Public

Issue 87

Busbar voltage transformer metering for Offshore wind farms under OFTO arrangements

6 July 2020
ELEXON

Meeting objectives

- Consider the potential solutions to Issue 87;
- Discuss related areas; and
- Agree next steps.

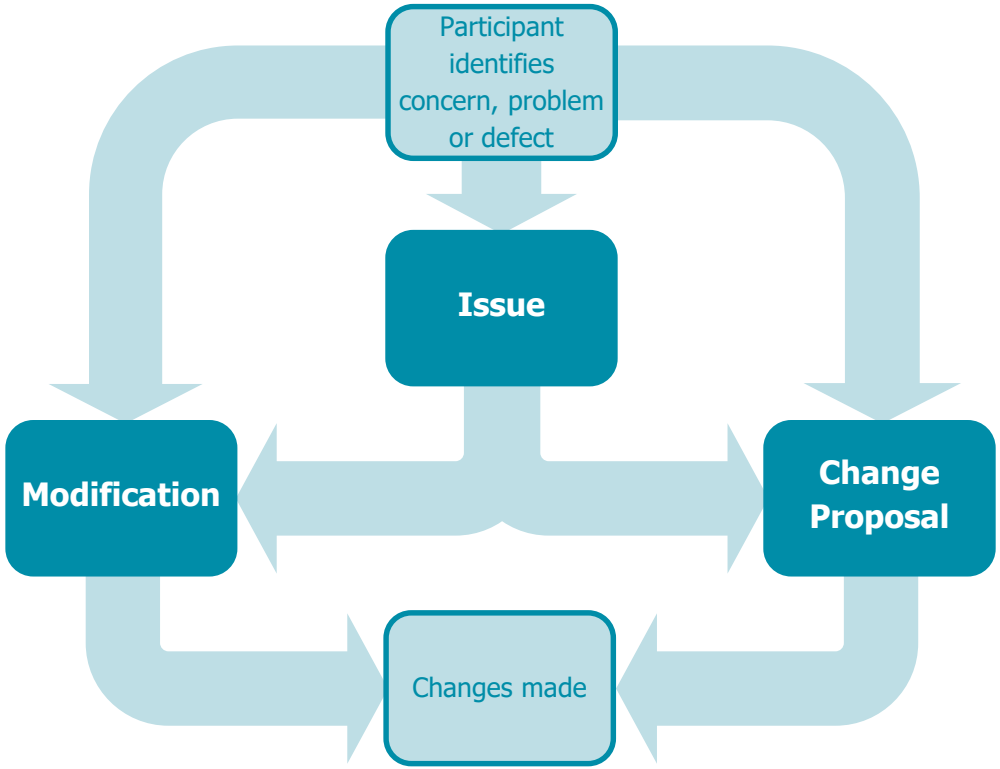
	Lead
1. Welcome and meeting objectives	Elliott Harper (Chair) , Ivar Macsween (Lead Analyst)
2. Issue 87 Background	Daniel Otto (Proposer)
3. Consideration of Issue 87 Solution options	Issue Group
4. Further areas for consideration	Issue Group
5. Next steps	Ivar Macsween
6. Meeting close	Elliott Harper

BSC Issue Process

Ivar Macsween

BSC Change Process

		Will my solution amend the BSC?	
		Yes	**No**
Do I have a clear solution?	**Yes**	Modification	CP
	No	Issue	Issue



BSC Issue Process

- Raised if participant wants to discuss an issue or concern
- Issue Group convened to discuss the Issue
- More of an informal, ad-hoc approach
- Group will consider any ways forward
  - e.g. solution (any BSC Party can take forward the outcomes of an Issue e.g. BSC Modifications), extra guidance, no change
- We will prepare a final Issue report for the BSC Panel

Background to Issue 87

Daniel Otto
(Proposer)

Current metering requirements for offshore wind

- The size and weight of Metering Equipment used at Offshore wind farm transformer platforms, which are subject to Offshore Transmission Owner (OFTO) arrangements (>132kV Offshore transmission voltage) can significantly affect the cost and complexity of development. This is because additional space on an Offshore platform results in an increase in cost.

Current metering requirements for offshore wind

- Under the existing BSC requirements there are two approaches that are used for metering Offshore wind turbine string arrays, which either use:

1. Code of Practice (CoP) 1 'The Metering of Circuits with a Rated Capacity Exceeding 100MVA for Settlement Purposes', which 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 to the platform transformers.

2. CoP 2 'The Metering of Circuits with a Rated Capacity not exceeding 100 MVA for Settlement Purposes, which is applied:

   a) Where turbine arrays are Commissioned at different stages of a wind farm project

   b) Different arrays have different owners

   In these cases CoP2 Metering Systems are installed to meter volumes at the strings for each individual array.

What's the Issue (1 of 2)?

- The size and weight of Metering Equipment used at Offshore wind farm transformer platforms, which are subject to Offshore Transmission Owner (OFTO) arrangements (>132kV Offshore transmission voltage) can significantly affect the cost and complexity of development. This is because additional space on an Offshore platform results in an increase in cost.
- Significant weight and space requirements can make developing new wind farms more complex and costly,
- Ultimately has a negative effect for end consumers who have to fund this through their energy bills.
- 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.

What's the Issue (2 of 2)?

- Potential materiality associated with Issue 87
  - Based upon current windfarm technology this proposal will reduce investment by circa £1 million per 1000MW windfarm*.

- Benefits to addressing the Issue
  - This will ultimately support competition by making new projects more available, which will benefit the end consumer.
  - Environmental benefit

* This Figure includes: Cost of VT, structural steel for offshore platform, metering, cabling, installation, test & commissioning

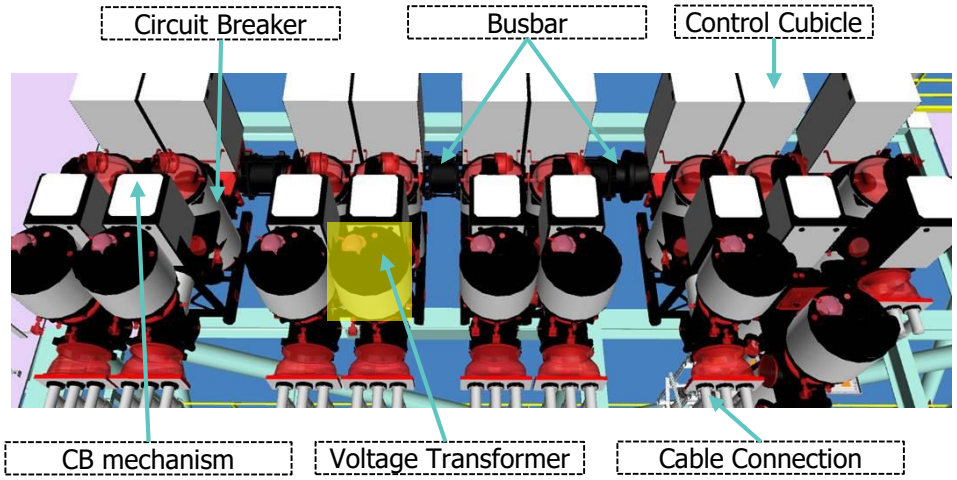
Issue 87 solution options

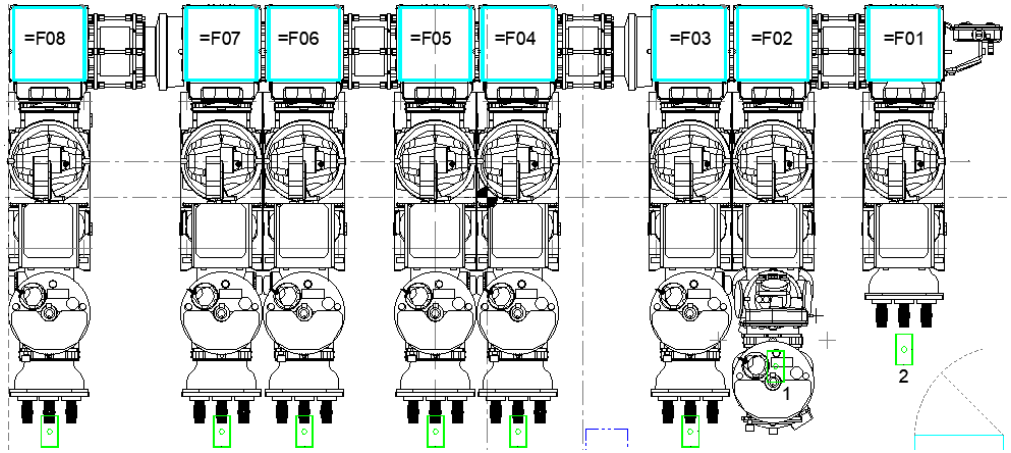
Change to the BSC

- The Proposer believes that a solution to reducing the VT requirements for Metering Systems following the CoP2 requirements is to place VTs at the busbar.
- The Proposer has suggested a number of potential solutions that should be considered by the Issue Group to determine if any should be Progressed as changes to the BSC.

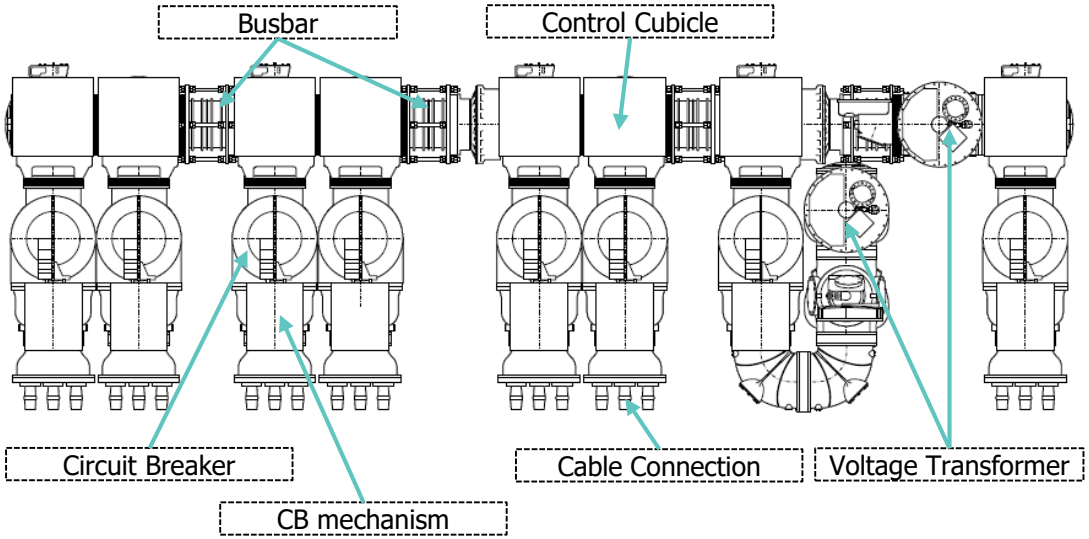
Change to the BSC

- Current arrangement (example)





- Proposed arrangement

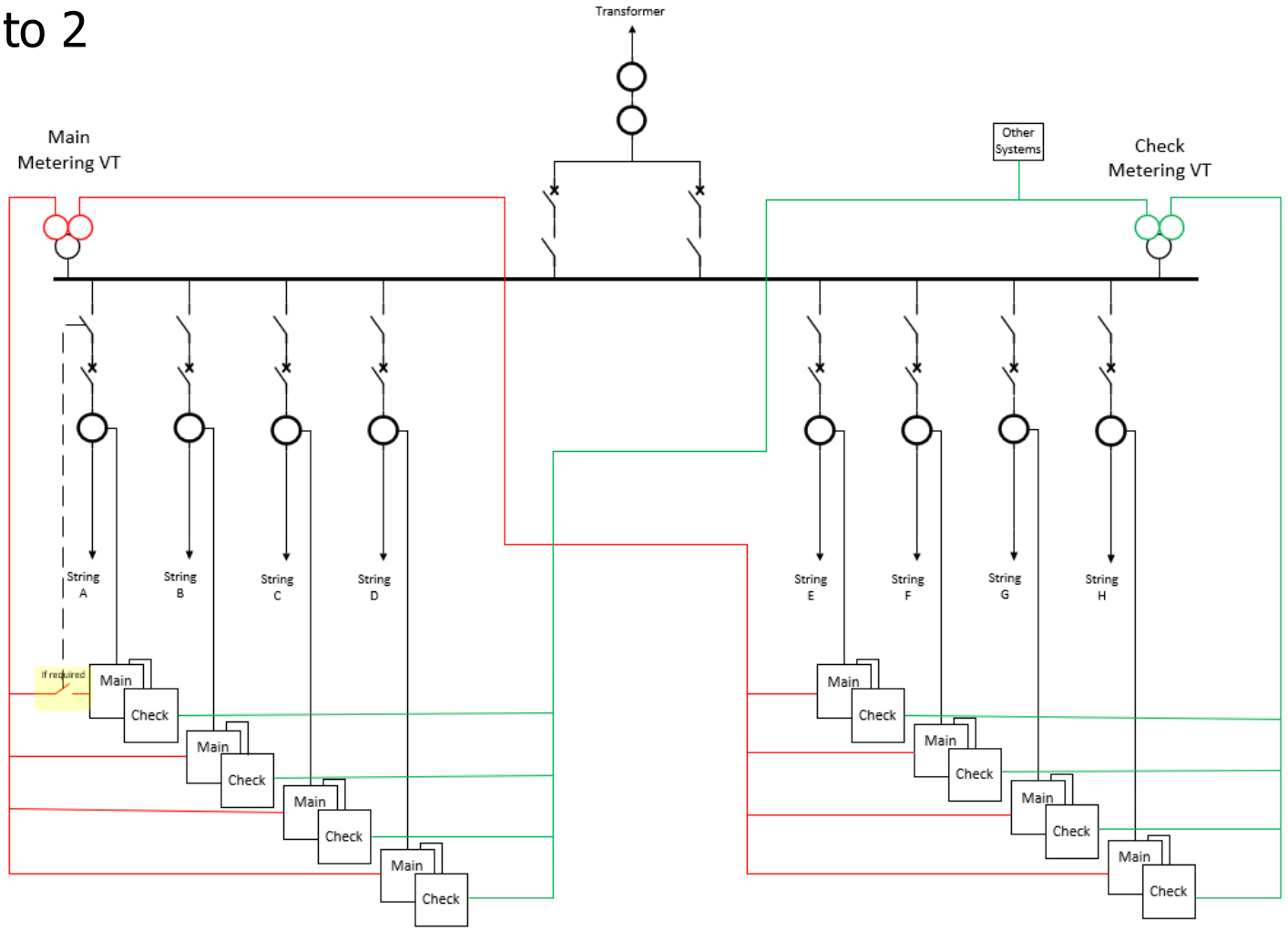


Potential Solution 1

- As illustrated in the next slides, a redundant arrangement where the main Meters are connected to one VT and the check Meters are connected to a separate VT.
  - This increases the availability of the solution as a failure of a VT would not impact on the Metering System.
  - It reduces the need for several VTs on the string levels, which decreases the cost.
- The VTs are electrically connected to same voltage level as the strings and hence metering is performed to the same accuracy as per the current CoP requirements.
- The following slides show variants of the proposed solution depending on the primary equipment arrangement

Potential Solution 1a

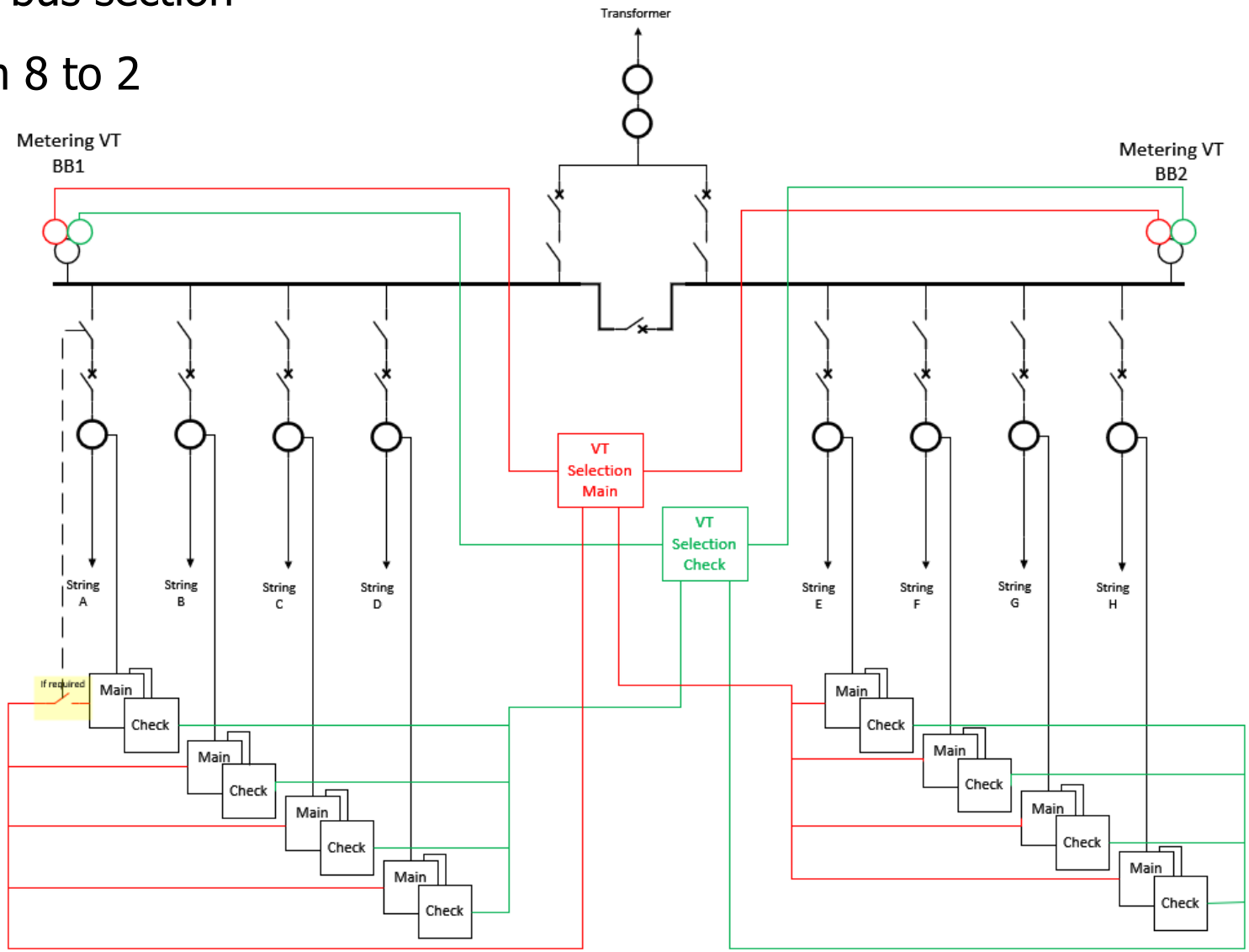
- CoP2 Metering – no bus section
- Reduction of VTs from 8 to 2
- BB1 VT – Main Meters
- BB2 VT – Check Meters
- Redundant VTs



Note: This solution is in additional to the existing solution using individual string VTs not shown in this presentation

Potential Solution 1b

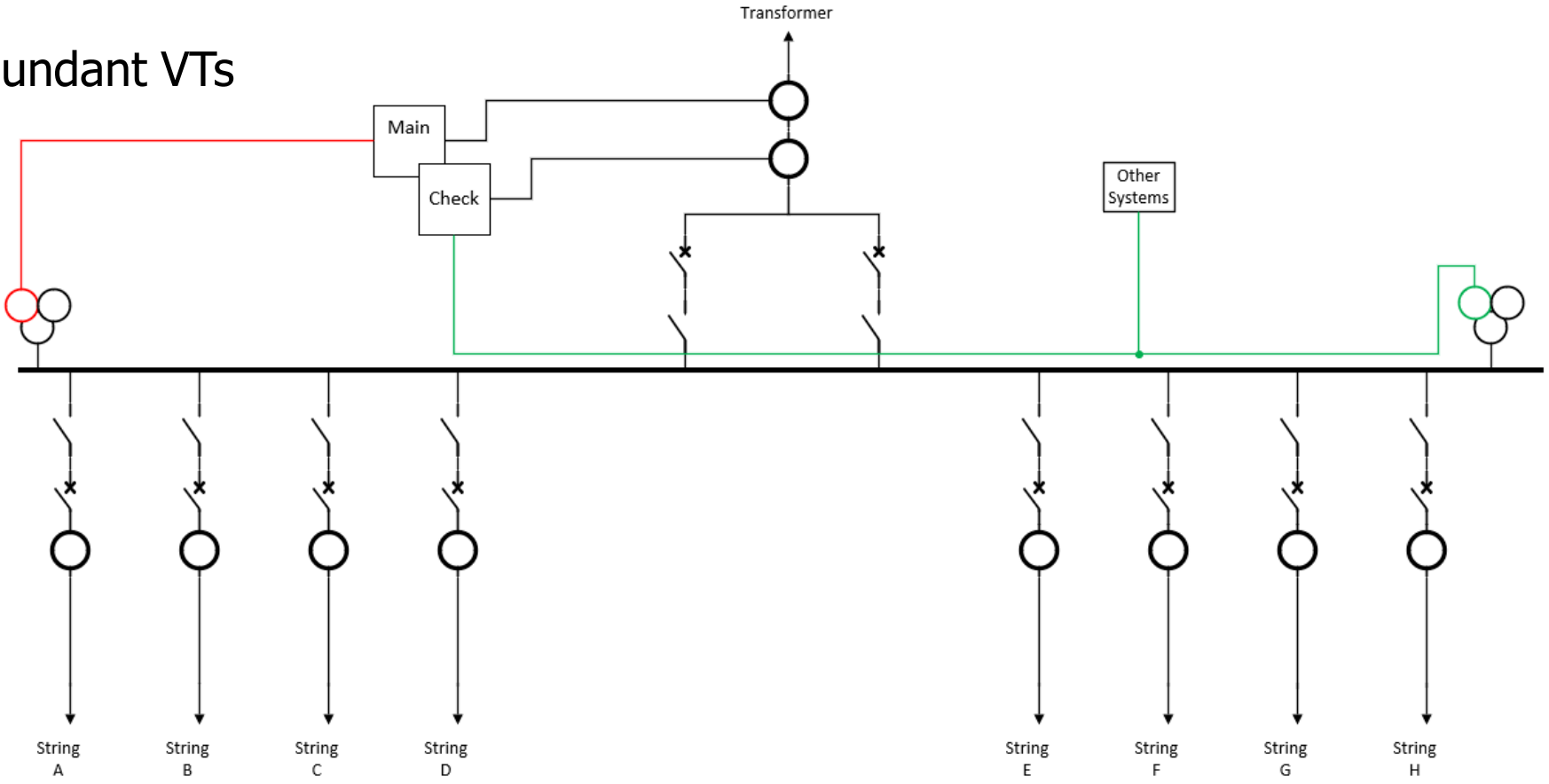
- CoP2 Metering – with bus section
- Reduction of VTs from 8 to 2
- VT Selection used



Note: This solution is in additional to the existing solution using individual string VTs not shown in this presentation

Potential Solution 1c

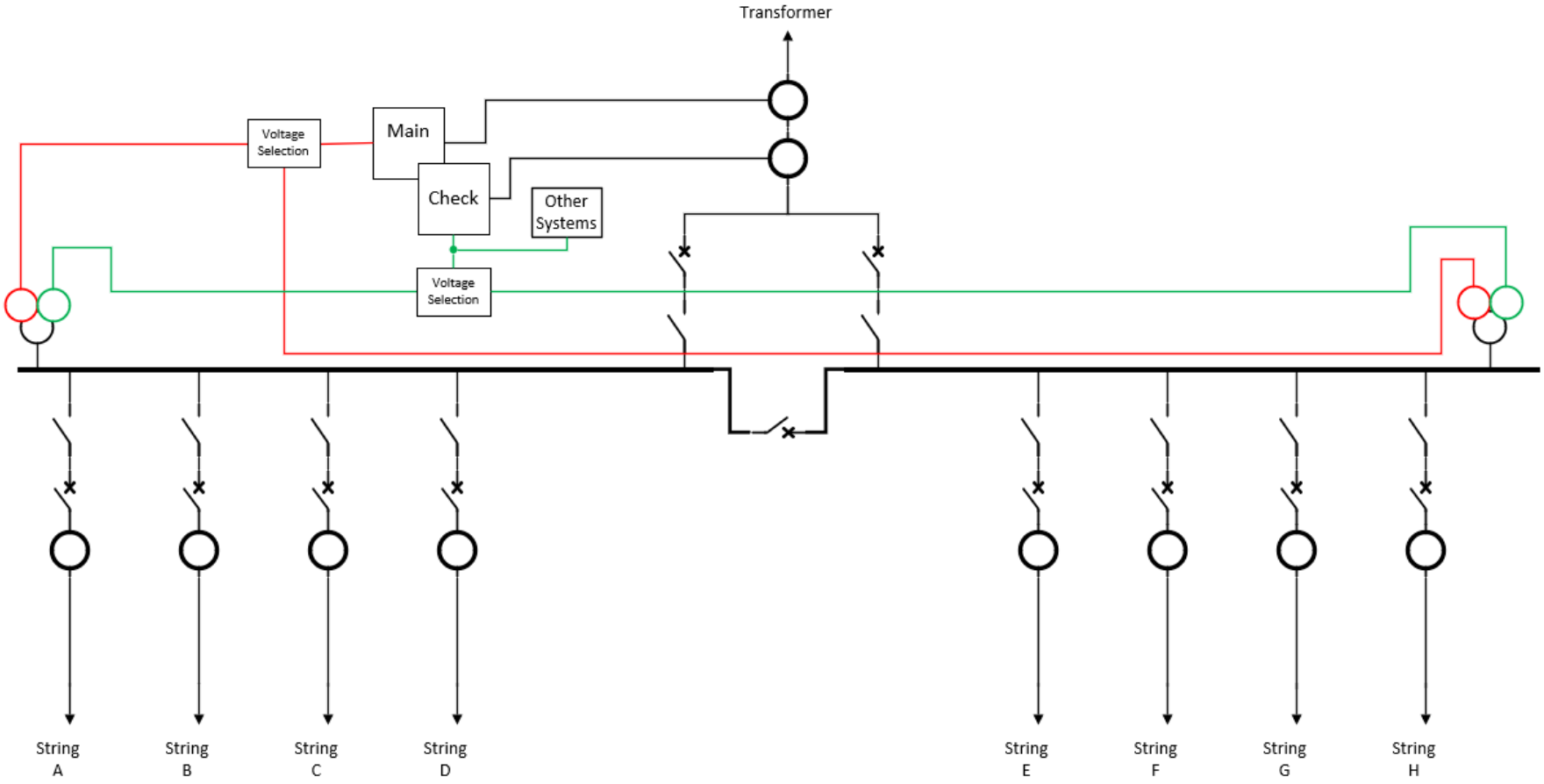
- CoP1 Metering – no bus section
- BB1 VT – Main Meters
- BB2 VT – Check Meters
- Redundant VTs



Note: This solution is in additional to the existing solution with incomer VTs not shown in this presentation

Potential Solution 1d

- CoP1 Metering – with bus section
- VT selection scheme required for Meters



Note: This solution is in additional to the existing solution with incomer VTs not shown in this presentation

Potential Solution 1 - Benefits

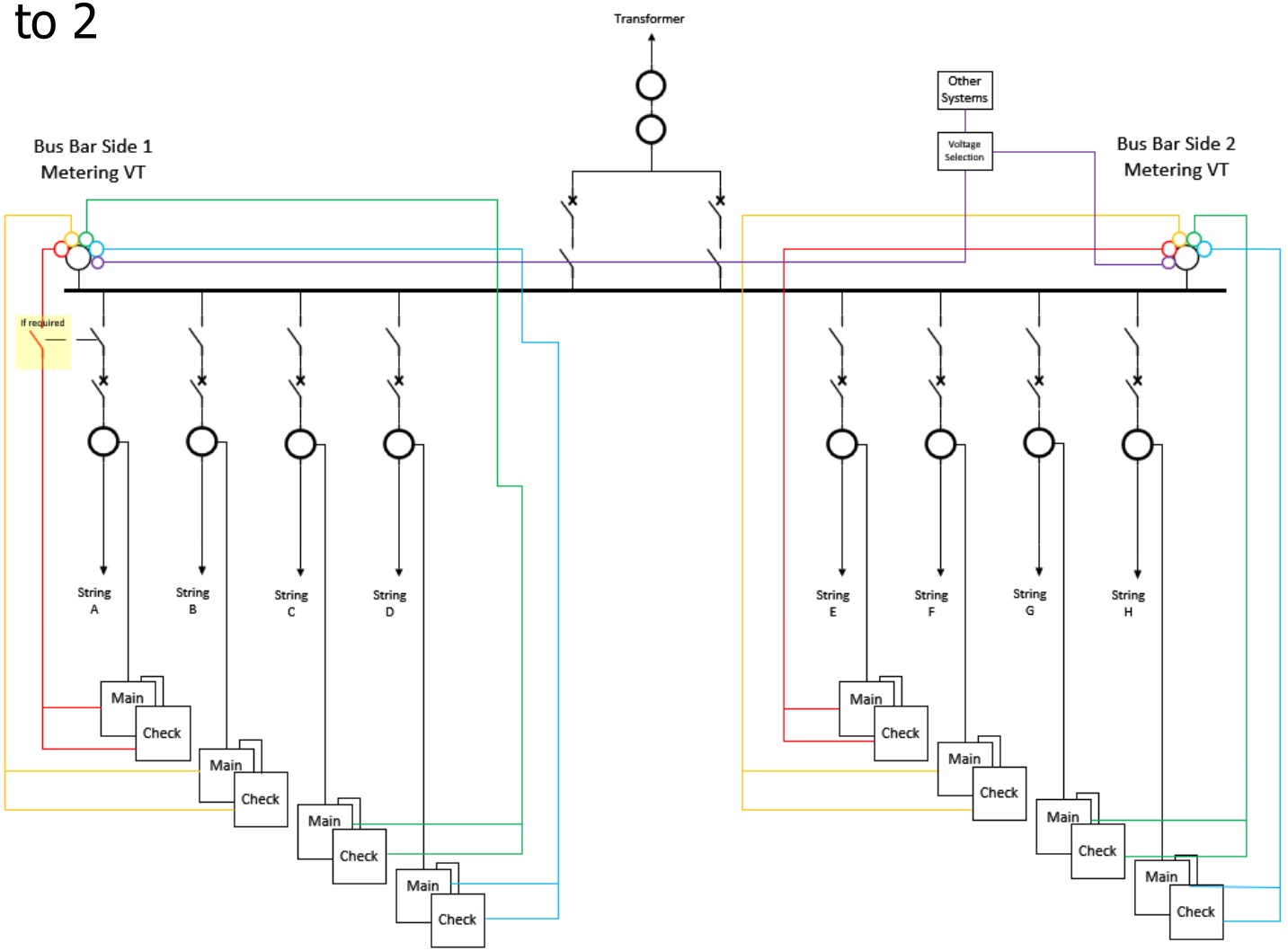
- Redundancy in case of VT failure -> high availability of Generation
- Reduction of cost for Investment and Maintenance
- Reduction of Greenhouse gas SF6
- Standardised Primary arrangement regardless of whether CoP1 or CoP2 is required

Potential Solution 2

- As illustrated in the next slides, busbar VTs are used with several secondary windings. This means that each string would have its own dedicated winding.
- Since this arrangement is not redundant, it does not have the advantage of dealing with a VT failure. However
  - It reduces the amount of VTs required for the solution
  - In case of a VT failure, generation can be rerouted via another Offshore Power Park Modules with a healthy VT.
- This arrangement is closer to current requirements of CoP2. The reason is that the current requirement is to have a separate VT per circuit.
- This proposal uses individual secondary windings, whilst the 1st proposal, whilst redundant uses multiple meters on the same VT secondary winding.

Potential Solution 2a

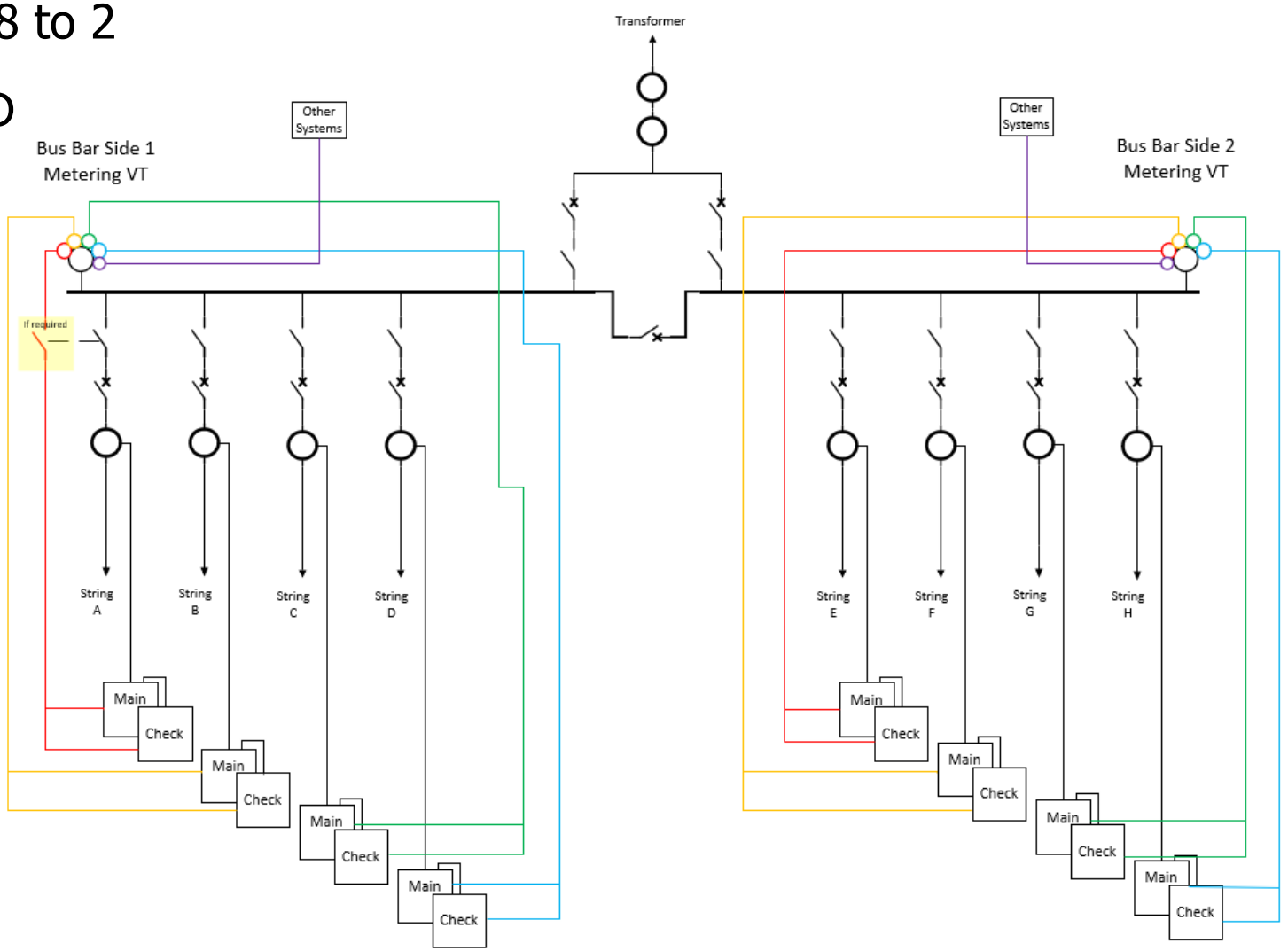
- CoP2 Metering – no bus section
- Reduction of VTs from 8 to 2
- BB1 VT – Strings A to D
- BB2 VT – String E to H
- Not redundant
- Closer to current CoP2 requirements



Note: This solution is in additional to the existing solution using individual string VTs not shown in this presentation

Potential Solution 2b

- CoP2 Metering – with bus section
- Reduction of VTs from 8 to 2
- BB1 VT – Strings A to D
- BB2 VT – String E to H
- Not redundant
- Closer to current CoP2 requirements



Note: This solution is in additional to the existing solution using individual string VTs not shown in this presentation

Potential Solution 2 - Benefits

- Arrangement closer to current CoP2 standard with having several secondary VT cores, one per String
- Reduction of cost for Investment and Maintenance
- Reduction of Greenhouse gas SF6
- Standardised Primary arrangement regardless of whether CoP1 or CoP2 is required

Issue 87 Solution Summary

	Estimated Weight saving	Number of VTs	Redundancy	Impact on Settlement Risk
Status Quo	N/A	8	No	Low
Solution 1a "CoP2 Metering – no bus section"	10.7t	2	Redundant VTs	Low
Solution 1b "CoP2 Metering – with bus section"	10.7t	2	Redundant VTs	Low
Solution 1c "CoP1 Metering – no bus section"	10.7t	2	Redundant VTs	Low
Solution 1d "CoP1 Metering – with bus section"	10.7t	2	Redundant VTs	Low
Solution 2a "CoP2 Metering – no bus section"	10.7t	2	No	Low/Med
Solution 2b "CoP2 Metering – with bus section"	10.7t	2	No	Low/Med

Further considerations

Further considerations

- What are the risks to settlement associated with each approach?
  - How can these be mitigated?

- Who is likely to be impacted by the change
  - Potential impact on Metering System Registrants, developers of offshore wind farms
  - Consideration of impact on end consumer.
  - How material would any associated cost savings be?

- When would it be appropriate to consult as part of a CP?
- No system impacts for ELEXON or market participants anticipated
- Are there any other areas the Issue 87 group need to discuss in relation to this change?

Consideration of change to BSC

- The purpose of Issue 87 is to discuss the defect and determine whether any changes to the BSC are appropriate.
- If supportive, the Proposer intends to find BSC Party to raise a CP following outcomes of Issue 87.
  - If no Party is found, ELEXON can raise on behalf of the Issue group.
- ELEXON have considered the scope of redlining necessary to achieve the proposed solutions.
  - Possible change to Code of Practice 1 and 2
  - Owned by ISG and SVG
  - Subject to approval following consultation.

Next steps

Next steps

- Please note that due to COVID-19 challenges, BSC Changes are subject to a prioritised consultation and release schedule.
- We will gather potential dates for the next Issue group meeting at an appropriate time subject to analysis.

Or;

- ELEXON will present the Issue 87 paper at the next appropriate Panel meeting