Grid Code Modification Proposal Form	At what stage is this document in the process?

GC0146:

Mod Title: Solutions for frequency control of Power Park Modules

01	Proposal Form
02	Workgroup Consultation
03	Workgroup Report
04	Code Administrator Consultation
05	Draft Grid Code Modification Report
06	Final Grid Code Modification Report

Purpose of Modification:

This modification is proposed to modify the existing requirement for frequency control at Power Park Modules (PPM) level and allow flexibility for Users to be able to choose a control solution at BM Unit level. The proposal does not seek to modify the current frequency response, but only the way the response is achieved.

The Proposer recommends that this modification should be:

- subject to self-governance

This modification was raised **12 May 2020** and will be presented by the Proposer to the Panel on **28 May 2020.** The Panel will consider the Proposer's recommendation and determine the appropriate route.

High Impact: *None*

Medium Impact

Generators with Power Park Modules

Low Impact

National Grid ESO.

Contents

Timetable

The Code Administrator recommends the following timetable:

Initial consideration by Workgroup	dd month year
Workgroup Consultation issued to the Industry	dd month year
Modification concluded by Workgroup	dd month year
Workgroup Report presented to Panel	dd month year
Code Administration Consultation Report issued to the Industry	dd month year
Draft Final Modification Report presented to Panel	dd month year
Modification Panel decision	dd month year
Final Modification Report issued the Authority	dd month year
Decision implemented in Grid Code	dd month year

Any questions?

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Proposer Details

Details of Proposer: (Organisation Name)	Orsted Hornsea Project Three UK Ltd
Capacity in which the Grid Code Modification Proposal is being proposed: (e.g. CUSC Party)	CUSC Party
Details of Proposer's Representative: Name: Organisation: Telephone Number: Email Address:	 Nicola Barberis Negra Orsted Power (UK) Ltd 07791 903 296 nibne@orsted.co.uk
Details of Representative's Alternate: Name: Organisation: Telephone Number: Email Address:	 Sridhar Suhukari Orsted Power (UK) Ltd 07875 750 381 srisa@orsted.co.uk
Attachments (Yes/No): Yes **If Yes, Title and No. of pages of each Attachment:** "GCDF - Orsted - Frequency control for PPMs_v6_Final.pdf" – 16 pages	

Impact on Core Industry Documentation.

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

BSC	
CUSC	
STC	
Other	

This change relates to the Grid Code Connection Conditions (CC) and European Connection Conditions (ECC).

1 Summary

Defect

The current Grid Code requirement for frequency control in wind farms requires each Power Park Module to be controlled separately with dedicated frequency controller. This solution requires the use of multiple control devices and also an overall master controller with additional costs and the risk of adding instability conditions when combined with other controlling elements of the wind farms. No additional operational benefit is perceived with the current requirement of the control at the Power Park Module level compared to the control at the Balancing Mechanism (BM) Unit level. See the attached presentation from Grid Code Development Forum (GCDF) which includes technical details.

What

It is proposed to modify the Grid Code (CC and ECC) to allow Generators to choose different solutions for frequency control of Power Park Modules. The proposal does not suggest to remove the existing requirements, but to allow Power Park Modules to be controlled either independently or jointly when grouped under the same BM unit. This additional flexibility would have no impact on the capability of the system to meet the existing frequency response requirements, as these are not modified.

Why

The benefits of this additional solution are as following

- CAPEX reduction between £320-400k per offshore platform which includes reduction in controllers, measuring equipment etc.
- Use of a Combined BM Unit for the entire Offshore platform
    - Better optimisation of the power output from the individual wind turbines on a second by second basis, under both normal operation and when there are outages
    - Higher energy capture during curtailment scenarios
- The reactive power / voltage control performed with a single Wind Farm Controller (WFC) will eliminate the risk of instability due to multiple WFCs controlling the same point and reduce the risk of limiting the support that can be provided to the OFTO
- Simpler and less error-prone system
- Ørsted experience is that there is no visible benefit in having multiple WFCs for an offshore wind farm, mainly due the way the frequency control system is designed.

How

It is proposed to modify the text in the Grid Code in clauses CC.6.3.7(a) and ECC.6.3.7.3.1(a) as described in section 9 “Legal Text”. Note that this change should also be applied retrospectively.

2 Governance

This modification should be subject to self-governance

3 Why Change?

The benefits of allowing additional flexibility in choosing the most efficient solution are as following. Note that the proposed change in legal text does not change any existing requirement, but allows generators to choose an additional solution for the frequency control without any impact on providing compliant frequency response.

- CAPEX reduction between £320-400k per offshore platform which includes reduction in controllers, measuring equipment etc.
- Use of a Combined BM Unit for the entire Offshore platform
    - Better optimisation of the power output from the individual wind turbines on a second by second basis, under both normal operation and when there are outages
    - Higher energy capture during curtailment scenarios
- The reactive power / voltage control performed with a single Wind Farm Controller (WFC) will eliminate the risk of instability due to multiple WFCs controlling the same point and reduce the risk of limiting the support that can be provided to the OFTO
- Simpler and less error-prone system
- Ørsted experience is that there is no visible benefit in having multiple WFCs for an offshore wind farm, mainly due the way the frequency control system is designed.

4 Code Specific Matters

Technical Skillsets

Understanding of the GB Grid Code, EU Requirements for Generators, and specifically Frequency Control requirements for Power Park Modules

Reference Documents

Presentation from GCDF 06 May 2020

5 Solution

This modification proposes to implement the changes outlined in Section 1 “How” via changes to the Grid Code which will be outlined in Section 9 “Legal Text” (currently in progress)

6 Impacts & Other Considerations

The impact of this proposal is considered to be minimum for National Grid ESO, as the frequency response requirement is not modified, only the way the control is implemented. No further changes to existing Codes are required, apart from those presented here and related to the Grid Code (see section below “Legal Text”

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

None

Consumer Impacts

The additional flexibility in choosing a solution for frequency control will allow Users to choose a cheaper solution which would then be reflected a reduction in costs for consumers. Besides, a reduction in complexity could reduce the risk of failure in the system and ensure a more resilient network. Details to support these benefits for consumers are described in section 1 “Summary” and in section 3 “Why Change”.

7 Relevant Objectives

Impact of the modification on the Applicable Grid Code Objectives:

Relevant Objective	Identified impact
(a) To permit the development, maintenance and operation of an efficient, coordinated and economical system for the transmission of electricity	Positive
(b) Facilitating effective competition in the generation and supply of electricity (and without limiting the foregoing, to facilitate the national electricity transmission system being made available to persons authorised to supply or generate electricity on terms which neither prevent nor restrict competition in the supply or generation of electricity);	None
(c) Subject to sub-paragraphs (i) and (ii), to promote the security and efficiency of the electricity generation, transmission and distribution systems in the national electricity transmission system operator area taken as a whole;	Positive

Impact of the modification on the Applicable Grid Code Objectives:	
Relevant Objective	Identified impact
(d) To efficiently discharge the obligations imposed upon the licensee by this license and to comply with the Electricity Regulation and any relevant legally binding decisions of the European Commission and/or the Agency; and	None
(e) To promote efficiency in the implementation and administration of the Grid Code arrangements	Positive

The proposed changes will allow Users to choose a more efficient and economic solution for frequency control whilst enhancing network security to the benefit of consumers, System Operator and Regulators

8 Implementation

As the proposed solution is clarification of text only, no specific implementation requirements are foreseen, apart from modification of the legal text in the Grid Code. The requirements addressed are already covered by existing custom and practice and no changes to processes or requirements on any parties are expected. The modification should be applied retrospectively without any impact on existing Users. Implementation would be subject to Grid Code governance process.

9 Legal Text

Proposal: modify the Grid Code requirement in **CC.6.3.7** to allow wind farm developers to choose either solution for the control of frequency in the system

*"Each **Generating Unit**, **DC Converter** or **Power Park Module** […] In the case of a **Power Park Module** the Frequency or speed control device(s) may be*

i) *on the **Power Park Module;** or*
ii) *on an aggregation of **Power Park Modules** which are registered under the same **BM Unit**; or*
iii) *on each individual **Power Park Unit**; or*
iv) *a combination of i) and iii) or a combination of ii) and iii).*

[…]"

Proposal: modify the Grid Code requirement in **ECC.6.3.7.3.1 (a)** to allow wind farm developers to choose either solution for the control of frequency in the system

"*In addition to the requirements of ECC.6.3.7.1 and ECC.6.3.7.2 […] In the case of a **Power Park Module** including a **DC Connected Power Park Module**, the **Frequency** or speed control device(s) may be*

i) *on the **Power Park Module** (including a **DC Connected Power Park Module**); or*
ii) *on an aggregation of **Power Park Modules** (including a **DC Connected Power Park Module**) which are registered under the same **BM Unit**; or*

iii) *on each individual **Power Park Unit Unit** (including a **Power Park Unit** within a **DC Connected Power Park Module**) ; or*

iv) *a combination of i) and iii) or a combination of ii) and iii).*

[…]"

Text Commentary

The proposed legal text reflects the intention to allow offshore wind farm developers to choose how to design the frequency control system ensuring more flexibility is permitted, without changing the existing requirement.

10 Recommendations

Proposer's Recommendation to Panel

- Agree that Self Governance procedures should apply

