

# WP2 - CfD Private Network Meter Commissioning, Proving and Calibration Tests

EMRS Working Practice

Public

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## 1. Change Amendment Record

Version	Date	Description
1.0	20 October 15	Go Live version
2.0	13 October 2017	Document transfer to new template
3.0	18 April 2019	Clarification added to Key Meter Technical Details Requirements. Streamlining of processes in Section 3.
4.0	27 August 2020	Annual Review

## 2. Introduction

The Contracts for Difference (CfD) scheme is managed by the CfD Counterparty, this role is performed by the Low Carbon Contracts Company (LCCC).

The scheme is open to any Generator using a low carbon energy solution irrelevant of whether they have a connection to the Total System (Distribution or Transmission System) or not. This allows a Generator operating within the boundaries of a Private Network to participate in the scheme. As this situation is not covered by the Balancing and Settlement Code (BSC) a CfD Agreement specific to Private Networks has been created to provide rules on the Metering System that should be utilised.

A CfD Generator operating on a Private Network must meet the additional requirements of the Private Network Metering Operational Framework (MOF) and the Technical System Requirements (TSR) in their CfD Agreement (Annex 6 & 7). The LCCC has the right to witness the Commissioning, Proving and subsequent Meter calibration tests of the Metering System. The LCCC has outsourced this metering assurance to a Management Services Provider (MSP).

### 2.1 Scope and Purpose

This document has been written by EMR Settlement Ltd (EMRS) on behalf of the LCCC for the CfD scheme. It covers procedures for the MSP and Metering Agent (MA) roles. The MSP role is being fulfilled by EMRS. If you have any questions on the MSP and MA roles, please contact LCCC.

The purpose of this working practice is to provide CfD Generators who are operating on a Private Network with information as to how they should Commission their Metering System. Under the terms and conditions of the Private Network Agreement the LCCC (or their nominated representative) has the right to witness the metering Commissioning, Proving and subsequent Meter calibration tests. The MSP will appoint a suitably qualified agent to verify technical specifications, test results and witness testing. This working practice is also relevant to that nominated representative of the MSP, the MA.

### 2.2 Main Users and Responsibilities

Table 1: Main Users and Responsibilities

Role	Responsibilities
Low Carbon Contracts Company Ltd (LCCC)	To arrange a Service Provider to manage the checking and witnessing of Metering Tests on a Private Network. Notify CfD Generator of results.
CfD Generator	To arrange Commissioning, Proving and subsequent Meter calibration testing. To submit results for analysis.
Management Services Provider (MSP)	Service Provider who will perform the management of the Metering Assurance Process on behalf of the LCCC.
Metering Agent (MA)	Service Provider who will perform the onsite testing, analysis of technical specifications and test results on behalf of the Management Services Provider.

## 2.3 Associated Documents

This Working Practice should be read in conjunction with the following documents:

- CfD Standard Terms and Conditions<sup>1</sup> and all subsequent amendments
- CfD Agreement<sup>1</sup> and all subsequent amendments
- Private Network CfD Agreement<sup>1</sup> and all subsequent amendments
- G21 – Operational Conditions Precedent (Metering and Settlement) & Electrical Schematic Obligation<sup>2</sup>
- WP195 – Capacity Market and CfD Metered Data<sup>3</sup>

## 3. Methodology

A CfD Generator operating on a Private Network is not subject to the Commissioning requirements of the BSC. The requirements for Commissioning are specified in the CfD Agreement. Prior to the Start Date the Generator must perform an initial Metering Commissioning and Proving Test. The LCCC can choose to attend the Metering Commissioning and Proving Tests (they may opt to send a suitably qualified person to witness; the MSP/MA).

In the CfD Agreement the Generator's site is referred to as the Facility and the Metering System used to measure net Metered Volume is the Facility Metering Equipment.

If any of the Key Meter Technical Details have changed or any item of the Facility Metering Equipment is repaired / replaced another Commissioning and Proving Test must be performed.

A CfD Generator can choose to perform a subsequent calibration of the Meters to extend the life of the Meter beyond the 10 years specified in their CfD Agreement. The requirements for subsequent Meter calibration tests are specified in the CfD Agreement. This extension can only increase the life of the Meter from 10 years to the maximum life expectancy specified by the Meter manufacturer in their technical specification for the Meter. Depending on the type and accuracy class of the Meter installed it may be more cost effective to replace the Meters once the initial 10 year period has elapsed.

The specific requirements are contained in the Private Network MOF and the TSR section in the CfD Agreement (Annex 6 & 7). The CfD Generator is responsible for arranging and conducting the Commissioning, Proving and subsequent Meter calibration tests, and submitting the results to the MSP/MA.

Prior to the Start Date the CfD Generator must complete the initial Commissioning and Proving Test for the Metering System. The CfD Generator must notify the MSP, as a minimum, 10 Working Days (WD) before these tests are due to take place. This notification must be accompanied by the Key Meter Technical Details form.

The Commissioning and Proving Tests may not take place on the same day (it is recommended that they are carried out on the same day) and the MA will not be asked to attend the site on more than two occasions to witness testing. Priority will be given to witnessing the Commissioning of the current transformers (CTs) and voltage transformers (VTs).

The submission of the Key Meter Technical Details form is one of the additional Operational Further Conditions Precedent in the Private Network Agreement (Paragraphs 2.1(C), (D) and (E) of Part B (Further Conditions Precedent) of Schedule 1 (Conditions Precedent)). There are others related to the Commissioning of the Metering Equipment; the Generator must submit:

<sup>1</sup> <https://www.gov.uk/government/publications/contracts-for-difference-standard-terms-and-conditions>

<sup>2</sup> <https://www.emrsettlement.co.uk/publications/guidance/>

<sup>3</sup> <https://www.emrsettlement.co.uk/publications/working-practices/>

- Manufacturer's certificates for the installed Meters and Metering CTs and/or VTs (to the relevant standards in the TSR);
- A Directors' Certificate confirming that the Meters and Metering CTs and/or VTs has been calibrated, installed, commissioned, proved and tested in accordance with the manufacturer's instructions;
- A Key Meter Technical Details Form (see Appendix 5); and
- A report from a suitably qualified person (approved by the CfD Counterparty) confirming that the Facility Metering Equipment has satisfied all the testing requirements in the MOF & TSR.

All Operational Conditions Precedent must be accompanied by a Directors' Certificate certifying that the information contained in, and enclosed with, the Operational Conditions Precedent Notice is true, complete and accurate in all material respects and not misleading, in each case by reference to the facts and circumstances then existing.

All imports and exports to the Facility must be metered. This can result in multiple Metering Systems being subject to the Commissioning tests, Proving Tests and subsequent Meter calibration requirements laid out in the Agreement (MOF).

### 3.1 Key Meter Technical Details

An example of the Key Meter Technical Details form can be seen in the Appendices (section 7.5). These details are the Meter serial numbers, the Outstation number of channels, the measurement quantity ID (e.g. AE for Active Export), the Meter multiplier, the pulse multiplier, the CT and/or VT<sup>4</sup> serial numbers and the CT and/or VT ratios.

Number of channels: Every measurement quantity that is setup in the Meter/Outstation should be included and not just the Active Energy channels used to settle in EMR. Therefore, if the Meter/Outstation is configured with Half Hourly reactive energy channels (e.g. Reactive Import and Reactive Export) as well as active energy channels (e.g. Active Import and Active Export) the number of channels would be 4 and not 2.

Measurement Quantity IDs: This is linked to the number of channels above. The number of Measurement Quantity IDs provided should be the same as the number of channels setup. The convention for the most common configurations is:

- Active Energy Import AI
- Active Energy Export AE
- Reactive Energy Import RI
- Reactive Energy Export RE
- Reactive Import associated with Active Import Q1
- Reactive Import associated with Active Export Q2
- Reactive Export associated with Active Export Q3
- Reactive Export associated with Active Import Q4

Meter Multiplier: Any multiplier applied to the cumulative register on the display of the Meter. For example if the cumulative Meter reading on the display was 123456 x10 kilo Watt hours (kWh) the Meter multiplier would be 10. If the reading on the display was 123456 kWh the Meter multiplier would be 1. This can be either kWh or Mega Watt hours (MWh) depending on the setup of the meter.

Pulse multiplier: This is any multiplier applied to the Half Hour pulses recorded (either by the Meter itself or a separate Outstation) in order for it to be converted to energy. Therefore, if a Meter recorded pulses in kW and in a Half-Hour recorded 5000 pulses (kW) to convert to energy

<sup>4</sup> Collectively CTs and VTs can be referred to as Measurement Transformers

(2500kWh) the multiplier would be 0.5. Where the Outstation is separate to the Meter the output pulse value of the Meter should be included.

Ratios: An example of a CT ratio would be 200/5A; an example of a VT ratio would be 11kV/110V.

### 3.2 Commissioning Tests

The purpose of the Commissioning Test is to determine that the Metering System is accurately recording the energy (whether import or export) at the Defined Metering Point (DMP). The overall accuracy of the Metering System at the DMP must be within the limits allowed in the TSR for the circuit capacity. The DMP in the case of a Private Network is the connection of the Facility (CfD Generator) to the Private Network.

Any Test Certificates submitted for the Meters and Measurement Transformers as part of an Operational Conditions Precedent will be checked against the Key Meter Technical Details Form submitted.

Commissioning process can be split into three distinct areas:

1. Defined Metering Point (DMP)

As part of the CfD Agreement the generator has an obligation to submit an Electrical Schematic Diagram (single line diagram) showing the locations of the Facility Metering Equipment. This includes CTs and/or VTs as well as detailing Meters (type/serial numbers) and communications equipment (type).

2. Measurement Transformers

The generator must arrange tests of the Measurement Transformers to verify that:

- 2.1 The CTs are of the ratio specified in the Key Meter Technical Details, are installed with the correct polarity and are correctly located to record the required power flow;
- 2.2 The VTs are of the ratio specified in the Key Meter Technical Details, are installed with the correct polarity and are correctly located to record the required power flow; and
- 2.3 The burdens on the CTs and VTs are less than or equal to the rated burden of each Measurement Transformer;

These tests can be performed by primary injection or by using prevailing load. The test results must be submitted using the Metering Equipment Commissioning Record (Part 1), an example of which can be seen in Appendices (section 7.1).

All test results shall be submitted to the LCCC for review (reviewed by appointed subcontractor MSP/MA).

### 3. Meters

The generator must arrange tests of the Meters to verify that:

- 3.1 The relationships between voltages and currents are of the correct phase sequence and that phase rotation is standard at the Meter terminals;
- 3.2 The Meters are set to the same CT and VT ratios as the installed Measurement Transformers;
- 3.3 The output of the Metering System correctly records the electricity in the primary system; and
- 3.4 The Metering Equipment detects phase failure and operates the necessary alarms.

The test results must be submitted using the Metering Equipment Commissioning Record (Part 2), an example of which can be seen in Appendices (section 6.2).

All test results shall be submitted to the LCCC for review (reviewed by appointed subcontractor MSP/MA).

### 3.3 Proving Test

The purpose of the Proving Test is to confirm that the stored metered data associated with the energy imported to, or exported from the Facility can be satisfactorily transferred via a suitable communications link to the data collection parties. The generator is responsible for arranging the Proving Test. The Proving Test must satisfy the requirements of the MOF Section 7.

This test can be done using secondary injection of the Meters if there is no prevailing load.

The method for doing this is:

1. Record the cumulative register reading for the dominant energy direction at the time of the test for the Metered Volume in relation to a Settlement Unit (a 30 minute period) at the start of an hour or half hour. Record the reading at the end of the applicable hour or half hour. This reading is taken from the physical register display of the Meter and is done for both main and check Meters – this can be recorded using the Meter manufacturer’s software;
2. Using the system that is expected to deliver metering data into the LCCC interrogate the Meter and obtain the Metered Volume for the applicable Settlement Unit; and
3. Compare the register advance (from difference in register reading in 1. above) with the reading obtained from 2. Above. Subject to justifiable differences the two readings must compare.

For every Proving Test (both main and check Meters) the results shall be submitted to the LCCC for review (reviewed by appointed subcontractor MSP/MA). This will include, for each Meter, the start and end reading from the cumulative register display and the downloaded 30 minute data value. If the MA is not present for the Proving Test the Generator must provide proof of the register readings, this can be a photograph of the start and end register readings or a time stamped download from the Meter manufacturer’s software.



### 3.4 Subsequent Meter Calibration Test

The purpose of a Meter calibration test is to check that the Meters are operating within the allowed error limits. Such calibrated Meters can remain in service for up to 10 years. An initial calibration is performed by the manufacturer of the Meter. Subsequent Meter calibrations can be performed to establish whether Meters can be left in service for longer if they remain within the error limits. Evidence must be provided to the LCCC for review (reviewed by appointed subcontractor MSP/MA) and it agrees that Meters can remain in service for longer than 10 years. Meters will be tested at various current values and power factors by a calibrated instrument of an accuracy class better than the Meter under test.

These tests will be performed by secondary injection. The test results must be submitted using the relevant Subsequent Metering Calibration Test Record, an example of which can be seen in the Appendices (sections 6.3 & 6.4).

Details of the instrument used to perform the calibration shall be given on the test results and this instrument must have been calibrated. The test instrument calibration record must be traceable to an accredited laboratory (UKAS / National Physical Laboratory). The LCCC (or appointed subcontractor MSP/MSP) can request the calibration test certificate of the test instrument.

It is not necessary to perform calibration tests on Reactive Energy therefore only Active Energy calibration tests are required to be performed on the Meter.

The measurement uncertainty for the tests shall be determined and quoted on the test results, where the uncertainty is determined in accordance with the current UKAS Directive M3003.

In the event that a Meter fails a calibration test then that Meter must not be used for CfD Settlement purposes<sup>5</sup>. In which case, the CfD Generator must make arrangements to replace the faulty Meter with one that has a valid calibration test certificate. The failed calibration test results must be provided to the LCCC along with the replacement Meter test results.

All test results shall be submitted to the LCCC for review (reviewed by appointed subcontractor MSP/MA). A set of Meter readings for before and after the calibration testing shall be recorded and submitted to the LCCC for review (reviewed by appointed subcontractor MSP/MA).

The decision on whether a Meter can remain in service is made once the LCCC (or their appointed subcontractor MSP/MA) have analysed the test results and confirmed they are acceptable.

<sup>5</sup> The only permissible exception to this is if it can be established that the test instrument used to calibrate the CfD Generators Meter was itself faulty; in which case evidence must be provided to the MSP.

## 4. Interface and Timetable Information

### 4.1 Meter Commissioning Test

This is the timetable that must be followed for a Meter Commissioning Test. As much notice as possible should be given for the Commissioning Test; as a minimum 10 days' notice are required before the proposed test and it must be completed before the Start Date.

If the Commissioning Test is being performed in stages this process is applicable for each individual part of the Commissioning.

The MSP will use the MA to witness testing and verify the results.

Ref	Condition	When	Action	From	To	Input Information Required	Method
3.1.1	MOF Annex 6 Condition 6.4	As soon as date known and no later than 10 WD prior to date Metering Commission Test required	Notify the LCCC of an impending test and the proposed date and time.  Generator submits the Key Meter Technical Details form.	Generator	LCCC	Notification that a Metering Commissioning Test is required and Key Meter Technical Details form	Email
3.1.2	MOF Annex 6 Condition 6.4	Following 3.1.1 and within 1 WD	Notify MSP of Meter Commission Test required	LCCC	MSP	Notification that a Metering Commissioning Test is required and Key Meter Technical Details form;  CfD ID and Generator details (name, address, phone number and email address);  Proposed test date	Email

3.1.3	MOF Annex 6 Condition 6.4	Following 3.1.2 and within 2 WD	Notify MA of Meter Commission Test required	MSP	MA	<p>Notification that a Metering Commissioning Test is required and Key Meter Technical Details form;</p> <p>CfD ID and Generator details (name, address, phone number and email address);</p> <p>Proposed test date</p>	Email
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Ref	Condition	When	Action	From	To	Input Information Required	Method
3.1.4	MOF Annex 6 Condition 6.4	Within 5 WD after receipt of Metering Commissioning Test Notification in 3.1.1;	<p>MA notifies the Generator whether or not they will attend.</p> <p>Where the MA is attending agree date and time of test and continue to 3.1.5; or</p> <p>Where the MA is not attending Generator to advise date and time of test and continue to 3.1.5.</p>	MA	Generator LCCC MSP	General Notification - MSP notifies the Generator whether or not they will attend.	Email
				Both Parties (MA, Generator)	Both Parties (MA, Generator)	Availability of each party.	Email
				Generator	LCCC MSP	Generator advises date and time of test.	Email
3.1.5	MOF Annex 6 Condition 6.4	On the agreed or confirmed date in 3.1.4, as applicable; <b>OR</b> on the date confirmed in 3.1.11	Perform Meter Commissioning Test and submit Commissioning paperwork (example in <a href="#">Appendix 1</a> or <a href="#">Appendix 2</a> ).	Generator	LCCC	Commissioning results, including Meter reads.	Hard-copy and Email
3.1.6	MOF Annex 6 Condition 6.4	Following 3.1.5 and within 1 WD	Test results sent to MA for review.	LCCC	MSP/MA	Commissioning results, including Meter reads.	Email

3.1.7	MOF Annex 6 Condition 6.4	Within 1 WD after the Meter Commissioning Test (3.1.5) or date of receipt of test results	MA to approve test results and confirm whether the test has been passed or failed  If MA attended confirmation in person to Generator	MA	MSP  Generator	Commissioning Test results and Analysis (examples in <a href="#">Appendix 1</a> or <a href="#">Appendix 2</a> ).	Email and/or In Person (as applicable)
3.1.8	MOF Annex 6 Condition 6.4	Following 3.1.7 and within 2 WD after the Meter Commissioning Test (3.1.5) or date of receipt of test results	Notify LCCC Commissioning test result  If passed continue to 3.1.9; <b>OR</b>  If failed continue to 3.1.10	MSP	LCCC	Notification Commissioning test result	Email
3.1.9	MOF Annex 6 Condition 6.4	Following 3.1.8 and within 2 WD after the Meter Commissioning Test (3.1.5) or date of receipt of test	Notify Generator Commissioning test passed  <b>END PROCESS</b>	LCCC	Generator	Notification Commissioning test passed	Email
3.1.10	MOF Annex 6 Condition 6.4	Following 3.1.8 and within 2 WD after the Meter Commissioning Test (3.1.5) or date of receipt of test results	Notify Generator Commissioning test failed	LCCC	Generator	Notification Commissioning test failed	Email

3.1.11	MOF Annex 6 Condition 6.5	Within 5 WD after notification of failed test (3.1.10)	Generator must perform another Commissioning Test, continue to 3.1.5	Generator	LCCC MSP MA	Generator advises date and time of re-test.	Email
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## 4.2 Proving Test

This is the timetable that must be followed for a Meter Proving Test. As much notice as possible should be given for the Proving Test; as a minimum 10 days' notice are required before the proposed test and it must be completed before the Start Date.

The MSP will use the MA to witness testing and verify the results.

Ref	Condition	When	Action	From	To	Input Information Required	Method
3.2.1	MOF Annex 6 Condition 7.4	As soon as date known and no later than 10 WD prior to date Meter Proving Test required	Notify the LCCC of an impending test and the proposed date and time.  Generator submits the Key Meter Technical Details form.	Generator	MSP	Notification that a Proving Test is required and Key Meter Technical Details form	Email
3.2.2	MOF Annex 6 Condition 7.4	Following 3.2.1 and within 1 WD	Notify MSP of Meter Proving Test required	LCCC	MSP	Notification that a Meter Proving Test is required and Key Meter Technical Details form;  CfD ID and Generator details (name, address, phone number and email address);  Proposed test date	Email
3.2.3	MOF Annex 6 Condition 7.4	Following 3.2.2 and within 1 WD	Notify MA of Meter Proving Test required	MSP	MA	Notification that a Meter Proving Test is required	Email

						and Key Meter Technical Details form; CfD ID and Generator details (name, address, phone number and email address);  Proposed test date	
3.2.4	MOF Annex 6 Condition 7.4	Within 5 WD after receipt of Proving Test Notification in 3.2.1;	MA notifies the Generator whether or not they will attend.  Where the MA is attending agree date and time of test and continue to 3.2.5; or  Where the MA is not attending Generator to advise date and time of test and continue to 3.2.5	MA  Both Parties (MA, Generator)  Generator	Generator LCCC MSP Both Parties (MA, Generator)  LCCC MSP	General Notification - MA notifies the Generator whether or not they will attend.  Availability of each party.  Generator advises date and time of test.	Email  Email  Email
3.2.5	MOF Annex 6 Condition 7.4	On the agreed or confirmed date in 3.2.4, as applicable;	Perform Proving Test and submit results.	Generator	LCCC	Proving Test results, including Meter reads and Half Hourly Metered	Hard-copy and Email



		<b>OR</b> on the date confirmed in 3.2.11				Volumes in CSV file format <sup>6</sup> .	
3.2.6	MOF Annex 6 Condition 7.4	Following 3.2.5 and within 1 WD	Test results sent to MA for review	LCCC	MSP/MA	Proving Test results, including Meter reads.	Email
3.2.7	MOF Annex 6 Condition 7.4	Within 1 WD after the Meter Proving Test (3.2.5) or date of receipt of test results	MA to approve test results and confirm whether the test has been passed or failed.  If MA attended confirmation I person to Generator	MA	MSP  Generator	Proving Test results and Analysis (examples in <a href="#">Appendix 6</a> ).	Email and/or In Person (as applicable)
3.2.8	MOF Annex 6 Condition 7.4	Following 3.2.7 and within 2 WD after the Meter Proving Test (3.2.5) or date of receipt of test results	Notify LCCC Proving Test result  If passed continue to 3.2.9; <b>OR</b>  If failed continue to 3.2.10;	MSP	LCCC	Notification Proving Test result	Email
3.2.9	MOF Annex 6 Condition 7.4	Following 3.2.8 and same WD	Notify Generator Proving Test passed  <b>END PROCESS</b>	LCCC	Generator	Notification Proving Test passed	Email

<sup>6</sup> WP195 defined the format of the CSV file that must be submitted

Ref	Condition	When	Action	From	To	Input Information Required	Method
3.2.10	MOF Annex 6 Condition 7.4	Following 3.2.8 and within 2 WD after the Proving Test (3.2.5) or date of receipt of test results (including Metered Volumes)	Notify Generator Proving Test failed	LCCC	Generator	Notification Proving Test failed	Email
3.2.11	MOF Annex 6 Condition 7.5	Within 5 WD after notification of failed test (3.2.10)	Generator must perform another Proving Test, continue to 3.2.5	Generator	LCCC MSP MA	Generator advises date and time of re-test.	Email

### 4.3 Subsequent Meter Calibration Test

This is the timetable that must be followed for a subsequent Meter Calibration Test. As much notice as possible should be given for the subsequent Meter Calibration Test; as a minimum 10 days' notice are required before the proposed test.

The MSP will use the MA to witness testing and verify the results.

Ref	Condition	When	Action	From	To	Input Information Required	Method
3.3.1	MOF Annex 6 Condition 5.5	As soon as date known and no later than 10 WD prior to date Subsequent Meter Calibration Test required	Notify the MSP of an impending test and the proposed date and time.  Generator submits the Key Meter Technical Details form.	Generator	LCCC	Notification that a Subsequent Meter Calibration Test is required and Key Meter Technical Details form	Email
3.3.2	MOF Annex 6 Condition 5.5	Following 3.3.1 and within 1 WD	Notify MSP of subsequent Meter calibration test required	LCCC	MSP	Notification that a Subsequent Meter Calibration Test is required and Key Meter Technical Details form;  CfD ID and Generator details (name, address, phone number and email address);  Proposed test date	Email

3.3.3	MOF Annex 6 Condition 5.5	Following 3.3.2 and within 2 WD	Notify MA of subsequent Meter calibration test required	MSP	MA	<p>Notification that a Subsequent Meter calibration test is required and Key Meter Technical Details form;</p> <p>CfD ID and Generator details (name, address, phone number and email address);</p> <p>Proposed test date</p>	Email
3.3.4	MOF Annex 6 Condition 5.5	Within 5 WD after receipt of Subsequent Meter Calibration Notification in 3.3.1	<p>MA notifies the Generator whether or not they will attend.</p> <p>Where the MA is attending agree date and time of test and continue to 3.3.5; or</p> <p>Where the MA is not attending Generator to advise date and time of test and continue to 3.3.5.</p>	<p>MA</p> <p>Both Parties (MA, Generator)</p> <p>Generator</p>	<p>Generator LCCC MSP</p> <p>Both Parties (MA, Generator) LCCC MSP</p>	<p>General Notification - MSP notifies the Generator whether or not they will attend.</p> <p>Availability of each party.</p> <p>Generator advises date and time of test.</p>	<p>Email</p> <p>Email</p> <p>Email</p>

Ref	Condition	When	Action	From	To	Input Information Required	Method
3.3.5	MOF Annex 6 Condition 5.5	On the agreed or confirmed date in 3.3.4	Perform Subsequent Meter calibration test and submit results.	Generator	LCCC	Subsequent Meter calibration test results, including Meter reads before and after testing.	Hard-copy and Email
3.3.6	MOF Annex 6 Condition 5.5	Following 3.3.5 and within 1 WD	Test results sent to MA for review.	LCCC	MSP/MA	Subsequent Meter calibration test results, including Meter reads before and after testing.	Email
3.3.7	MOF Annex 6 Condition 5.5	Within 1 WD after the Meter calibration test (3.3.5) or date of receipt of test results	MA to approve test results and confirm whether the test has been passed or failed.  If MA attended confirmation in person to Generator	MA	MSP  Generator	Subsequent Meter calibration test results and Analysis (examples in <a href="#">Appendix 3</a> or <a href="#">Appendix 4</a> ).	Email and/or In Person (as applicable)
3.3.8	MOF Annex 6 Condition 5.5	Following 3.3.7 and within 2 WD after the subsequent calibration test (3.3.5) or date of receipt of test results	Notify LCCC subsequent Meter calibration test result.  If passed continue to 3.3.9; <b>OR</b>  If failed continue to 3.3.10	MSP	LCCC	Notification subsequent Meter calibration test result	Email
3.3.9	MOF Annex 6 Condition 5.5	Following 3.3.8 and within 2 WD after the	Notify Generator subsequent meter calibration passed	LCCC	Generator	Notification subsequent meter calibration passed	Email

		subsequent calibration test (3.3.5) or date of receipt of test results					
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Ref	Condition	When	Action	From	To	Input Information Required	Method
3.3.10	MOF Annex 6 Condition 5.5	Following 3.3.8 and within 2 WD after the subsequent Meter calibration (3.3.5) or date of receipt of test results	Notify Generator subsequent Meter calibration test failed	LCCC	Generator	Notification subsequent Meter calibration test failed	Email
3.3.11	MOF Annex 6 Condition 5.6	If calibration instrument proved to be faulty then within 5 WD after notification of failed test (3.3.10); or  As soon as reasonably practicable after notification of failed test (3.3.10 and within 20 WD	Generator must perform another Subsequent Meter calibration test, continue to 3.3.3	Generator	MA MSP	Generator advises date and time of re-test.	Email
			Generator must replace failed Meter and perform another Meter Commissioning and Proving Test, submit new Key Meter Technical Details and manufacturers Meter Test Certificate <b>END PROCESS</b>	Generator	MA MSP	Key Meter Technical Details form  Meter Test Certificate (manufacturer)	Email

## 5. Contact Information

For all queries please contact:

Contact Organisation	Contact
Settlement Services Provider (EMR Settlement Ltd)	Telephone: 020 7380 4333 Email: <a href="mailto:contact@emrsettlement.co.uk">contact@emrsettlement.co.uk</a>
Low Carbon Contracts Company (LCCC)	Telephone: 020 7211 8881 Email: <a href="mailto:info@lowcarboncontracts.uk">info@lowcarboncontracts.uk</a>

## 6. Acronyms and Definitions

A list of acronyms and definitions can be found in the 'Acronyms and Definition' document on the EMRS website<sup>7</sup>.

<sup>7</sup> <https://www.emrsettlement.co.uk/publications/working-practices/>



## 7. Appendices: Metering Records and Forms

### 7.1 Appendix 1 – Metering Equipment Commissioning Record Part 1 (Measurement Transformers)

#### 1. DETAILS

<b>Current Transformer</b>	<b>L1</b>	<b>L2</b>	<b>L3</b>
Location of CTs			
Serial Number			
Burden			
Accuracy Class			
Make			
Type			
Available Ratios (A)			
Ratio Selected (A)			
CT pole face – P2 facing Generating Unit?	<b>Yes/No*</b>	<b>Yes/No*</b>	<b>Yes/No*</b>

<b>Voltage Transformer</b>	<b>L1</b>	<b>L2</b>	<b>L3</b>
Location of VTs			
Serial Number			
Burden			
Accuracy Class			
Make			
Type			
Available Ratios (V)			
Ratio Selected (V)			

- L1 CT associated with L1 voltage? **Yes/No\***
- L2 CT associated with L2 voltage? **Yes/No\***
- L3 CT associated with L3 voltage? **Yes/No\***
- Standard Phase sequence at Testing Facility (L1, L2, L3)? **Yes/No\***
- CT shorting links left open? **Yes/No\***
- CTs and VTs Calibration Records attached? **Yes/No\***
- \*Delete as appropriate**

**2. RATIO VERIFICATION**

Test Performed:

**Primary Injection/Prevailing Load Test\***

Test Results:

**Pass/Fail\***

**2.1 Primary Injection Tests**

Instruments Used: .....

Include description and serial Nos: .....

Calibration expiry dates: .....

Description of test performed: .....

Test Results: .....

Correct polarity verified?

**Yes/No\***

<b>Current Transformer</b>	<b>L1</b>	<b>L2</b>	<b>L3</b>
Primary Current Injected			
Secondary Current measured High Ratio			
Secondary Current measured Mid Ratio			
Secondary Current measured Low Ratio			
Ratio Calculation High Ratio			
Ratio Calculation Middle Ratio			
Ratio Calculation Low Ratio			

<b>Voltage Transformer</b>	<b>L1 – L2</b>	<b>L2 – L3</b>
Primary Volts Injected		
Secondary Volts measured High Ratio		
Secondary Volts measured Low Ratio		
Ratio Calculation High Ratio		
Ratio Calculation Low Ratio		

**2.2 Prevailing Load Tests**

Instruments Used: .....

*Include description and serial Nos:* .....

Calibration *expiry dates:* .....

<b>Current Transformer</b>	<b>L1</b>	<b>L2</b>	<b>L3</b>
Primary Measurement			
Secondary Measurement			
Ratio Calculation			

**3. CT POLARITY VERIFICATION**

Description of test performed: .....

*For example, verification with known standard CT (buck & boost tests) or DC flick test.*

Instruments Used: .....

*Include description and serial Nos:* .....

Calibration *expiry dates:* .....

All tests performed and are correct?

**Yes/No\***

Tests performed by: .....

Date of Tests: .....

**\*Delete as appropriate**

## 7.2 Appendix 2 – Metering Equipment Commissioning Record Part 2 (Meters)

### 1. DETAILS

<b>Meters</b>			
Serial Number			
Manufacturer			
Type			
Meter CT Ratio			
Meter VT Ratio			
Register Readings			
Date & Time			
kW Demand			

Correct phase sequence at Meter terminals?

**Yes/No\***

Current and Voltages have correct relationship?

**Yes/No\***

#### CT Burdens

CT secondary cable run

.....VA

Meters

.....VA

Other – Description:.....

.....VA

Total CT Burden

.....VA

Overall Burden on CTs within limits?

**Yes/No\***

#### VT Burdens

VT secondary cable run

.....VA

Meters

.....VA

Other – Description:.....

.....VA

Total VT Burden

.....VA

Overall Burden on VTs within limits?

**Yes/No\***

Confirm that the Meter is set to the actual ratios of the CTs and VTs?

**Yes/No\***

CTs and VTs located where indicated on electrical schematic diagram?

**Yes/No\***

If No state location and reason:

.....

Phase alarms operating correctly?	<b>Yes/No*</b>
AI register advances when electricity flows towards the Generating Unit?	<b>Yes/No*</b>
CT shorting links left open?	<b>Yes/No*</b>
Meter potential fuse ratings:.....Amps	
Local fuse ratings:.....Amps	
Commissioning form Part 1 verified and correct?	<b>Yes/No*</b>
All connections tight?	<b>Yes/No*</b>

Tests performed by: .....

Date of Tests: .....

**\*Delete as appropriate**

### 7.3 Appendix 3 – Subsequent Meter Calibration Test Record – Class 1 Meters

#### Meter

CfD ID	
Meter Type Reference	
Serial Number	
Meter CT ratio	
Meter VT ratio	
Class	
Circuit Configuration	

#### Test Instrument

Test Instrument	
Serial Number	
Type	
Accuracy Class	
Date of last Calibration Test	

**Export/Import<sup>1</sup> Direction**

P/Q	% Rated Voltage	% Rated Current	Phase Angle Applied	Phase	Instrument Error <sup>2</sup>	Plant Error <sup>3</sup>	Meter Error <sup>4</sup>	Measurement Uncertainty <sup>5</sup>
P	100	1.0 I <sub>n</sub> <sup>6</sup>	0°	L1/L2/L3				
				L1				
				L2 <sup>7</sup>				
				L3				
		1.0 I <sub>n</sub> <sup>6</sup>	60°	L1				
				L2 <sup>7</sup>				
				L3				
		0.05 I <sub>n</sub> <sup>6</sup>	0°	L1/L2/L3				
Q		1.0 I <sub>n</sub> <sup>6</sup>	0°	L1/L2/L3				

**Import/Export<sup>1</sup> Direction**

P/Q	% Rated Voltage	% Rated Current	Phase Angle Applied	Phase	Instrument Error <sup>2</sup>	Plant Error <sup>3</sup>	Meter Error <sup>4</sup>	Measurement Uncertainty <sup>5</sup>
P	100	1.0 I <sub>n</sub> <sup>6</sup>	0°	L1/L2/L3				

**Temperature:**.....

**Date of Test:**...../...../.....

**Location of Test:**.....  
.....

**Test Sheet Reference No.:**.....

**Tested by: Print Name:**.....

**Signed:**.....

**Explanatory Notes:**

- <sup>1</sup> The Meter will be tested in the direction it predominantly operates in, i.e. for a Generator this will be in the Export direction. If the same measuring element is used to measure both Import and Export then one additional test point is required in the reverse direction. Delete as appropriate;
- <sup>2</sup> The displayed error on the Test Instrument used to test the Meter; this will include the effect of any applied Meter compensations for transformer errors/losses, if applicable;
- <sup>3</sup> The Plant Error applied to the Meter at that % rated current and power factor based on the transformer errors/losses calculation;
- <sup>4</sup> The actual error of the Meter once the effect of the Plant Error is removed from the raw Instrument Error;
- <sup>5</sup> Measurement Uncertainty calculated to a confidence level of 95 %,  $k=2$ ;
- <sup>6</sup> Test point used is the nominal value of current the Meter is rated for, i.e. if the nominal current of the meter is 5A the test would be done at 5A; and
- <sup>7</sup> L2 test point is only applicable if the Meter has three measuring elements, i.e. in a 3 Phase 4 Wire Meter.



## 7.4 Appendix 4 – Subsequent Meter Calibration Test Record – Class 0.2s/0.5s Meters

### Meter

CfD ID	
Meter Type Reference	
Serial Number	
Meter CT ratio	
Meter VT ratio	
Class	
Circuit Configuration	

### Test Instrument

Test Instrument	
Serial Number	
Type	
Accuracy Class	
Date of last Calibration Test	

**Export/Import<sup>1</sup> Direction**

P/Q	% Rated Voltage	% Rated Current	Phase Angle Applied	Phase	Instrument Error <sup>2</sup>	Plant Error <sup>3</sup>	Meter Error <sup>4</sup>	Measurement Uncertainty <sup>5</sup>		
P	100	1.0 I <sub>max</sub> or 1.2 I <sub>n</sub> / 1.5 I <sub>n</sub> or 2.0 I <sub>n</sub> <sup>6</sup>	0°	L1/L2/L3						
			60°	L1/L2/L3						
			-36.9°	L1/L2/L3						
		0.1 I <sub>n</sub>	60°	L1/L2/L3						
			-36.9°	L1/L2/L3						
		0.05 I <sub>n</sub>	0°	L1/L2/L3						
				L1						
				L2 <sup>7</sup>						
		0.02 I <sub>n</sub>	60°	L1/L2/L3						
			-36.9°	L1/L2/L3						
		0.01 I <sub>n</sub>	0°	L1/L2/L3						
		Q		1.0 I <sub>max</sub> or 1.2 I <sub>n</sub> / 1.5 I <sub>n</sub> or 2.0 I <sub>n</sub> <sup>6</sup>	90°	L1/L2/L3				
					0.1 I <sub>n</sub>	30°	L1/L2/L3			
				-30°		L1/L2/L3				
0.05 I <sub>n</sub>	90°			L1/L2/L3						
				L1						
				L2 <sup>7</sup>						
L3										

**Import/Export<sup>1</sup> Direction**

P/Q	% Rated Voltage	% Rated Current	Phase Angle Applied	Phase	Instrument Error <sup>2</sup>	Plant Error <sup>3</sup>	Meter Error <sup>4</sup>	Measurement Uncertainty <sup>5</sup>
P	100	1.0 I <sub>max</sub> or 1.2 I <sub>n</sub> / 1.5 I <sub>n</sub> or 2.0 I <sub>n</sub> <sup>6</sup>	0°	L1/L2/L3				

Temperature:.....

Date of Test:...../...../.....

Location of Test:.....  
.....

Test Sheet Reference No.:.....

Tested by:      Print Name:.....

**Signed:**.....

**Explanatory Notes:**

- <sup>1</sup> The Meter will be tested in the direction it predominantly operates in, i.e. for a Generator this will be in the Export direction. If the same measuring element is used to measure both Import and Export then one additional test point is required in the reverse direction. Delete as appropriate;
- <sup>2</sup> The displayed error on the Test Instrument used to test the Meter; this will include the effect of any applied Meter compensations for transformer errors/losses, if applicable;
- <sup>3</sup> The Plant Error applied to the Meter at that % rated current and power factor based on the transformer errors/losses calculation;
- <sup>4</sup> The actual error of the Meter once the effect of the Plant Error is removed from the raw Instrument Error;
- <sup>5</sup> Measurement Uncertainty calculated to a confidence level of 95 %,  $k=2$ ;
- <sup>6</sup> Test point used is dependent on the current rating of the Meter and will be the highest value of current the Meter is rated for, i.e. if the nominal current of the meter is 5A the test would be done at 6A ( $1.2 \times 5A$ ).  $1.5 I_n$  or  $2.0 I_n$  is only used if the Meter is designed for it and is determined by the overload capacity of the circuit, if unspecified test at  $1.0 I_{max}$ . Delete as appropriate; and
- <sup>7</sup> L2 test point is only applicable if the Meter has three measuring elements, i.e. in a 3 Phase 4 Wire Meter.

## 7.5 Appendix 5 – Key Meter Technical Details Form

**To:** [•] (the “CfD Counterparty”)  
[Address]  
**From:** [•] (the “Generator”)  
[Unique reference number: [•]]  
**Dated:** [•]

### KEY METER TECHNICAL DETAILS

1. The following Key Meter Technical Detail was changed on: Date:.....  
.....
2. The Key Meter Technical Details are now as follows:  
Outstation ID.....  
Meter Serial Number.....  
Outstation Number of Channels.....  
Measurement Quantity ID.....  
Meter Multiplier.....  
Pulse Multiplier.....  
CT Serial Number.....  
VT Serial Number.....  
CT Ratios.....  
VT Ratios.....

Print Name.....  
Signed.....  
Date.....

## 7.6 Appendix 6 – Metering Proving Test Record

### DETAILS

<b>Meters</b>			
Serial Number			
Start Time (UTC)			
Start Reading <b>(AI/AE*)</b>			
Independent Primary Load Value (Start)			
End Time (UTC)			
End Reading <b>(AI/AE*)</b>			
Independent Primary Load Value (End)			
Meter Register Advance			
Half Hourly Period Energy Value			

Confirm that Meter register advance matches Half Hour period advance?

**Yes/No\***

Confirm Half Hourly advance from Data Collector?

**Yes/No\***

Confirm Half Hourly advance from Meter manufacturer's software?

**Yes/No\***

Tests performed by: .....

Date of Tests: .....

**\*Delete as appropriate**

## 7.7 Appendix 7 – Analysis Results Template

### CFD Private Network Commissioning/Calibration Final Report

CFD ID:

Project Name:

Circuit ID:

Metering Configuration Type:

Type of Test:

Date of Test:

Test Result **Pass/Fail\***  
(\* Delete as appropriate)

Details of Non-Compliances

Details of Observations

Comments

Date Sent:

Name:

