



# GSR026- Adding Non-Standard Voltages to the SQSS

Louise Trodden  
National Grid ESO

# Introduction

## History

GSR0021 was raised in 2015 to look at reviewing incorporating 220kV transmission assets into the SQSS.

This was subsequently rejected by Ofgem as it did not offer a solution to further nominal voltages potentially requiring review and addition to both the SQSS and the network.

Future proof- additional equip  
Not urgent no customers- limited potential

[Decision Letter from Ofgem](#)  
[GSR0021 Industry Consultation Paper](#)

## Proposal

Raise a new modification in response to Ofgem's decision letter dated July 2016.

The objective of this modification will be to capture any future equipment with varying nominal voltages – therefore avoiding frequent amendments to the SQSS and also the Grid Code. The aim will be to do this using defined terms where possible and creating a table of voltages similar to that in the EU codes in both the SQSS and the Grid Code.

# Where are these cables?

## Current Locations

The Kintyre-Hunterston subsea AC link has two subsea cables between Crossaig on the Kintyre peninsula and Hunterston.

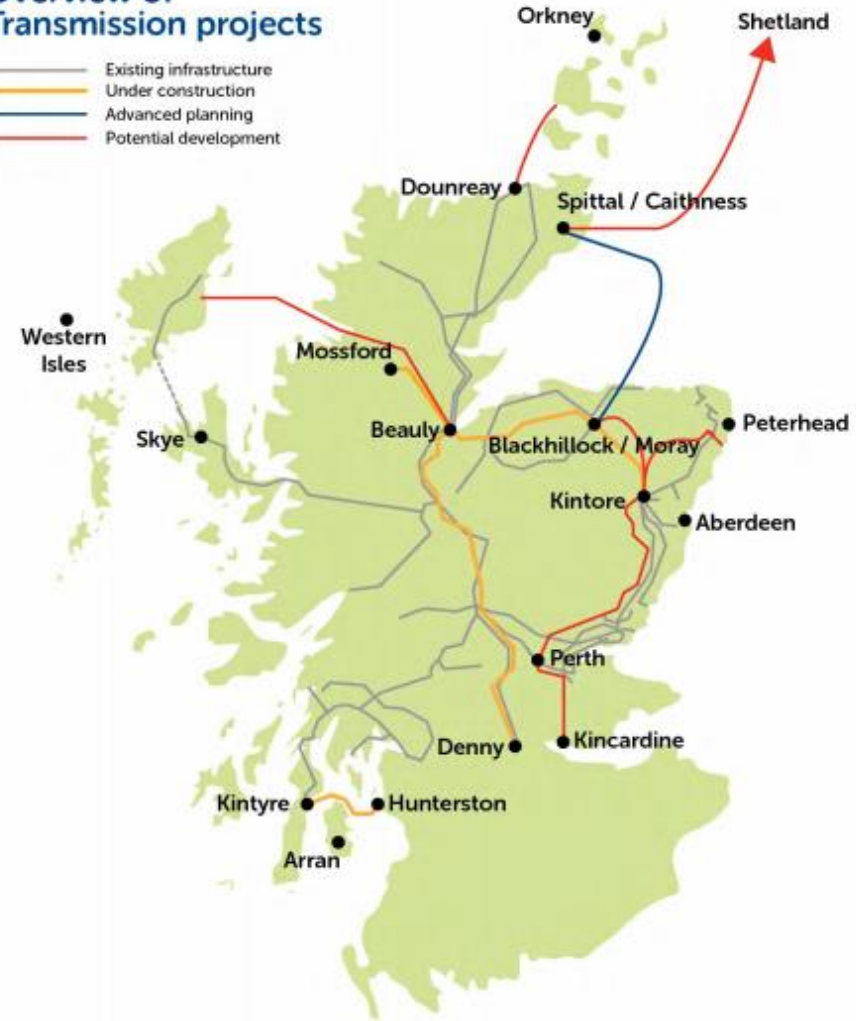
These are connected to the Onshore Transmission System via two 400/220kV supergrid transformers at Hunterston and via two 220/132 kV transformers at Crossaig.

## Future

220kV is common EU transmission voltage. It is possible that further equipment of other common voltages (Eg: 380kV, 110kV) could be connected to the GB system in the future.

### Overview of Transmission projects

- Existing infrastructure
- Under construction
- Advanced planning
- Potential development



# Why should we review?

## Clarity of Requirements

- Unclear what specification or performance is required from equipment at voltages not currently specified within the codes.

## Consistency

- SQSS and Grid Code need to be aligned.

## Specification

- In including specifications for equipment at voltage not currently covered by the codes.

# What Areas of Code are to be Reviewed?

Section of SQSS	SQSS Reference Points
Voltage Limits in Planning and Operating the Onshore Transmission System	Tables 6.1, 6.2, 6.3 and 6.4
Terms and Conditions	Supergrid Definition

Version : NETS SQSS v2.4 April 2019

Please note that there are no planned changes to Chapter 10 (Offshore Voltages) They already have a range of voltage requirements listed.



## Current SQSS Example

## Proposed SQSS Example

Table 6.1 Pre-Fault Steady State Voltage Limits and Requirements in Planning Timescales

<b>(a) Voltage Limits on Transmission Networks</b>		
Nominal Voltage	Minimum ( <b>Note 1</b> )	Maximum
400kV	390kV (97.5%)	410kV (102.5%) <b>Note 2</b>
275kV	261kV (95%)	289kV (105%)
132kV	125kV (95%)	139kV (105%)
<b>(b) Voltages to be Achievable at Interfaces to Distribution Networks</b>		
Nominal Voltage		
Any	105% at forecast <i>Group Demand</i> ; 100% at forecast <i>Minimum Demand</i> , or as otherwise agreed with the relevant Network Operator	

Table 6.1 Pre-Fault Steady State Voltage Limits and Requirements in planning timescales

<b>(a) Voltage Limits on Transmission Networks</b>		
Nominal Voltage	Pu	Normal Operating Range
>300- 400kV	0.975 pu-1.025 pu***	± 2.5% ( <b>Note 1 and 2</b> )
>200kV-300kV	0.95pu-1.05pu**	± 5%
<200kV	0.95pu-1.05pu*	± 5%
<b>(b) Voltages to be Achievable at Interfaces to Distribution Networks.</b>		
Nominal Voltage		
Any	1.05 pu at forecast Group Demand 1.00 pu at forecast Minimum Demand or as otherwise agreed with the relevant Network Operator.	

### Notes

- It is permissible to relax these to the limits specified in Table 6.2 if:
  - following a *secured event*, the voltage limits specified in Table 6.2 can be achieved, and
  - there is judged to be sufficient certainty of meeting Security and Quality of Supply Standards in operational timescales.
- It is permissible to relax this to 420kV (105%) if there is judged to be sufficient certainty that the limit of 420kV (105%) can be met in operational timescales.

### Notes

- It is permissible to relax these to the limits specified in Table 6.2 if:
  - following a secured event, the voltage limits specified in Table 6.2 can be achieved, and
  - there is judged to be sufficient certainty of meeting Security and Quality of Supply Standards in operational timescales.
- It is permissible to relax this to 420kV (105%) if there is judged to be sufficient certainty that the limit of 420kV (105%) can be met in operational timescales.

# Questions from previous meetings

## Grid Code

### Are we compliant?

We believe that we are still compliant- this did not seem to be a concern to Ofgem in the previous rejected modification as no customers are currently connected.

### At the values set right in the tables?

The tables have had the values amended to show Greater or Less than. Rather than 200-300kV and 300-400kV.

### Why would we change the CC when this is for new connections?

We would like to keep consistency through the codes. There are no changes to the specifications, just the layout.

**What about the Electrical Standards-** Have requested this information from internal and external parties.

## SQSS

### Will IEC standards be aligned?

There appears to be no conflict upon review.

### The pu value on the table does not match

The table had a error on the presentation- it was the Grid Code, however within the legal text, it was correct.

### Will the current cables work to those ranges?

Roddy Wilson at SEE has confirmed that the Kintyre – Hunterston cables are capable of operating over the voltage ranges set out in the proposal for the SQSS.

### Is the 200kV cut off ok with the operational limits?

These values were derived from the previous papers that were submitted. (SQSS modification paper dated the 1<sup>st</sup> April 2015)

### What about Offshore specification in Chapter 10?

There are no changes to specification, just the layout of what is already in the codes, however in this case we are not changing the layout of Chapter 10 as this already has ranges of voltages

## Summary

This modification is fairly straight forward in that there are not complex changes to be made, and uses the same principles and technical detail of that in the previously rejected modification from Ofgem. Its also worth noting that in the initial papers submitted it was the preferred approach to have a range of voltages in the table.

Having said this, it has been reworked to create flexibility of further nominal voltages being introduced in GB, therefore reducing the need to update the codes with further nominal voltages to support alignment for both the Grid Code and SQSS.

## Next Steps

**The next slide shows the reasons for rejection by Ofgem and the response that this modification proposal makes to them.**



Authority's Assessment of the Proposed Modification	How the Proposed Modification Responds.
<p>We agree with the workgroup's change to the definition of the term "supergrid" in Chapter 11. We also agree that the voltage levels proposed by this modification proposal are aligned with IEC 60038. However, we are not convinced of the workgroup's proposed approach to including these in the SQSS.</p>	<p>There is no dispute to the term "supergrid" being updated. To keep this in the proposal. Another review of the IEC shows no conflict.</p>
<p>First, the workgroup have not provided sufficient justification for their proposal to adopt approach 1 (as described in section 3 above) for Chapter 6 while approach 2 is already used in Chapter 10 of the SQSS. We further note that the voltage limits as set out in paragraph 27, part VII "Supplies to Installations and to other Networks" of the Electricity Safety, Quality and Continuity Regulations (ESQCR) 2002 are based on approach 2. We think that the modification as proposed will produce unjustified and potentially confusing inconsistency between Chapters 6 and 10 of the SQSS and between the SQSS and ESQCR.</p>	<p>There is a range of voltages already used in Chapter 10 of the SQSS. This proposal aims to provide consistency in the code by also including a range of voltages and seeks to be aligned in its approach with EU codes.</p>
<p>We are also concerned that in the near future more changes to the SQSS may be required to reflect equipment being installed on the network at voltages different to the discrete voltages identified in the SQSS.</p>	<p>By removing specific nominal voltages and creating a table with a range, allows for other voltages to be used in the codes.</p>
<p>In terms of the timing of making the proposed changes to the SQSS, we note that the current installation of 220 kV transmission assets does not include any customer interfaces and therefore the proposed voltage limits do not apply to this installation. We do note though the possibility of 220 kV transmission network assets (as indeed those at other voltage levels) containing customer interfaces being installed in the future.</p>	<p>This change allows flexibility for any future assets to be clear on the requirements and specifications for each nominal voltages.</p>
<p>Given the above concerns, we believe that the workgroup and the SQSS Panel should consider the consistency between Chapters 6 and 10 voltage limits and review the options available to them to find an enduring solution that withstands the current technological limitations, whilst avoiding frequent and unnecessary changes to the SQSS.</p>	<p>This proposal seeks to create tables with voltage ranges so that there are consistencies in voltage limits and allows for further nominal voltages to be introduced without the need to frequently update the codes.</p>

## Time Line of Proposed Next Steps

