ELEXON

CP Progression Paper

Permitting the use of busbar voltage transformers within metering Codes of Practice 1 and 2

Contents

About This Document

Not sure where to start? We suggest reading the following sections:

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- Have 15 mins? Read sections 1, 4, 5 and 6
- Have 30 mins? Read all sections
- Have longer? Read all sections and the annexes and attachments
- *You can find the definitions of the terms and acronyms used in this document in the BSC Glossary*

This document provides information on a new Change Proposal (CP) and outlines our proposed progression timetable for this change, including when it will be issued for CP Consultation in the next suitable Change Proposal Circular (CPC) batch.

We are presenting this paper to the ISG on 4 April 2023 to capture any comments or questions from Committee Members on this CP before we issue it for consultation.

There are 3 parts to this document:

- This is the main document. It provides a summary of the solution, impacts, anticipated costs, and proposed implementation approach, as well as our proposed progression approach for this CP.
- Attachment A contains the CP proposal form.
- Attachment B contains the proposed redlined changes to deliver the CP solution.

Committee

Imbalance Settlement Group (ISG)

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ISG264/01

CP Progression Paper

28 March 2023

Version 1.0

1. Summary

Why change?

The size and weight of voltage transformers (VTs) used at Offshore wind farm power transformer platforms, which are subject to Offshore Transmission Owner (OFTO) arrangements[1], can significantly affect the cost and complexity of development.

Under Code of Practice (CoP) 2 'The metering of circuits with a rated capacity not exceeding 100 MVA for Settlement purposes, where Metering Equipment is installed at the wind turbine string array (string) level, the current requirement is to have a separate VT per string/circuit.

Issue 87 'Busbar voltage transformer metering for Offshore wind farms under OFTO arrangements' proposed an alternative arrangement that reduces the need for multiple VTs at the string level on Offshore wind farm power transformer platforms by allowing the placement of VTs at the busbar. As well as reducing the number of VTs required, this arrangement offers increased redundancy than the status quo and enables a higher availability of metered data for wind farms.

To recognise this configuration under the BSC, a change to CoP2 is necessary to allow busbar VTs to be used at the string level. CoP1 'The metering of circuits with a rated capacity exceeding 100 MVA for Settlement purposes' will also need to be amended to futureproof the solution as the size of wind turbine generators (WTGs) increases. Elexon is raising this CP on behalf of the Issue 87 Workgroup to progress their recommendation.

Solution

To update CoPs 1 and 2 to allow busbar VTs to be used. The solution will apply to onshore sites (generally), as well as Offshore wind farms, in line with the recommendations of the Issue 87 Workgroup.

Impacts and costs

This CP will impact Registrants, BSC Parties who are Equipment Owners, the Central Data Collection Agent (CDCA), Half Hourly Data Collectors (HHDCs), and Central Volume Allocation (CVA) and Supplier Volume Allocation (SVA) Meter Operator Agents (MOAs).

This CP will require changes to CoP1 and CoP2. The central implementation cost will be less than £1k to implement the relevant document changes. No BSC central systems changes are anticipated.

Implementation

The CP is proposed for implementation on 3 November 2023 as part of the November 2023 BSC Standard Release.

[1] Where the Offshore transmission voltage is at or above 132,000V (132kV).

2. Why Change?

What is the issue?

The size and weight of VTs used at Offshore wind farm power transformer platforms, which are subject to OFTO arrangements, can significantly affect the cost and complexity of development. This is because additional space on an Offshore platform is required to accommodate the VTs within the Gas Insulated Switchgear (GIS). This results in the need for larger Offshore platforms, leading to an increase in cost.

Under existing BSC requirements, there are two approaches that are used for metering Offshore wind turbine string arrays[2]:

1. CoP1 'The metering of circuits with a rated capacity exceeding 100 MVA for Settlement purposes' is applied where the entire project goes live at the same time and has the same owner. CoP1 Metering Systems are typically used to meter volumes at the 33kV or 66kV connection(s) to the platform transformers.

2. CoP2 'The metering of circuits with a rated capacity not exceeding 100 MVA for Settlement purposes is applied where:

    a. wind turbine string arrays are Commissioned at different stages of a wind farm project; or
    b. different wind turbine string arrays have different owners.

    CoP2 Metering Systems are installed to meter volumes at the string level for each individual array.

For Metering Systems installed at the string level (following CoP2), the current requirement is to have a separate VT per circuit (string). Its secondary winding must be dedicated to the main and check Meters. If another secondary winding is provided the check Meter can be connected to it along with any non-Settlement burden, provided overall accuracy can be maintained.

Siemens Transmission and Distribution Limited (STDL) raised Issue 87 'Busbar voltage transformer metering for Offshore wind farms under OFTO arrangements' on 3 March 2020 as they believe that there are effective alternatives to this metering set up.

Background

Offshore Transmission Owners

OFTOs are the owners of Offshore transmission assets which connect certain Offshore wind farms to the onshore electricity network.

In 2007, Ofgem and the Department of Energy and Climate Change (DECC), now the Department for Energy Security and Net Zero (DESNZ), proposed new arrangements aimed at encouraging Offshore generation. These arrangements were incorporated into the BSC at 'Go Active' (24 June 2009) and the regime fully commenced on 10 June 2014. Under the arrangements, developers of Offshore wind farms, that connect to the Transmission System (or a Distribution System) onshore, where the Offshore transmission assets convey

[2] A set of wind turbines sharing a common circuit, connected in parallel, is known as a 'string' or 'string array'.

What is a voltage transformer?

A voltage transformer is a piece of Metering Equipment that is designed to accurately measure high voltages and feed lower voltage signals to a measuring instrument, like a Meter. The primary winding is connected to the high voltage circuit being measured and it steps down the voltage in the secondary winding so this can be safely, and accurately, fed to a Meter.

electricity from or to shore at or above 132kV, need to transfer the Offshore transmission assets to an OFTO via a competitive tender process. When the assets are transferred to the OFTO, Ofgem will grant a Transmission Licence to the OFTO to operate those Offshore transmission assets.

BSC requirements for Settlement metering for Offshore wind farms

Section L of the BSC requires flows of electricity at Boundary Points and Systems Connection Points to be measured and recorded for Settlement purposes, including at Offshore wind farms that are subject to the Offshore Transmission Regime.The Metering Equipment must:

- comply with the relevant CoP for the circuit capacity/demand;
- be commissioned in accordance with CoP4 'The Calibration, Testing and Commissioning Requirements of Metering Equipment for Settlement Purposes'.

The Party responsible for the flows of electricity must register the Metering Equipment as a Metering System(s) in the relevant registration system (i.e. Central Meter Registration Service (CMRS) or a Licensed Distribution System Operator's (LDSO) Supplier Meter Registration Service (SMRS)).

For Offshore wind farms that are subject to the Offshore Transmission Regime, most of the Metering Equipment needs to be registered in CMRS as a CVA Metering System(s). Any back-up supplies, in the onshore substation, associated with the Offshore wind farm, that are fed from the Distribution System of an LDSO, must be registered in SMRS as a SVA Metering System.

What is a Boundary Point?

Boundary Point means a point at which any Plant or Apparatus not forming part of the Total System is connected to the Total System.

What is a Systems Connection Point?

A Systems Connection Point is a point of connection (whether consisting of one or more circuits) between two or more Systems excluding:

(a) a point of connection between Distribution Systems in the same GSP Group; and

(b) a point of connection between Offshore Transmission System User Assets and the Transmission System.

3. Solution

Proposed solution

Elexon presented the Issue 87 Report to the BSC Panel (315/07) at its meeting on 10 June 2021. The Issue Workgroup agreed a solution that reduces the need for multiple VTs at the string level, on Offshore wind farm power transformer platforms, by allowing the placement of VTs on the busbars that the strings connect to, and share.

Under these arrangements, two busbar VTs are used, each with a single secondary winding. The main Meters are connected to the 'main' VT's secondary winding and the check Meters are connected to the 'check' VT's secondary winding. This offers redundancy if the main VT fails as the check VT continues to feed the check Meters.

To recognise this configuration under the BSC, a change to CoP2 is necessary to allow busbar VTs to be used.

Moreover, STDL recently confirmed that as WTGs get larger in capacity, and busbar voltages increase to 132kV, string arrays will begin to need CoP1 metering. Following discussions with the Issue 87 proposer, Elexon recommends that the proposed solution should also be future proofed to cover CoP1 metering at the string level. This is because, as the size of WTGs increases, so too will the string level circuit capacities. If these go above 100MVA then CoP1 metering will be required at the string level.

The proposed solution is not intended to exclude current requirements under the status quo. The desired outcome is that the change provides optionality within the CoPs for additional configurations (i.e. placement of VTs at the busbar) that parties are free to choose, should they wish to.

Finally, having considered the benefits to this approach, the Issue 87 Workgroup believes it would be appropriate for the solution to apply to onshore sites (generally), as well as Offshore wind farms.

Although the solution proposed for CoPs 1 and 2 could be extended to CoP3 and, in a different (unspecified) form, CoP5, Elexon recommends limiting the scope to CoPs 1 and 2 as this is where we believe the most benefit will be derived. It is likely that most CoP3 connections will not have more than two feeder circuits fed from a single, electrically separate busbar and thus benefit by fitting only two VTs. CoP5 does not require a check Meter so this solution would not be appropriate and would not provide the redundancy this solution provides.

Proposer's rationale

Wind is recognised as being an important source of renewable energy, but significant size and weight requirements can make developing new wind farms complex and costly. This ultimately has a negative effect on end customers who have to fund this through their energy bills.

The Issue 87 Proposer believes that if a solution to reduce the requirement of VTs in Metering Systems can be delivered, then new projects can be secured with lower investment costs. Savings could be expected to scale with the capacity of the site - therefore a 1 gigawatt (GW) site could expect savings of around £1 million, with a 1.5 GW site expecting savings of around £1.5 million. This will ultimately support competition by making new projects more viable, which will benefit the end consumer.

The Issue 87 Workgroup also identified the following benefits:

- The solution offers increased redundancy than the status quo and enables a higher availability of metered data for wind farms. This is because the main Meters are connected to one VT and the check Meters are connected to a separate VT. The failure of a VT would not impact on the Metering System which allows for a greater quality of data entering Settlement in these instances.

- There is an environmental benefit in that any reduction in VTs will lead to a reduction in the greenhouse gas Sulphur Hexafluoride (SF6) which is used to make VTs and would ultimately end up in the atmosphere via leakage.

- A solution that decreases the likelihood of engineers needing to perform maintenance, on a hard-to-reach site, may offer operational safety benefits.

Proposed redlining

The proposed redlining to CoP1 and CoP2 can be found in Attachment B.

4. Impacts and Costs

BSC Party & Party Agent impacts and costs

Elexon anticipates low impacts to the following BSC Parties and Party Agents. We will seek to confirm these through the CP consultation.

BSC Party & Party Agent Impacts	
BSC Party/Party Agent	**Impact**
Registrants	Registrants will have to agree more estimates (sent by the HHDC or CDCA) if a 'main' busbar VT fails. However, instead of replacing estimates with non-Settlement metered data, the Registrant could simply agree the (validated) check Meter data for all of the circuits affected. Estimates from the check Meters should be accurate and therefore easier to agree. Registrants will also need to ensure that busbar VTs are Commissioned correctly in accordance with CoP4 (usually via their appointed MOA), in particular where the owner of the VTs is not a BSC Party.
BSC Parties (Equipment Owners)	Equipment Owners (i.e. a person which is the owner of Metering Equipment, such as VTs, comprised in that Metering System but is not the Registrant of that Metering System) will need to ensure that their busbar VTs are Commissioned correctly in accordance with CoP4.
CDCA	The CDCA will be required to estimate more in the event of a failure of a main busbar connected VT compared to a circuit connected VT. This is because a busbar VT secondary winding will be supplying multiple main Meters (or multiple check Meters) for multiple circuits. Multiple sets of estimates would therefore be needed. In the case where the faulty busbar VT feeds multiple main Meters, the CDCA will estimate using check Meter data.
HHDCs	HDDCs may be impacted as busbar VTs could be used for SVA Metering Systems. For SVA registered Metering Systems, HHDCs will also need to do more metered data estimation in the event of a fault with a busbar connected VT, versus a circuit connected VT. In the case where the faulty busbar VT feeds multiple main Meters, the HHDC will estimate using check Meter data.
CVA and SVA MOAs	CVA and SVA MOAs may need to update internal processes/documents to ensure that, where a busbar VT has been used, that the main and check Meters are connected correctly and have been Commissioned correctly in accordance with CoP4.

Central impacts and costs

Central impacts

This CP will require changes to CoP1 and CoP2. No central system changes are anticipated.

Central Impacts	
Document Impacts	**System Impacts**
• Code of Practice (CoP) 1 'The metering of circuits with a rated capacity exceeding 100 MVA for Settlement purposes'	• None
• CoP 2 'The metering of circuits with a rated capacity not exceeding 100 MVA for Settlement purposes	

Impact on BSC Settlement Risks

Impact on BSC Settlement Risks

The following risks cover the installation and Commissioning of VTs:

003 'SVA Risk: Metering Equipment Installations are incorrect'
020 'CVA Risk: CVA Metering Equipment Installation and Commissioning'

This CP could increase the materiality of both of these risks as with any new process there is more opportunity for error. However, CoP4 is an existing control around Commissioning Metering Equipment and will not need to be amended for busbar VTs. Elexon can also utilise techniques such as education and audits to mitigate and identify any potential error.

This CP impacts 021 'CVA Risk: Retrieval and Processing of Metered Data' and 007 'SVA Risk: Metered Data is not retrieved' as the CDCA or HHDC will be required to estimate more in the event of a failure of a main busbar connected VT compared to a circuit connected VT. However, where the faulty busbar VT feeds multiple main Meters, the CDCA or HHDC will estimate using check Meter data which should be more accurate than replacing estimates like zero data (for generation sites) or trended data (for demand sites) with non-Settlement metered data.

Central costs

The central implementation costs for this CP will be less than £1k to implement the document only changes.

5. Implementation Approach

Recommended Implementation Date

This CP is recommended for implementation on 3 November 2023 as part of the standard November 2023 BSC Release.

6. Proposed Progression

Progression timetable

The table below outlines the proposed progression plan for this CP:

Progression Timetable	
Event	**Date**
CP Progression Paper presented to ISG for information	4 Apr 2023
CP Consultation	11 Apr 2023 – 9 May 2023
CP Assessment Report presented to ISG for decision	6 Jun 2023
Proposed Implementation Date	3 Nov 2023 (Nov 23 Release)

CP Consultation questions

We intend to ask the standard CP Consultation questions for this CP. We do not believe any additional questions need to be asked for this CP.

Standard CP Consultation Questions
Do you agree with the proposed solution?
Do you agree that the draft redlining delivers the proposed solution?
Will this CP impact your organisation?
Will your organisation incur any costs in implementing this CP?
Do you agree with the proposed implementation approach for this CP?

7. Recommendations

We invite you to:

- **NOTE** the proposed progression timetable for the CP; and
- **PROVIDE** any comments or additional questions for inclusion in the CP Consultation.