SQSS Modification Proposal Form	At what stage is this document in the process?
# GSR026 ## Mod Title: Adding Non-Standard Voltages to the SQSS. .	01 Proposal Form 02 Industry Consultation 03 Modification Report

Purpose of Modification: Following the rejection of modification GSR0021[1] to the System Quality and Standards of Supply (SQSS) by Ofgem, this modification is being raised to seek modifications to the SQSS. A separate modification will be raised to modify the Grid Code. The modifications are looking to incorporate equipment at nominal voltages other than those that are currently used within the Codes. It is also proposed to align the SQSS with the Grid Code with the term 'supergrid' being referred to as a voltage over 200kV.

	**The Proposer recommends that this modification should be:** • proceed to Consultation This modification was raised *16 04 2020* and will be presented by the Proposer to the Panel on *27 04 2020.* The Panel will consider the Proposer's recommendation and determine the appropriate route.
	**High Impact**: None.
	**Medium Impact:** Any users subject to requirements of the Grid Code installing equipment at novel voltages, who will gain clarity.
	**Low Impact**: Users subject to requirements of the Grid Code of equipment at standard voltages who will see no change.

[1] https://www.nationalgrideso.com/codes/security-and-quality-supply-standards/modifications/gsr021-operational-and-planning-criteria

Contents

Timetable

The Code Administrator recommends the following timetable:

Code Administration Consultation Report issued to Industry	May 2020 in-line with Grid Code modification
Final Modification Report presented to Panel	June 2020
Final Modification Report issued the Authority	June 2020
Decision implemented in SQSS	Following Authority approval & consultation

Any questions?

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Proposer Details

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Attachments (No): **If Yes, Title and No. of pages of each Attachment:**	

Impact on Core Industry Documentation.

Please mark the relevant boxes with an "x" and provide any supporting information

BSC	
CUSC	
STC	
Grid Code	X
Other	

This modification proposal endeavours to apply consistency to the SQSS alongside Grid Code changes. A separate Grid Code modification has been raised at the April panel under GC0142.

1 Summary

Defect

A previous modification, (GSR0021) to include 220kV assets into the SQSS was rejected by Ofgem in July 2016. This was for the following reasons:

- There were concerns regarding the original proposal having only considered the addition of 220kV as a nominal voltage and did not cover future technological advancements or subsequent new voltage rates.
- The original proposal was also not detailed enough to differentiate how both on and offshore voltages were reported in chapter 6 and chapter 10 of the SQSS.

These assets are currently situated at the Kintyre-Hunerston subsea AC link with two subsea cables between Crossaig on the Kintyre peninsula and Hunterston. The connection to the Onshore transmission system is via two 400/20kV supergrid transformers at Hunterston and via two 200/123kV transformers at Crossaig. Whilst there is currently no user equipment directly affected by the new voltage, 220kV assets are not currently specified within the SQSS.

This defect remains however, this modification now seeks to expand the Grid Code to clarify the requirements that will be placed on equipment at non standard voltages. For reference, currently 400kV, 275kV and 132kV are voltages typically referred to within the SQSS. This means that any other nominal voltages specification and requirements are not defined in the code.

What

The proposer suggests that by removing specific nominal voltages from the relevant clauses of the SQSS, this will align better with the treatment given in the European Network Codes and cover any technical or subsequent introduction of new voltages in the future. (It is worth noting that other standard EU voltages are 110kV, 220kV and 380kV) Also ensuring these changes are aligned with the SQSS.

In the Grid Code assets over 200kV are defined as supergrid assets. Currently, the defined term in the SQSS states supergrid assets at 275kV and above. To seek further alignment with the Grid Code, this modification also seeks to propose that the same defined term apply in the SQSS.

Why

The proposed changes to the SQSS should ensure that current and future voltages within the transmission network have clear specification and performance requirements. By including specifications for voltages in such a way that will enable consistency for both the SQSS and the Grid Code.

How

The legal text to embody this modification relies on the use of voltage ranges for equipment to ensure that all future possibilities are captured and so better aligning the

SQSS and Grid Code with an approach followed in EU codes using a table of voltages and the specifications to suit.

2 Governance

Requested Next Steps

This modification should:

- proceed to Consultation

As the legal text for this proposal is complete and straightforward, in the Proposer's view a workgroup may not be necessary.

3 Why Change?

Following the rejection of GSR0021, and the request to reassess the consistency of approach to defining voltage limits, this proposal seeks to change the way both nominal, and operational and planning voltages are categorised within both the SQSS and Grid Code. By aligning with the Grid Code in the process, this shows consistency across the codes, and using similar formats to that of EU code should support the authorities request to avoid changes to the codes, should further nominal voltages be introduced to the system.

4 Code Specific Matters

Technical Skillsets

Understanding the previously rejected SQSS modification for GSR0021 and understanding of the structure of the relevant sections of the SQSS would be helpful but not essential – the principles of this change are straightforward.

Reference Documents

Decision Letter from Ofgem - GSR021. This decision letter from Ofgem outlines the reason for this proposal.

GSR0021 Industry Consultation Paper This paper outlines the history to the previous modification.

5 Solution

The modification will update the SQSS with the changes outlined in Section 9- ‘’Legal Text’’ to ensure that nominal voltages other than those used as standard in GB (132kV, 275kV, 400kV) can be accommodated for equipment connecting to the system.

6 Impacts & Other Considerations

Current and future parties that are subject to the SQSS and Grid Code when connecting to the transmission system.

These changes aim to make it clearer for those connecting to the transmission system what performance and specification should be followed at each nominal voltage. Additionally, this modification allows for consistency with the changes being proposed to the Grid Code.

When the previous modification GSR0021 was raised, the consensus was that this was positive change for National Grid, Scottish Power (SPT), Scottish Hydro Electric and Transmission (SHE Transmission) and no detriment to the modification was identified therefore there should not be any significant reasons for not proceeding.

Does this modification impact a Significant Code Review (SCR) or other significant industry change projects, if so, how?

None expected

Consumer Impacts

None expected

7 Relevant Objectives

Impact of the modification on the SQSS objectives:	
Relevant Objective	Identified impact
(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;	Positive
(ii) ensure an appropriate level of security and quality of supply and safe operation of the National Electricity Transmission System;	Positive

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

To support the alignment of the EU codes and facilitate the future of the system.

8 Implementation

Implementation of this modification will only require minor amendments to the legal text of the SQSS and with alignment to a similar change being taken forwards in the Grid Code.

Given that the SQSS modification was initially rejected in 2016 with the request to further review, we should move forward with the proposal, however, given there are no customer connections at this voltage as quoted in Ofgem's decision letter, this was not a high priority.

Implementation should occur as standard on completion of the modification and approval by Ofgem. The application should apply to all new and existing equipment but no changes in costs for specifications or system changes are envisaged. SEE have confirmed that the equipment currently installed (Kintyre-Hunterston) can comply with the operational limits specified.

9 Legal Text

11- Terms and Conditions

Supergrid	That part of the national electricity transmission system operated at a nominal voltage of 200kV ~~275kV~~ and above.

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

(a) Voltage Limits on Transmission Networks		
Nominal Voltage	PU Value	Minimum/Maximum
>300-400kV	0.975 pu-1.025 pu***	+/-2.5% **(Note 1 and 2)**
>200-300kV	0.95 pu-1.05 pu**	+/- 5%
<200kV	0.95 pu-1.05 pu*	+/- 5%
(b) Voltages to be Achievable at Interfaces to Distribution Networks.		
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

1. It is permissible to relax these to the limits specified in Table 6.2 if:

(i) following a secured event, the voltage limits specified in Table 6.2 can be achieved, and

(ii) there is judged to be sufficient certainty of meeting Security and Quality of Supply Standards in operational timescales.

2. 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

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

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

Notes

1. It is permissible to relax these to the limits specified in Table 6.2 if:
   (i) following a *secured event*, the voltage limits specified in Table 6.2 can be achieved, and
   (ii) there is judged to be sufficient certainty of meeting Security and Quality of Supply Standards in operational timescales.
2. 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.

Table 6.2: Steady State Voltage Limits and Requirements in Planning Timescales

(a) Voltage Limits on Transmission Networks		
Nominal Voltage	PU Value	Minimum/Maximum
>300-400kV	0.95 pu-1.025 pu***	-5% / +0.25% **Note 3 and 4**
>200-300kV	0.90 pu-1.05 pu**	-10% / + 5%
<200kV	0.90 pu-1.05 pu*	-10% / + 5%
(b) Voltages to be Achievable at Interfaces to Distribution Networks.		
Nominal Voltage	See below for the minimum voltage that must be achievable. Must always exceed lower limits of Table 6.4 (b)	+5%
(c) Voltages to be Achieved at Interfaces to Distribution Networks		
Any	**Note 5** 1.00 pu at forecast *Minimum Demand* or as otherwise agreed with the relevant Network Operator.	

Notes

3. It is permissible to relax this to 360kV (-10%) if the affected substations are on the same radially fed spur post-fault, and:

(i) there is no lower voltage interconnection from these substations to other supergrid substations; and

(ii) no auxiliaries of large power stations are derived from them.

4. It is permissible to relax this to 420kV (+5%) if there is judged to be sufficient certainty of meeting Security and Quality of Supply Standards in operational timescales, and operational measures to achieve these are identified at the planning stage.

5. May be relaxed downwards following a secured event involving the outage of a Grid Supply Transformer, provided that there is judged to be sufficient certainty that the limits of Table 6.4(b) can be met in operational timescales

Table 6.2 Steady State Voltage Limits and Requirements in Planning Timescales

(a) Voltage Limits on Transmission Networks		
Nominal Voltage	Minimum	Maximum
400kV	380kV (95%) ***Note 3***	410kV (102.5%) ***Note 4***
275kV	248kV (90%)	289kV (105%)
132kV	119kV (90%)	139kV (105%)
(b) Voltage Limits at Interfaces to Distribution Networks		
Nominal Voltage		
Any	See below for the minimum voltage that must be achievable. Must always exceed lower limits of Table 6.4(b)	105%
(c) Voltages to be Achievable at Interfaces to Distribution Networks		
Nominal Voltage	-	
Any	100% at any demand level ***Note 5*** or as otherwise agreed with the relevant Network Operator	

Notes

3. It is permissible to relax this to 360kV (-10%) if the affected substations are on the same radially fed spur post-fault, and:
   (i) there is no lower voltage interconnection from these substations to other *supergrid* substations; and
   (ii) no auxiliaries of *large power stations* are derived from them.
4. It is permissible to relax this to 420kV (+5%) if there is judged to be sufficient certainty of meeting Security and Quality of Supply Standards in operational timescales, and operational measures to achieve these are identified at the planning stage.
5. May be relaxed downwards following a secured event involving the outage of a Grid Supply Transformer, provided that there is judged to be sufficient certainty that the limits of Table 6.4(b) can be met in operational timescales.

Table 6.3: Pre-Fault Steady State Voltage Limits and Targets in Operational Timescales

(a) Voltage Limits on Transmission Networks		
Nominal Voltage	PU Value	Minimum/Maximum
>300-400kV	0.95 pu-1.05 pu***	-5% / +5% **Note 6**
>200-300kV	0.95 pu-1.09 pu**	-5% / + 9% **Note 6**
<200kV	0.95 pu-1.10 pu*	-5% / + 10% **Note 6**
(b) Voltages to be Achievable at Interfaces to Distribution Networks.		
Nominal Voltage	-	
Any	Target voltages and voltage ranges as agreed with the relevant Distribution Network Operators, within the limits of Table 6.4	

Notes

6. It is permissible to relax this to 90% at substations if no auxiliaries of large power stations are derived from them.

Table 6.3 Pre-Fault Steady State Voltage Limits and Targets in Operational Timescales

(a) Voltage Limits on Transmission Networks		
Nominal Voltage	Minimum	Maximum
400kV	380kV (95%) ***Note 6***	420kV (105%)
275kV	261kV (95%) ***Note 6***	300kV (109%)
132kV	125kV (95%) ***Note 6***	145kV (110%)
(b) Voltages to be Achievable at Interfaces to Distribution Networks		
Nominal Voltage	-	
Any	Target voltages and voltage ranges as agreed with the relevant Distribution Network Operators, within the limits of Table 6.4	

Notes

6. It is permissible to relax this to 90% at substations if no auxiliaries of *large power stations* are derived from them.

Table 6.4: Steady State Voltage Limits and Targets in Operational Timescales

(a) Voltage Limits on Transmission Networks		
Nominal Voltage	PU Value	Minimum/Maximum
>300-400kV	0.90 pu-1.05 pu***	-10% / +5% **Note 7**
>200-300kV	0.90 pu-1.09 pu**	-10% / + 9%
<200kV	0.90 pu-1.10pu*	-10% / + 10%
(b) Voltages to be Achievable at Interfaces to Distribution Networks.		
Nominal Voltage		
132kV	0.90 pu- 1.10 pu*	-10% / + 10%
At Less than 132kV	0.94 pu-1.06 pu*	-6% / +6%

Notes

7. May be relaxed to 440kV (110%) for no longer than 15 minutes following a secured event

Table 6.4 Steady State Voltage Limits and Targets in Operational Timescales

(a) Voltage Limits on Transmission Networks		
Nominal Voltage	Minimum	Maximum
400kV	360kV (90%)	420kV (105%) ***Note 7***
275kV	248kV (90%)	300kV (109%)
132kV	119kV (90%)	145kV (110%)
(b) Voltage Limits at Interfaces to Distribution Networks		
Nominal Voltage		
132kV	119kV (90%)	145kV (110%)
At less than 132kV	94%	106%

Notes

7. May be relaxed to 440kV (110%) for no longer than 15 minutes following a *secured event*.

Please note, there are no changes proposed to Chapter 10- Offshore voltage limits. These changes only apply to the onshore voltage limits as specicifed above, with the prinicple being the same having a ranges of voltages.

10 Recommendations

Proposer's Recommendation to Panel

Panel is asked to:

- Agree that this modification can proceed to Consultation

