

BSCP32/4.1 Application for a Metering Dispensation

Part A – Applicant Details

To: BSCCo	Date Sent: 14/01/2021
From: Requesting Applicant Details	
Name of Sender: _____	
Contact email address: _____	
Contact Tel. No. _____	Contact Fax. No. _____
Name of Applicant Company: First Hydro Company _____	
Address: Ffestiniog Power Station	
Tan-Y-Grisiau	
Bleanau Ffestiniog	
Gwynedd	
Post Code: LL41 3TP	Our Ref: _____
Name of Authorised Signatory: _____	
Authorised Signature: _____	Password: _____

Confidentiality:

Does any part of this application form contain confidential information?

Request for Confidentiality **YES/NO*****Delete as applicable*

If 'YES', please state the parts of the application form that are considered confidential, including justification below. Information that is considered confidential:

Reasons for requesting confidentiality:

Detailed Single Line Diagram to remain confidential as the site is considered a critical infrastructure for Electricity network balancing along with black start capabilities.

BSCP32/4.1 Application for a Metering Dispensation (Cont.)**Part B - Affected Party Details**

Number of Affected parties ____1____¹

Contact Name at Affected party:	
Contact email address:	
Contact Tel. No.	Contact Tel. No.
Company Name of Affected party: National Grid Electricity Transmission	
Address: National Grid Electricity Transmission,	
Faraday House,	
Warwick Technology Park	
Gallows Hill	
Warwick	
Post Code: CV34 6DA	

¹ For more than one Affected party, Part B should be completed for each, using additional copies of Part B as required.

BSCP32/4.1 Application for a Metering Dispensation (Cont.)

Part C – Reason for Application

If the application is an extension or update for an existing Metering Dispensation, enter existing ref:

Site Specific / ~~Generic~~* **Delete as applicable.*

Describe why you require a Metering Dispensation. Include any steps you propose to limit the impact on Settlement and other Registrants:

Background

Ffestiniog Power Station comprises four 90MW Generator/Motor Units (GMUs) commissioned in 1963. Two GMUs are connected in parallel, onto the lower voltage (LV) side of each 275/16kV Supergrid transformer (SGT). They are metered at 16kV at the GMUs, with the current transformers (CTs) located on the Earthing resistor side of the GMU field windings. There is also a station transformer (STx) connected to the LV side of each SGT (SGTs 1 and 2) and, again, these are metered at the 16kV side of the STxs.

D/15 - In September 1991, NGC Pumped Storage Business applied for a Metering Dispensation (D/15) to allow the existing metering arrangement to be left in commission, though not complying with the metering Code of Practice E (CoPE) of the Pooling and Settlements Agreement (P&SA), for the Final Metering Scheme arrangement at Ffestiniog Power Station. D/15 was sought for the refurbishment period of the station, being within the next 10 years from 1991. At the Metering Sub-Committee (MSC) meeting on the 9 January 1992 the MSC considered that no Metering Dispensation was necessary in this case and that the application should be withdrawn until such time as the new metering Codes of Practice were approved. The Voltage Transformers (VTs)/CTs complied with CoPE, with compensation applied to the GMU Meters to achieve overall accuracy at the Commercial Interface on the higher voltage (HV) side of the SGTs. D/15 was withdrawn.

D/288 - In 2004 the LV switchgear, with integral VT/CT units, were upgraded to an accuracy class of 1.0 and 0.5 retrospectively (i.e. a material change to Metering Equipment). As a result the Generator (First Hydro Company (FHC)) applied for a Metering Dispensation (D/288) to meter to Code of Practice (CoP) 2 standards (for the GMUs) and CoP3 standards (for the STxs). New Meters were also installed and equally compensated for the transformer losses to meet the accuracy requirements of metering CoPs 2 and 3 at the Defined Metering Point (DMP), which was the HV side of the SGTs.

FHC trades each GMU as a BM Unit (T_FFES-1, T_FFES-2, T_FFES-3 and T_FFES-4) and they are individually controlled and despatched by the National Grid Electricity System Operator (NGESO). This cannot be done if the metering were installed on the HV side of the two generator transformers, SGT1 and SGT2. FHC therefore sought D/228 to

continue to meter at the existing locations to enable despatch of a single BM Unit. The ISG approved D/288 on a lifetime basis at its meeting (ISG 37/415) on 24 February 2004.

Withdrawal of D/288 and new Dispensation application

Ffestiniog Power Station is currently going through a period of major refurbishment where the four GMUs are due for replacement. Replacement of unit 1&2 is underway and unit 3&4 is due to commence in January 2023. The new GMU units have been increased from 95MVA to 107MVA units. Another change to design is the excitation system where the excitation system has/will change from a permanent magnet type to a static excitation system fed off the site's distribution system. Each of the four excitation systems require a dedicated step-down excitation transformer (ETx). This design change would improve our response times to synchronise to grid from standstill and enhance our fast response time.

Due to the rating of the generator being increasing beyond 100MVA, it was not recognised that this challenged D/288 as the metering requirements would need to improve to CoP1 Metering Equipment requirements from the current CoP2 arrangement. As the project is in the commissioning phase, any disruption would now incur major financial penalties from the Principle contractor. Although there is no change to meter at the DMP, as this would be a major undertaking, due to the point in time of the project, it is not feasible to currently incorporate the design requirements to upgrade the measurement transformers (CT/VT) to CoP1 standards for GMUs 1 & 2. It was discovered that the GMU's CT only had one set for each unit and were Class 0.5 and not class 0.2s as required by CoP2.

The refurbishment works was confined primarily to the GMUs, therefore apart from the connection of the ETx to the 16kV bus system, no further works was scoped within this refurbishment project. The arrangement of the existing GMU and STx CTs and VTs have not been changed however, the CTs for the GMU, which are located on the Neutral Earth end, were replaced from class 0.5 to class 0.2s. As the new design of the GMU's requires an additional transformer (16kV/260V 620kVA) for unit excitation, which has been connected to the 16kV system, it was uneconomical and impracticable to design this to meet CoP5 requirements and to locate the Metering Equipment at the DMP due to the nature of our HV distribution arrangement. The ETxs (1 per GMU) are to be connected between the isolator (1S4) and the unit main circuit breaker (1MO).

The ETxs are supplied as a package with dedicated CTs to class 0.2s on the primary side to accommodate the new Actual Metering Point (AMP). Due to the limited space available for ETx dedicated VTs, it is proposed to connect to the VT that serves the main Meters of the Station Transformer. The VT secondary winding feeding the STx main Meter was chosen based on minimal cost to implement and minimal impact to current project works along with negligible effects on burden. The additional burdens on the STx VTs have been assessed by Siemens (see attached report).

The typical loads for the ETx are as follows:

For PF = 1

361kVA @90MW

299kVA @55MW

340kVA @pump/motoring

For PF = 0.85

456kVA @90MW

360kVA @55MW

442kVA @pump/motoring

As the Station VTs are class 0.5 and the ETx Meters are class 0.5s, the overall accuracy requirements of the ETx Metering Sub System exceeds CoP5 requirements for overall accuracy at the DMP without compensating for losses caused by the operation of the ETx through the SGT, cabling and busbar to the AMP. As such, it will have no overall effect on the stated compensation applied to the GMU's compensated Meters. Siemens (Meter Operator) have carried out a loss compensation assessment which has identified that no errors are to be applied to the CoP5 Meters as the compensation on the GMU metering is sufficient.

Conclusion

The current Metering Dispensation D/288 is to be withdrawn and superseded by this new application.

This Metering Dispensation application will capture the final metering circuits' failure to be metered at the DMP, as per D/288, with additional aspects of final Settlement metering captured as they currently fail to meet the relevant CoP requirements for the circuits at the AMP.

Along with consolidating D/288, this Metering Dispensation application is to also consolidate the following aspects:

A Metering Dispensation from CoP1 is required for GMU 1 & 2 metering since the rating of each GMU has increased above 100MVA. This is to meter to CoP2 standards at the AMP, not CoP1, due to the following:

- Only one dedicated set of (upgraded to) class 0.2s CTs (CoP2) available at the AMP (main and check Meters on same set of CT);
- There are two separate VT's for the main & check Meters, however they are to accuracy standard class 0.5 (CoP2); and
- The current main and check Meters are class 0.5s which meet CoP2 requirements.

This aspect of the application is on a temporary basis for a period of three years until the next outage due by October 2024) where the three points raised above are to be addressed and the system designed to meet CoP1 requirements (apart from location).

Due to the recognition that the GMU 3&4 CT's are class 0.5, they do not comply with CoP2 requirements. A time limiting dispensation from CoP1 is sought until the CT's are replaced in the GMU major refurb project in 2024/25. Note – The VT's and Metering are class 0.5/0.5s respectively therefore compliant to CoP2 standards.

A Metering Dispensation from CoP1 to meter to CoP5 standards (except for the VT non-compliance) is required for the ETx Metering Equipment to:

- Meter away from the DMP; and
- the CoP5 metering does not have dedicated VT as they share the main Station Transformer VTs, which is for metering purposes only.

Period of Metering Dispensation required

Lifetime / ~~Temporary~~* *Delete as applicable.

<p>If temporary, indicate for how long the Metering Dispensation is required.</p>	<p>A lifetime Metering Dispensation is required for not being able to meter at the DMP as per D/288 and to capture that it is not practical to move the AMP of the GMU's to before the ETx tee off.</p> <p>A temporary Metering Dispensation is required to meter GMUs 1 and 2 to CoP2 standards for a period of three years until the next planned outage.</p> <p>A temporary Metering Dispensation is required is to continue using Class 0.5s CT's to meter GMU 3&4 at CoP 2 standards for a period of 4 years until the implementation of the major refurbishment works in 2024/2025.</p> <p>A full Metering Dispensation review is to be undertaken in three years when GMU metering equipment are to be updated to ensure the temporary Metering Dispensation issues have been resolved and that only a lifetime Metering Dispensation is needed.</p>
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Provide justified reasoning for the period of Metering Dispensation requested in the box below:

Rationale for duration of Metering Dispensation:

Due to the configuration of the 275kV/16kV system at Ffestiniog, until such time a total re-design of the HV system occurs where the DMP can be moved to the 275kV boundary, a lifetime dispensation for metering at the AMP away from the DMP will be required.

With regards to the AMP for this Metering Dispensation, it may be possible to re-design the AMP of the unit and excitation metering on the 16kV system whereby the AMP will be before the “Tee off” point, at 16kV. Therefore, they would not need separate metering, for the ETs, in the future. This was considered in the refurbishment works but due to the site’s 16kV arrangement, there’s no physical location available where a CT can be installed without incurring major works and cost. To accommodate this a full re-design of the 16kV system would be required and as this system was replaced circa 2004, for this first time in the station’s lifecycle, it is not foreseen that another upgrade will be for another 25-30 years. Due to this extensive period, we propose this aspect of the Metering Dispensation to be considered a lifetime application. However, a note has been made on the company asset management strategy document, for future consideration, to design out this aspect of the Metering Dispensation during future enhancement works.

Work is underway to specify the requirements to meet the required CoP1 standards and best endeavours will be made to implement these required changes during any periods of downtime on the GMUs, however this cannot currently be committed to. As such, to cover this aspect of the Metering Dispensation, a time limited period of three years (June/July 2024) is required. This date is an approximate date of three years from when the GMUs are fully in-service as this would be when the first planned outage period is requested.

With regards to GMU 3&4, if/when the GMU’s are uprated as per GMU 1&2 during the next phase of major refurbishment (circa 2024/25) then compliance with CoP1 standards are to be considered at the time to ensure no consideration of further Metering Dispensations are required as lessons learnt from this Metering Dispensation will ensure FHC will be closer to full compliance with Balancing and Settlement Code Codes of Practice are taken into consideration.

Please see below table of non-compliance for all aspects of the Metering Dispensation requested against the CoP standards.

Table of Non-Compliance				
Unit	Req. CoP at DMP	Actual CoP at AMP	Issue	Term
Unit 1-4 and Station Tx 1&2 and Ex Tx 1-4	CoP1	Varies depending on circuit capacity at AMP	Metering away from the DMP – GMU’s STxs and ETxs to be individually metered as GMUs are separately dispatched.	Lifetime
Unit 1 & 2	CoP 1	CoP2 (should now be CoP1 due to GMU being uprated to 107 MVA)	Meters are class 0.5s Only one set of CTs available at class 0.2S for main and check Meters	2024 – Meters to be upgraded to class 0.2s (and programmed with 50/50 share of losses to DMP) at Next Planned Outage 2024 – Additional set of class 0.2s CTs to be added at

			VTs at class 0.5	Next Planned Outage 2024 – VTs to be replaced with two class 0.2 VTs (or 1 VT with two secondary windings) at Next Planned Outage
Unit 3 & 4	CoP 1	CoP2 (GMU 3&4 currently rated to 95MVA)	Single CT at class 0.5s	2024/25 – CT to be replaced during major refurb where likely the GMU's will be uprated to 107MVA units therefore whole metering system to be to CoP1 standards. 4-year dispensation requested
Ex Tx 1-4	CoP1	CoP5	No dedicated VTs	Lifetime

Part D1 - Loss Adjustments for Power Transformer and/or Cable/Line Losses

Where loss adjustments are proposed and applied (or are to be applied) to the Metering System for power transformer and/or cable/line losses, provide the following information:

Describe how do you propose to correct the Metering System to account for the losses of this power transformer?

Please see attached report by Siemens to account for power transformer losses

In order to validate the loss adjustments applied (or to be applied) to the Metering System please provide the following information together with supporting data (e.g. power transformer test certificates):

What are the iron losses for this power transformer? N/A

What are the copper losses for this power transformer? N/A

Are there any other losses that have been taken into account? ~~Yes~~/No*. If Yes what are they?

Demonstrate how these elements of loss have been used in the corrections to the Metering System.

N/A

*Delete as applicable.

Describe how do you propose to correct the Metering System to account for the losses of the power cable/line?

Please see attached report by Siemens that details assessment made and considerations to line losses.

In order to validate the loss adjustments applied (or to be applied) to the Metering System please provide the following information together with supporting data (e.g. cable/line manufacturer's data sheet):

What is the type of power cable/line?

What is the length of this power cable/line?

What is the DC resistance of this power cable/line?

What is the impedance of this power cable/line?

What is the capacitance of this power cable/line?

Are there any other losses that have been taken into account? ~~Yes~~/No*. If Yes what are they?

Demonstrate how these elements of loss have been used in the corrections to the Metering System.

*Delete as applicable.

Materiality

Please complete the following:

What is the cost of providing compliant Metering Equipment?	What does this cost entail?
<p>Metering at the DMP for all circuitry £1.5M per SGT (x2)</p> <p>ETx Only - Moving the AMP to above the tee-off (at 16kV) of units 1-4 (and their excitation transformers) to eliminate the requirements of this Metering Dispensation £100k per unit (x4)</p> <p>GMUs' metering to CoP1 standards £30k per unit</p>	<p>Connection to the HV side of the SGTs for all metering along with the supply of a suitable Transformer along with design work.</p> <p>Moving the AMP of unit 1-4 before the ETx tee off would have negated the requirement for the additional CoP5 metering and this aspect of the Metering Dispensation. This was considered within the scope of works for the refurbishment project where major modification to the busbars was required to cater for this which was increased cost and outside scope.</p> <p>An additional CTs to class 0.2s along with signal cable back to Meters, two off VTs with dedicated secondary windings (or 1 VT with two secondary windings) at class 0.2s and two off class 0.2s replacement Meters along with commissioning.</p> <p>To install a complaint system now would impact the refurb project where FHC would be liable for delay compensation from the principle contractor of circa £500k per day.</p>
What is the cost of the proposed solution?	What does this cost entail?
ETx only - £20k per unit (x4)	<p>Supply of CTs and connection to existing VT for new AMPs (x4).</p> <p>Engineering design, supply, installation and commissioning of CoP5 metering.</p>
What is the impact to Settlement of your proposed solution?	Why?
CoP2 metering away from CoP 1	Although the GMU 1&2 are rated at 107MVA, the SGT is limited at 190MVA and

<p>Not meeting CoP 2 standards</p> <p>CoP5 metering - Negligible Accuracy impact on Settlement</p>	<p>typical operation of the GMU would be at 95MVA per unit.</p> <p>For GMU 1&2, the CTs at the AMP are to class 0.2s therefore CT accuracy complaint, although both main and check Meter off same CT. Challenge to accuracy on the VT as they are class 0.5, not class 0.2. Primary cable/busbars line loss assessment carried out - see attached report. The meters are to be compensated for VT/CT losses.</p> <p>GMU 3&4 not metering to CoP2 standards due to only having a single dedicated CT at Class 0.5s for both main and check metering. Challenge to accuracy however the meters are to be compensated for CT/VT errors.</p> <p>Mitigation are that the ETx Meters we have installed are class 0.5s (CoP2) as such this is two classes above the CoP5 requirement (class 2.0), the station VT secondary winding is class 0.5 (CoP2) as such is one class above what is required for CoP5 (class 1.0) and the CTs are class 0.2s (CoP1/2) again one class above what is required for CoP5 (class 0.5).</p> <p>CoP5 overall accuracy limits are +/- 1.5% at the DMP.</p> <p>To accommodate the low burden connected to the 100VA rated burden of the VT, the Meters are to be appropriately compensated therefore additional burden resistors are not required.</p>
<p>What is the impact to other Registrants of your proposed solution?</p>	<p>Why?</p>
<p>Negligible impact on other Registrants as the solution has negligible impact on Settlement.</p>	<p>NGC require re-scaling of the SCS database due to the upgrading of GMU 1&2 which is in progress.</p> <p>GMU 1&2 – Overall accuracy at the DMP will currently be maintained at CoP2 limits (+/-1.0%). Once the CT's/VT's and Metering</p>

	<p>will be upgraded in 2024, CoP 1 limits will be achieved.</p> <p>GMU 3&4 – Overall accuracy at the DMP will exceed the 1% required for CoP 2 due to the CT being at Class 0.5 however the metering are to be adequately compensated for CT/VT losses.</p> <p>ETx - Overall Accuracy at the DMP will be maintained within CoP5 limits (+/- 1.5%).</p> <p>Load losses from the DMP are compensated for under the GMU metering and shared 50/50 between them, for each SGT connection.</p>
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Site Details (for Site Specific Metering Dispensation)

Site Name:	Ffestiniog Power Station
Site Address:	Tan-y-Grisiau, Blaenau Ffestiniog, Gwynedd, LL413TP
MSID(s):	7013 & 7014
Registered in: CMRS / SMRS*: *Delete as applicable.	
For SMRS, please advise of SMRA in space provided.	

Manufacturer Details (for Generic Metering Dispensation)

Manufacturer Name:	
Metering Equipment Details:	

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Part D - Technical Details

Code of Practice details

Metering Dispensation against Code of Practice*	Code of Practice 1
Issue of Code of Practice*:	Issue 2 Version 13
Capacity of Metering Circuits/Site Maximum Demand (MW/MVA):	GMU 1-4 – 107.2MVA STx 1-2 – 1MVA ETx 1-4 - 620kVA
(Proposed) Commissioning Date of Metering:	GMU 1 & ETx 1 Metering wk comm. 15/02/21 GMU 2 & ETx 2 Metering wk comm. 08/03/21
Accuracy at Defined Metering Point:	GMU 1&2 – 0.5% (CoP1) GMU 3 & 4 – 0.5% (CoP1) STx 1-2 – 0.5% (CoP1) ETx – 0.5% (CoP1)
Accuracy of Proposed Solution (including loss adjustments):	GMU 1&2 – 1.0% (CoP2 until 2024) GMU 3 & 4 – 1.0% (CoP2) STx 1-2 – 1.5% (CoP3) ETx 1-4 – 1.5% (CoP5)
Outstanding non-compliances on Metering Systems:	None
Deviations from the Code of Practice (reference to appropriate clause):	<p>For GMU 1&2 – Meter to CoP2 standards of 1% at the DMP. Losses between the DMP and AMP have been assessed along with compensation values to be included to the GMU metering to maintain overall accuracy within the CoP2 limits at the DMP.</p> <p>For GMU 3&4 – Meter to CoP2 standards of 1% at the DMP although CT not to CoP 2 standards. Losses between the DMP and AMP has been assessed along with compensation values to be included to the GMU metering to maintain overall accuracy within the CoP2 limits at the DMP.</p> <p>Section 5 5.1.1 – Two sets of CTs to class 0.2s (one set provided)</p>

	<p>5.1.2 – Two VTs to class 0.2 (two sets to 0.5 provided)</p> <p>5.3 – Main and check Meters to meet class 0.2s (two class 0.5s provided)</p> <p>For the ETx - Meter to CoP5 standards of 1.5% at the DMP. Any losses between the DMP and AMP will be assessed and, if necessary, loss compensation will be added to the Meters to maintain overall accuracy within the CoP5 limits at the DMP.</p> <p>For all the Metering Sub-Systems:</p> <p>Appendix A: 5. For transfers between the Transmission System and:-</p> <p>(i) Generating Plant, the DMP shall be at the point(s) of connection of the Generating Plant to the Transmission System.</p> <p>4.3.3 AMP not at DMP</p>
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* insert Code of Practice number and issue

Any Other Technical Information

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Declaration

We declare that other than as set out above we are in all other respects, in compliance with the requirements of the relevant Code of Practice and the BSC. A schematic is attached to this application for clarification of the metering points involved.

Signature: *Date:*

Password:

Duly authorised for and on behalf of Applicant Company

Confirmation of Receipt and Reference

BSCCo acknowledges receipt of this document and has assigned the reference number as indicated on the first page.

Signature: M Smith

Date: 22 February 2021

Duly authorised for and on behalf of BSCCo