BSCP32/4.1 Application for a Metering Dispensation

Part A – Applicant Details

To: BSCCo	**Date Sent:** XX/10/2021_____
From: Requesting Applicant Details Name of Sender: Edward Coleman_____ Contact email address: Edward.coleman@statkraft.com_____ Contact Tel. No. _____	Contact Fax. No N/A_____
Name of Applicant Company: Statkraft Markets GmbH_____	
Address: Statkraft Markets GmbH	
Derendorfer Allee 2a	
D-40476 Dusseldorf	
Germany	
Post Code:_____	Our Ref: ListerDrive_Disp_____
Name of Authorised Signatory: ___Edward Coleman_____ 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: …… number, site name, expiry date (if any) and BSC Panel determinations will routinely be made available in the public domain unless the applicant informs BSCCo otherwise at the time of application

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Part B - Affected Party Details

Number of Affected parties___2__[1]
NGET and NGESO

Contact Name at Affected party: Kerry Parkinson, ET Customer Account Manager	
Contact email address: Kerry.Parkinson@nationalgrid.com	
Contact Tel. No. 01926 653000	Contact Tel. No. 07788 362033
Company Name of Affected party: National Grid Electricity Transmission	
Address: National Grid House (B2)	
Warwick Technology Park	
Gallows Hill	
Warwick	
Post Code: CV34 6DA	

Contact Name at Affected party: John Wilson, Connections Contract Manager	
Contact email address: John.Wilson6@nationalgrideso.com	
Contact Tel. No. 01926 654300	Contact Tel. No. 07890 535856
Company Name of Affected party: National Grid Electricity System Operator	
Address: Faraday House (L2)	
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.

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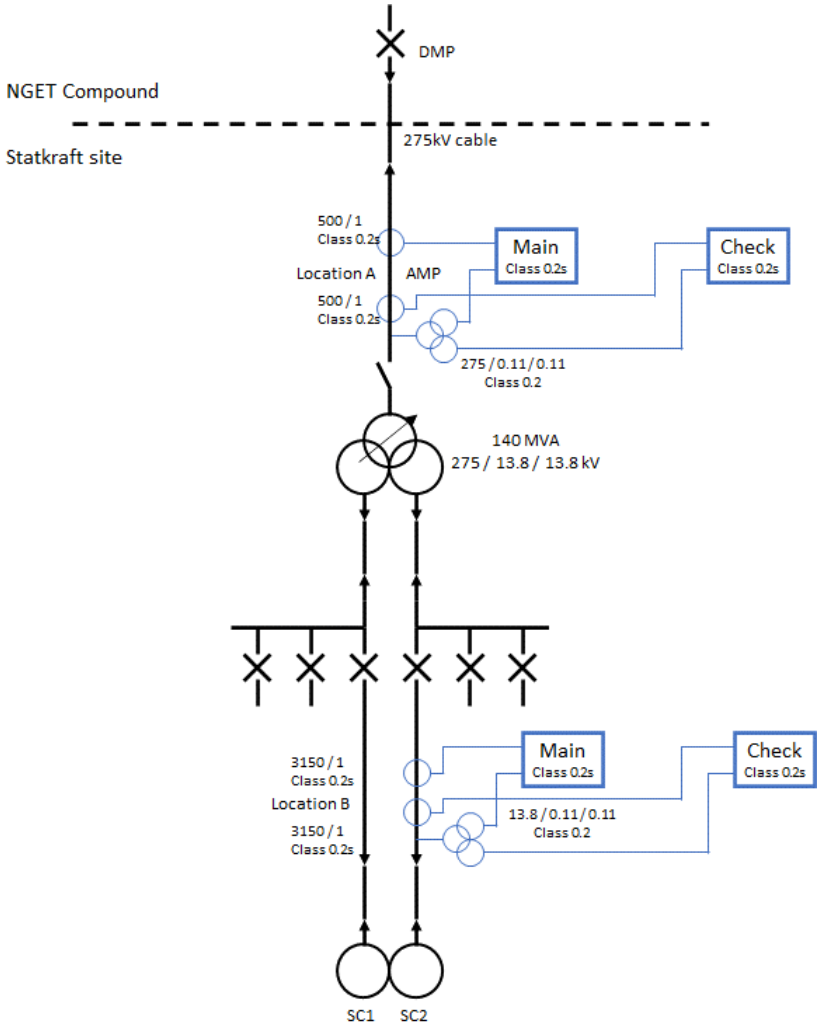
Part C – Reason for Application

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

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:

The Lister Drive compensation project consists of two wound field synchronous compensators (with excitation system) with additional inertia from adding a flywheel to each machine. Each synchronous compensator (SC) is rated at 67 MVA and operates at 13.8kV and both synchronous compensators are connected to the 275kV network through a single dual secondary (275kV / 13.8 / 13.8) transformer. There is a single cable connection to a single disconnecting circuit breaker (DCB) in NGET's existing 275kV substation. A full single line diagram is attached to this application, but a sketch is shown below.



Statkraft has entered into two Stability Compensation Service (SCS) contracts with NGESO (also known as Pathfinder projects), one for each synchronous compensator, to provide inertia and reactive power. Since each SCS contract requires its related SC to be individually controlled, it is necessary to register each as a Balancing Mechanism Unit (BMU).

In addition to the SCS, Statkraft would offer one or both SCs in the Balancing Mechanism (MWh import). This could be at times when the SCs are not dispatched by NGESO under the existing SCS contracts or could be in the future when the SCS contracts have expired. Statkraft would also like the flexibility to expand the site in the future to include additional generation or demand, possibly including additional synchronous compensators.

The principal reason for seeking this Metering Dispensation is to ensure MWh and MVArh Import / Export is allocated appropriately to each of the BMUs.

The overall rating of the project is 140MVA and so is well within the capability of a single transmission connection so a second transmission connection would not be economic.

It is proposed that the total Import / Export MWh and MVArh is metered at Location A in the above sketch – the site AMP*.

It is also proposed that metering of one of the SCs (SC2) will be carried out on the respective low voltage side of the transformer – Location B in the above sketch. The measured values at Location B will be corrected (for MWh and MVArh) as if the measurement had been at the DMP. The difference between the values for the total Import / Export at the DMP (corrected from the measured values at the site AMP) and the corrected measurements at Location B will be allocated to the other SC (SC1).

There are two auxiliary power systems (for redundancy) operated in an either / or arrangement, so all of the auxiliary load will either be supplied through the MV switchboard of SC1 or through that of SC2, not half each. Metering at Location B for SC2 means that all of the auxiliary (and start-up) power used by both SC1 and SC2 is allocated to SC1. Metering at SC1 would have the same issue – all of the auxiliary power would be allocated to SC2. This does not affect the overall Import / Export MWh and MVArh measured at Location A.

The cable length between the low voltage terminations of the transformer and the medium voltage (13.8kV) switchgear where the metering CTs and VTs for SC2 are installed (Location B) is approximately 30 metres. The cable length between Location B and SC2 (downstream of the metering point) is approximately 10 metres.

*The second reason for seeking this Metering Dispensation is to account for the distance between the site AMP and the DMP, for the Boundary Point Metering Equipment, because NGET have advised that there is insufficient space in the NGET Lister Drive compound to install metering class current transformers (CTs) and volage transformers (VTs) so these are to be installed in the Statkraft compound. The cable route distance between the DMP and the Cable Sealing End (CSE) in the Statkraft compound is 141m. There is then a busbar connection of 11m to the metering VT. However, the loss in the busbar will be small compared with the tolerances in the applicable Code of Practice.

Period of Metering Dispensation required

Lifetime *Delete as applicable.

If temporary, indicate for how long the Metering Dispensation is required.	N/A

Provide justified reasoning for the period of Metering Dispensation requested in the box below:

Rationale for duration of Metering Dispensation: A Metering Dispensation is required for the lifetime of the assets as there is no intention for the connection arrangement to change within the lifetime of the assets.

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?

To allocate the losses to the correct SC, the measurement at Location B will be corrected by the estimated losses (MWh and MVArh) between Location B and the DMP for one SC (SC2) i.e. a compensation factor will be applied to the Meter readings at Location B.

Half of the transformer iron losses will be added to the measured import / export at Location B and the copper losses will be scaled by the transformer full load copper loss to give the calculated import / export at Location A.

A further correction will then be included for the difference in location between Location A and the DMP, see below.

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):

Please see attached manufacturer's datasheet.

What are the iron losses for this power transformer?

54kW

What are the copper losses for this power transformer?

440kW

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.

The iron loss in the transformer is 0.0386% of the transformer rating.

The copper loss in the transformer is 0.314% of the transformer rating.

The reactive power absorbed in the transformer is 14.0% of its rating at full load.

Active Import

Consider that the total Active Import measured at Location B is 10,000MWh (which is approximately the expected Active Import annually if one synchronous compensator runs continuously). The Active Import for SC2 measured at Location B should be increased by half of the iron loss and by the copper loss to give the corrected Active Import at Location A. The corrected Active Import at Location A for SC2 should be increased by 0.334% (half of 0.0386% + all of 0.314%) to 10,033.4MWh.

Active Export

There is not expected to be any Active Export but if, due to future expansion of the site, there were, then the Active Export measured at Location B should be decreased by 0.334% to give the corrected Active Import at Location A.

Reactive Import

Consider that the total Reactive Import measured at Location B is 500,000MVArh (which is approximately the expected Reactive Import annually if one SC runs continuously at maximum Reactive Import). For the reactive power absorbed in the transformer, the Reactive Import measured at Location B should be increased by 14.0% to give the corrected Reactive Import at Location A, i.e. 569,978MVArh.

Reactive Export

The calculations for Reactive Export are the reverse of the above and so the Reactive Export measured at Location B should be decreased by 14.0% to give the corrected Reactive Export at Location A, i.e. 430,022MVArh.

*Delete as applicable.

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

The measurement at Location A will be corrected by the estimated losses (MWh and MVArh) between Location A and the DMP for both SC1 and SC2 i.e. a compensation factor will be applied to the Meter readings at Location A.

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):

Please see attached manufacturer's data sheet.

What is the type of power cable/line?

275kV, 500mm^2 aluminium, single core per phase.

What is the length of this power cable/line?

The cable route length is 141 metres.

The Defined Metering Point is at the Cable Sealing End structure in the NGET compound.

When the cable comes up into the Statkraft compound there is a length of busbar (less than 11 metres) between the CSE and the metering VT, the Actual Metering Point.

The distance between the DMP and Location A is 141 metres in cable plus 11 metres in busbar.

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

0.0085 Ω (at 20^{o}C)

What is the impedance of this power cable/line?

0.032 Ω

What is the capacitance of this power cable/line?

0.020 μF

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.

The active power loss in the cable when both SCs are operating is 2.6kW i.e. 0.002% of the transformer rating.

The reactive power absorbed in the cable when both SCs are operating is 8.3kVAr i.e. 0.006% of the transformer rating.

The reactive power generated in the cable when the cable is energised (irrespective of whether two, one or none of the SCs are operating) is 479kVAr i.e. 0.342% of the transformer rating.

Active Import

Consider that the total Active Import measured at Location A is 20,000MWh (which is approximately the total expected Active Import annually if both SCs run continuously) and the Active Import measured at Location B is 10,000MWh. The corrected Active Import at the DMP should be increased by 0.002% to 20,000.4MWh. The calculated Active Import at the DMP for SC2 is increased by 0.334% (to 10,033.4MWh) to account for the transformer and then by 0.002% to 10,033.6MWh to account for the cable (0.336% in total). The calculated Active Import at the DMP for SC1 is 9966.8MWh.

The compensation factor for the Active Import at Location A is 1.00002.

The compensation factor for the Active Import at Location B is 1.00336.

Active Export

There is not expected to be any Active Export but if, due to future expansion of the site, there were, then consider that the total Active Export measured at Location A is 20,000MWh and the Active Export measured at Location B is 10,000MWh. The corrected Active Export at the DMP for both SCs should be decreased by 0.002% to 9,999.8MWh. The calculated Active Export at the DMP for SC2 is decreased by 0.336% to 9966.4MWh.

The compensation factor for the Active Export at Location A is 0.99998.

The compensation factor for the Active Export at Location B is 0.99664.

Reactive Import

Consider that the total Reactive Import measured at Location A is 1,000,000MVArh (which is approximately the maximum Reactive Import annually if both SCs run continuously at maximum Reactive Import) and the Reactive Import measured at Location B is 500,000MVArh. For the reactive power absorbed in the cable inductance, the corrected Reactive Import at the DMP for both SCs should be **increased by 0.006%.** For the reactive power generated in the cable capacitance, the corrected Reactive Import at the DMP for both SCs should be **decreased by 0.342%.** The net effect is the Reactive Import at the DMP for both SCs should be reduced by 0.336% to 996,640MVArh.

The calculated Reactive Import at the DMP for SC2 from the measured value at Location B is **increased by 14.0%** (to 569,978MVArh) to account for the transformer and then **increased by 0.006%** for the cable inductance. For the reactive power generated in the cable capacitance, it is proposed to correct the Reactive Import at the DMP for SC2 by reducing the measured value at Location B by half of the total reactive power generated by the cable i.e. **decrease by 0.171%.** The net effect is the Reactive Import at the DMP for SC2 should be increased by 13.83% to 569,037VArh. The calculated Reactive Import at the DMP for SC1 is 427,603MVArh.

The compensation factor for the Reactive Import at Location A is 0.99664.

The compensation factor for the Reactive Import at Location B is 1.13830.

Reactive Export

The calculations for Reactive Export are the reverse of the above.

The compensation factor for the Reactive Import at Location A is 1.00336.

The compensation factor for the Reactive Import at Location B is 0.86170. *Delete as applicable.

Materiality

Please complete the following:

What is the cost of providing compliant Metering Equipment? The cost of a busbar extension and provision of an additional 275kV bay with metering to meter each BMU separately would be in excess of £2M.	What does this cost entail? To have a separate connection for each BMU would require an additional 275kV circuit connection in the NGET substation, with metering. This is not currently available and so would inevitably result in a delay (measured in years) to the connection.
What is the cost of the proposed solution? The cost of the additional CoP1 compliant metering at Location B is in the order of £50k.	**What does this cost entail?** Additional 13.8kV metering CTs and VTs are proposed at Location B together with additional Meters.
What is the impact to Settlement of your proposed solution? No impact on Settlement.	**Why?** Any errors in accounting for losses between the Import / Export at Location B (for SC2) and the DMP will be attributed to the Registrant of the Metering Equipment at the DMP, who is the same as the Registrant of the Metering Equipment at Location B.
What is the impact to other Registrants of your proposed solution? No impact on other Registrants.	**Why?** No other Registrants involved.

Site Details (for Site Specific Metering Dispensation)

Site Name:	Lister Drive Stability Project
Site Address:	36 Carnegie Road Liverpool L13 7HY
MSID(s):	7434
Registered in: CMRS *Delete as applicable.	CMRS
For SMRS, please advise of SMRA in space provided.	N/A

Manufacturer Details (for Generic Metering Dispensation)

Manufacturer Name:	N/A
Metering Equipment Details:	N/A

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Part D - Technical Details

Code of Practice details

Metering Dispensation against Code of Practice*	CoP1 (@DMP)
Issue of Code of Practice*:	Version 13, Issue 2 (Latest)
Capacity of Metering Circuits/Site Maximum Demand (MW/MVA):	140 MVA
(Proposed) Commissioning Date of Metering:	17/12/2021
Accuracy at Defined Metering Point:	CoP1
Accuracy of Proposed Solution (including loss adjustments):	CoP1 for SC1 (including compensation) CoP1 for SC2 (including compensation)
Outstanding non-compliances on Metering Systems:	N/A – New site
Deviations from the Code of Practice (reference to appropriate clause):	5. For transfers between the Transmission System and:- (i) Generating Plant, the DMP shall be at the point(s) of connection of the Generating Plant to the Transmission System.
	The AMP for the Boundary Point Metering Equipment will be 141m in cable plus 11m in busbar from the DMP.

* insert Code of Practice number and issue

Any Other Technical Information

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: E Coleman (By email) ..... Date: XX/XX/2021

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: C Day..... Date: 4 November 2021

Duly authorised for and on behalf of BSCCo