the application of this methodology. It highlights the potential commercial and contractual benefits of these designs and the potential to avoid the need for a SQSS design variation (see CBA appendices).

Please note:

- The CBA data provided in this note is indicative. Its use within NGET has been limited to high level cost benefit analysis. The examples provided are for illustrative purpose only.
- Actual generation data will vary from site to site and from year to year due to factors such as technology, weather, fuel prices, and changes of operational regimes. This may affect the level of restriction for a specific site. The results of any analysis are indicative only.
- The CBA methodology provided is suitable for connections where the User is comparing a traditional OHVS (offshore high voltage substation) platform with a minimum of two transformer circuits against two separate single transformer platforms.
- Ultimately, whilst the option for Users to submit single transformer designs via a SQSS Design Variation has been available for a long time there has always been an associated cost, time delay and a level of uncertainty / risk in said application. This document aims to clarify means whereby the User can utilise said designs without the need for a design variation while still remaining SQSS compliant.

Introduction:

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.'

This is one of the core principals of SQSS and is commonly the starting point for the design of any given project. How a project is able to meet this requirement however has been historically restrictive for the designers and although the facility exists to submit a design variation to National Grid this is not always the optimum route for a User because it introduces risk / uncertainty / costs / time. The key point in SQSS that has a significant impact on a User's design options is the interpretation of the definition of 'offshore grid entry point capacity' as shown below;

Offshore Grid Entry Point Capacity (OffGEP Capacity):

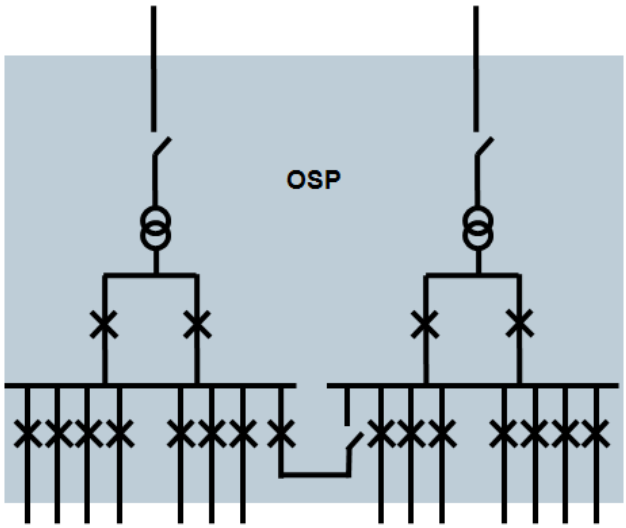
'*The cumulative registered capacity of all offshore power stations connected at a single offshore grid entry point and/or the cumulative registered capacity of all offshore power stations connected to all the offshore grid entry points of an offshore transmission system '.*

The way the above definition has been interpreted in the past has resulted in designs that are natively SQSS compliant without the need for a design variation but are always based on having two transformer circuits at each grid entry point and not to treat a given design as an accumulation of offshore grid entry point capacity. By interpreting things in this way it of course allows for the most robust infrastructure for the end customer, however as technology moves forward that can yield further cost benefits to the end user while still complying with SQSS clause 7.8.1.1 it has not always been a clear and easy path to introduce such designs in the knowledge they will comply with SQSS natively.

The aim of this guidance note is to clarify the definition of Offshore Grid Entry Point Capacity and to highlight some high level design opportunities that will allow more flexibility for Developers to use single transformer platforms without the need for a design variation.

Design:

A common (but not unique) design for an offshore substation at any single grid entry point is shown below:



Offshore platform consists of two transformer circuits in order to meet SQSS security requirements.

Each circuit is connected by a normally open bus bar or possibly cable interconnector rated equal to the export cable; this is not a requirement, only a recommendation

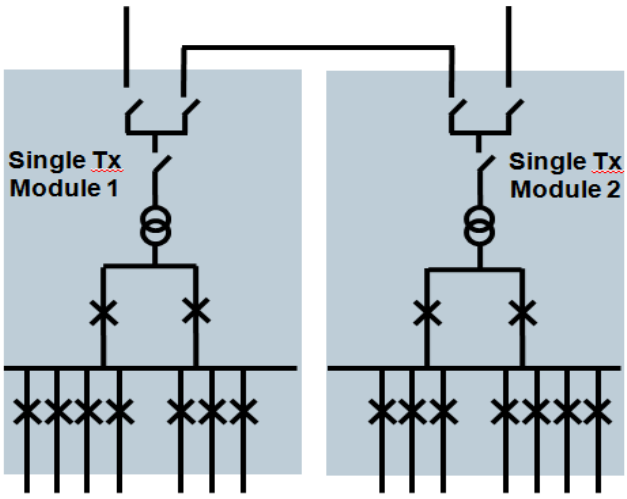
Each transformer has two connections to its respective bus bar section. But one connection is accepted.

Both circuits are contained on a single physical platform

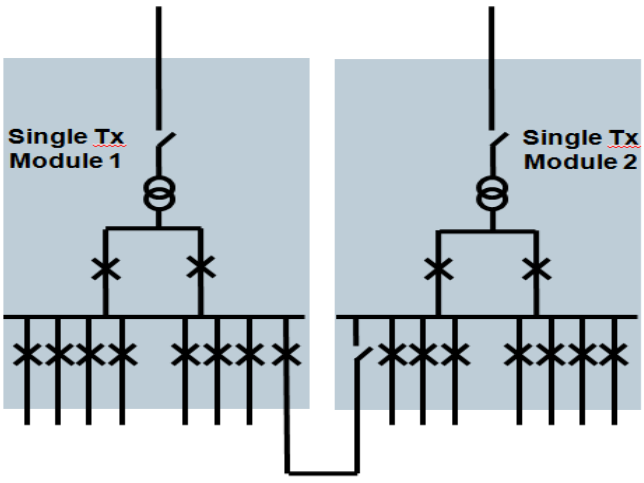
If there is more than one offshore platform it is treated as a separate grid entry point that must be SQSS compliant.

This guidance note offers the opportunity for the industry to natively explore different designs based around a minimum of two separate single offshore transformer platforms; as of the publication date of this document NGET will no longer expect that designs based on this principal will require a design variation in order to be SQSS compliant.

Some typical examples for design options are shown below but please note these examples are not the only ways to comply with SQSS:



Example 1: two platforms linked by HV interconnector



Example 2: two platforms linked by MV Interconnector

- Both examples above comply with the requirement of not losing more than 50% of total registered park size capacity. In fact even if there was no interconnector of any kind two single platforms would still meet this requirement, subject to equipment and cable ratings.
- When using multiple single transformer platforms connection applications will be accepted based on the definition of the OffGEP, i.e. 'the cumulative registered capacity of all offshore power stations connected to all the offshore grid entry points of an offshore transmission system'. This will negate the need for multi-platform single transformer designs to submit a SQSS design variation.

Summary:

The existing SQSS standard document already allows for the use of multiple single transformer platforms based on the second definition of the offshore grid entry capacity. This guidance note is issued to confirm that designs submitted based on the OffGEP definition – '*the cumulative registered capacity of all offshore power stations connected to all the offshore grid entry points of an offshore transmission system'* will no longer automatically require a design variation. National Grid accepts that project designs that use this definition of OffGEP is a valid approach as long as the design complies with the core requirements of SQSS clause 7.8.1.1.

As further clarification it should be noted that clause 7.8.1.1 clearly refers to the offshore capacity as a fixed registered park size (e.g. 500MW) and does not mandate that a given design must be able to export 50% of available power at any one time during a fault or outage. For example, if there are two single transformer platforms with an interconnector and one of the export cables failed then the design would still be compliant regardless of whether the interconnector was rated for export loads or just life support.

Finally, this note is intended to provide guidance and illustrative examples only. The associated high level cost benefit analysis is not project specific and it is the responsibility of the User to determine the level of security and redundancy that provides the most cost effective solution for their project / plant within the boundaries of SQSS.