



Department
of Energy &
Climate Change

Electricity Market Reform- Capacity Market

Annex to the Capacity Market Supplementary
Design Proposals and Transitional Arrangements
Draft Technical Requirements for the Bespoke
Metering Configuration Solution

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Introduction

This document is an annex to the Capacity Market Supplementary Design Proposals and Transitional Arrangements Consultation and sets out the draft technical requirements for CMUs that wish to use the Bespoke Metering Configuration Solution.

The draft technical requirements are based on the Balancing and Settlement Codes (BSC) Metering Codes of Practice and also the Contracts for Difference (CFD) Private Network Technical System Requirements and Private Network Metering Operational Framework.

Details on the aim of the consultation and how to respond can be found in the main consultation document.

Definitions

In these technical requirements:

Accredited Laboratory means the National Physical Laboratory (NPL) or a calibration laboratory that has been accredited by the United Kingdom Accreditation Service (UKAS), or a similarly accredited international body.

Active Energy means the electrical energy produced, flowing or supplied by an electric circuit during a time interval, being the integral with respect to time of instantaneous active power, measured in units of watt-hours or standard multiples thereof.

Bespoke Technical Requirements means the document containing technical information relating to Metering Points, measured quantities and demand values for Metering Systems, Metering Equipment criteria and commissioning, records and proving, as set out in this document.

BSC means the Balancing and Settlement Code.

Capacity Market Settlement Activities means the calculation, invoicing, reconciliation and settlement of payments to be made pursuant to the Capacity Market Agreement.

Capacity Market Settlement Services Provider means any person appointed for the time being and from time to time by the Electricity Settlement Company (ESC) to carry out any of the Capacity Market Settlement Activities, or who is designated by the Secretary of State to carry out the Capacity Market Settlement Activities.

Check Meter means a precision processor-based meter which measures the electric energy as accurately as the utility revenue meter. Forms part of the Metering Equipment that the provider is required to install and maintain.

Commissioning Tests means the minimum requirements necessary to establish that the Metering Equipment is accurately measuring and recording the energy (demand or generation) in an Outstation at a Site.

Communications Equipment means in respect of any Metering Equipment:

- a) the terminating equipment (which may include a modem) necessary to convert data from such Metering Equipment into a state for transmission to the ESC or the Settlement Services Provider; and

- b) the exchange link which is connected to that terminating equipment, including (for the avoidance of doubt) any Outstation.

Consumption Data Comparison Check means a method to prove the validity of the data from the transfer process, as set out in the Proving Test section.

Correct Energy Measurement Test means a method to prove the output of the Metering System correctly records the energy in the primary system at the Provider Meter Point as set out in the Meter checks – commissioning, records and proving section.

Customer Meter means the Meter of a Customer for the purposes of measuring the Customer Metered Volume where DSR CMUs are sub tenants of a larger site.

Customer Metered Volume means, in relation to a Settlement period, the volume of Electricity determined as at a Customer Metering Point, which flowed in relation to that Settlement Period, and where there are multiple Customer Metering Points, the Customer Metered Volume shall mean the aggregate of the input volumes of Electricity.

Customer Metering Point means, in relation to a Customer, a Meter located at that Customer for the purposes of measuring the Electricity supplied for Capacity Market Settlement Activities.

Demand means the amount of Electricity being consumed at any given time.

Delivery Body has the meaning given to that term in Regulation 2.

Distribution Licence means a licence granted or treated as granted pursuant to section 6(1)(c) of the EA 1989.

Distribution System means the system for the distribution of Electricity within Great Britain operated by Licensed Distributors.

Distribution System Operator means:

- a) a Licensed Distribution System Operator; or
- b) any other party which distributes Electricity for the purposes of section 4(1)(bb) of the EA 1989 (as inserted or to be inserted by section 28 of the Utilities Act 2000) through a Distribution System, acting in that capacity.

EA 1989 means the Electricity Act 1989.

EA 2013 means the Energy Act 2013.

Electricity means Active Energy.

GB Transmission System means the system consisting (wholly or mainly) of high voltage electric lines owned by Transmission Licensees within Great Britain that is used for the transmission of Electricity from one (1) generating station to a substation or to another generating station or between substations or to/from any interconnector.

Generating Unit means any equipment in which electrical conductors are used or supported or of which they form part which produces electricity, and includes such equipment which produces electricity from storage.

Generator Metered Volume means, in relation to a Settlement Period, the net aggregate volume of exports and imports of Electricity determined as at the Generator Metering Point, which flowed in that Settlement Period.

Generator Metering Point means the point at which Generator Metered Volume is measured for the purposes of the Capacity Market Settlement Activities and is net of any Generating Unit demand for Electricity.

Half-Hourly Metering Equipment means the Metering Equipment which provides measurements on a half-hourly basis for the purposes of the Capacity Market Settlement Activities.

Key Meter Technical Details means those items set out in the Bespoke Technical Requirements.

Licensed Distribution System Operator means a party which holds a Distribution Licence in respect of distribution activities in Great Britain, acting in that capacity.

Licensed Distributor means a person who is authorised pursuant to a Distribution Licence to distribute electricity.

Main Meter means the Metering Equipment that the Capacity Provider is required under the Bespoke Technical Requirement to install to measure Electricity supplied by the Capacity Provider.

Material Change means a change to the Metering Equipment or Communications Equipment other than a change by way of repair, modification or replacement of any component which is not a substantial part of the Metering System even where an enhanced or equivalent component is used for the repair, modification or replacement rather than an identical component.

Measurement Transformers means either a current transformer (CT) or a voltage transformer (VT) or a device carrying out both such functions, whose purpose is to enable

the Metering Equipment to operate at more convenient currents and/or voltages (as applicable) than are present on the power system being measured.

Meter means a device for measuring Active Energy and/or Reactive Energy.

Meter Register means the physical Meter reading displayed in kWh/MWh or kVArh/MVArh.

Meter Technical Details means all technical details (including Outstation channel mapping) of a Metering System required to enable metered data to be collected and correctly interpreted from that Metering System as referred to in the Bespoke Technical Requirements.

Metered Volume means the Metered Volume in relation to generating units or DSR components, as the context requires.

Metering Equipment means Meters, Measurement Transformers, metering protection equipment including alarms, circuitry, associated Communications Equipment and Outstations and wiring and shall include any Customer Meter and associated Metering Equipment.

Metering Points means the Generator Metering Point and the Customer Metering Point.

Metering System means particular commissioned Metering Equipment installed for the purposes of measuring the quantities of exports and imports at the Meter Point.

Outstation means equipment which receives and stores data from a Meter(s) for the purpose, inter alia, of the transfer of that data to the ESC, and which may perform some processing function before such transfer, and which may be one or more separate units or be integral with the Meter.

Proving Test means a test to confirm that the stored metered data associated with the energy imported to, or exported from the Total System can be satisfactorily transferred via a suitable communications link to the data collection parties.

Reactive Energy means the electrical energy produced, flowing or supplied by an electric circuit in quadrature to Active Energy at a time interval, being the integral with respect to time of instantaneous reactive power, measured in units of volt ampere reactive hours or standard multiples thereof.

Secretary of State means the Secretary of State for Energy and Climate Change.

Settlement Period means a period of 30 minutes beginning on the hour or the half-hour.

Total System means the Transmission System and each Distribution System.

Transmission Licence means an electricity transmission licence granted or treated as granted pursuant to section 6(1)(b) of the EA 1989 that authorises a person to transmit Electricity.

Transmission Licensee means any person who is authorised by a Transmission Licence to transmit electricity.

Transmission System means those parts of the GB Transmission System that are owned by a Transmission Licensee within the transmission area specified in its Transmission Licence.

UTC means Co-ordinated Universal Time.

Technical Requirements

1. The CMU shall comply at all times with the requirements of these Bespoke Technical Requirements, which are aligned with the BSC metering codes of practice.
2. The CMU, a generating unit or DSR component that uses the bespoke metering configuration solution shall install, commission, test, maintain, rectify faults and provide a sealing service in respect of its Metering Equipment, including its associated Communications Equipment, in accordance with these Bespoke Technical Requirements.

Metering points

3. The Capacity Provider shall ensure that all meters are installed at an appropriate location and that at all times the metering arrangements must meet all Technical Requirements and can accurately record the metered volume comprising:
 - All output electricity generated;
 - All input electricity used, including any imported onsite electricity; and
 - All electricity supplied by the provider to a customer as measured at the customer metering point (where applicable).

Measurement quantities

4. The provider must ensure that it reports its net metered volume for the purposes of the Settlement Activities.
5. For each separate circuit the following energy measurements are required for the purposes of Settlement Activities:
 - Import kWh/MWh; and
 - Export kWh/MWh.

Accuracy requirements

6. The overall accuracy of the energy measurements at or referred to a Metering Point shall at all times be within the limits of error as shown:

Table 1: Metering Type 1 (Metering of circuits rated greater than 100MVA for the purposes of Settlement Activities)

CONDITION	LIMITS OF ERROR AT STATED SYSTEM POWER FACTOR	
Current expressed as a percentage of Rated Measuring Current	Power Factor	Limits of Error
120% to 10% inclusive	1	± 0.5%
Below 10% to 5%	1	± 0.7%
Below 5% to 1%	1	± 1.5%
120% to 10% inclusive	0.5 lag and 0.8 lead	± 1.0%

Table 2: Metering Type 2 (Metering of circuits not exceeding 100MVA for the purposes of Settlement Activities)

CONDITION	LIMITS OF ERROR AT STATED SYSTEM POWER FACTOR	
Current expressed as a percentage of Rated Measuring Current	Power Factor	Limits of Error
120% to 10% inclusive	1	± 1.0%
Below 10% to 5%	1	± 1.5%
Below 5% to 1%	1	± 2.5%
120% to 10% inclusive	0.5 lag and 0.8 lead	± 2.0%

Table 3: Metering Type 3 (Metering of circuits not exceeding 10MVA for the purposes of Settlement Activities)

CONDITION	LIMITS OF ERROR AT STATED SYSTEM POWER FACTOR	
Current expressed as a percentage of Rated Measuring Current	Power Factor	Limits of Error
120% to 10% inclusive	1	± 1.5%
Below 10% to 5%	1	± 2.0%
120% to 10% inclusive	0.5 lag and 0.8 lead	± 2.5%

Metering equipment

7. Capacity Providers shall ensure that all Metering Equipment in accordance with these Technical Requirements are:

- installed and commissioned (if not already installed and commissioned); and
- maintained and operated.

8. The Metering Equipment to be installed should be in accordance with Schedule 7 of the EA 1989 and the meters must be approved in accordance with schedule 4 of the Meters (Certification) Regulations or Measuring Instrument Directive (MID).

Meters

9. All Meters shall be static and measure on a Half Hourly basis.

10. For each circuit Meters shall be supplied and may be used for a period not exceeding ten (10) years from the date of manufacture.

11. All Meters should include Outstation functionality.

12. Meters shall be configured such that the number of measuring elements is equal to or one less than the number of primary system conductors. These include the neutral conductor, and/or the earth conductor where system configurations enable the flow of zero sequence energy.

13. All Meters supplied via Measurement Transformers shall be set to the actual primary and secondary ratings of the Measurement Transformers and the ratios displayed as follows:

- for Meters separate from the display and/or Outstation the ratios shall be recorded on the nameplate of the Meter; and
- for Meters combined with the display and/or the Outstation, the ratios shall be displayed and downloaded during the interrogation process. In addition, the compensation factor that has been applied for measurement transformer errors and/or system losses, where this is a constant factor applied at security level 3 shall be similarly displayed and downloaded.

14. All Meters shall include a non-volatile Meter Register of cumulative energy for each measured quantity. The Meter Register(s) shall not roll-over more than once within a six (6) month period.

Table 4: All meters for Type 1, 2 and 3 metering should meet the following criteria:

Type of Meter	Relevant Standard	Minimum Class Accuracy
1	BS EN 62053-22	0.2s
2	BS EN 62053-22	0.5s
3	BS EN 61036 or BS EN 60521 BS EN 50470-3	1 B

Meter technical details

15. The provider of each Metering System shall:

- establish and maintain Meter Technical Details in respect of the Metering Equipment;
- ensure that such Meter Technical Details are true, complete and accurate; and
- provide such Meter Technical Details to the Electricity Settlement Company (ESC) if requested.

Calibration, commissioning and maintenance of metering equipment

16. The provider of each Metering System shall ensure that the Metering Equipment shall be calibrated, maintained and commissioned in accordance with these Technical Requirements. The calibration is required to demonstrate compliance with IEC 185, IEC 186, BS EN 60044-1, BS EN 60044-2, and/or class index BS EN 60044-3 accuracy and measurement range requirements, as appropriate for the Measurement Transformers.

17. These calibrations must demonstrate conformity with relevant product standards appropriate to the class index of the Meters. Manufacturers' certificates shall be provided which include the actual errors of the Meter across its operating range and is required to demonstrate compliance with BS EN 62053-22, BS EN 61036, BS EN 60521 and/or BS EN 50470-3 accuracy and measurement range requirements, as appropriate for the Meters.

18. Where it is necessary to apply compensations to Meters, these are to be applied after the Meter has been calibrated and further tests carried out which confirm that the compensation has been correctly applied.

19. The provider shall, at its own cost and expense, ensure that the Metering Equipment is kept in good working order, repair and condition to the extent necessary to allow the correct registration, recording and transmission of the requisite details of the Metered Volume measured by the relevant Metering System.

20. If Metering Equipment is removed, replaced or otherwise changed, then its commissioning record should be retained by the provider and must be provided to the ESC on request.

Metering Equipment criteria

21. Metering Equipment other than outdoor Measurement Transformers shall be accommodated in a clean and dry environment.

22. For each circuit, other than one which is permanently disconnected, the voltage supply to any Meters, displays and Outstations shall be connected such that it is normally energised to facilitate reading of the Meter Register(s) and local and remote interrogation of the Outstation.

Measurement Transformers

23. The terms "current transformer" and "voltage transformer" used below do not preclude the use of other measuring techniques with a performance equal to that specified for such Measurement Transformers.
24. For each circuit, current transformers (CT) and voltage transformers (VT) shall meet the requirements set out below.
25. Additionally, where a combined unit measurement transformer (VT and CT) is provided the 'Tests for Accuracy' as covered in clause 8 of IEC Standard 44-3 covering mutual influence effects shall be met.
26. All Measurement Transformers shall be of a wound construction.
27. Where practicable, the following may be subject to checks:
- Ratio, class, rated burden and polarity from the labels physically attached to the Measurement Transformers and/or the identification plates attached to switchgear or other enclosures containing Measurement Transformers (although this may not always be practical for safety reasons); and
 - Test records/certificates detailing specific measured errors held by the equipment owner, associated with the Measurement Transformers on site or from agreed generic CT/VT certificates in the case of CTs and VTs.

Table 5: All current transformers for Type 1, 2 and 3 metering should meet the following criteria:

Type of Meter	Relevant Standard	Minimum Class Accuracy	No of Sets	Usage
1	IEC 60044-1	0.2s	2	1 Set of CTs shall be dedicated to the Main Meter only and 1 set supplying the Check Meters. Check Meter CTs can be used for other purposes providing the capacity market accuracy requirements are met.
2	IEC 60044-1	0.2s	1	CTs shall be dedicated to Settlement Activities supplying both Main Meters and Check Meters. An additional set of CTs may be fitted for the Check Meter which may also be used for other purposes providing the capacity market accuracy requirements are met.
3	IEC 185	0.5	1	1 set of CTs for Main Meters and Check Meters for Settlement Activities purposes, but can be used

Type of Meter	Relevant Standard	Minimum Class Accuracy	No of Sets	Usage
				for other purposes if the capacity market accuracy requirements are met.

28. The primary winding of voltage transformers shall be connected to the circuits being measured.

Table 6: The secondary windings of voltage transformers for Type 1, 2 and 3 metering used for the purposes of Settlement Activities shall meet the following criteria:

Type of Meter	Relevant Standard	Minimum Class Accuracy	No of VTs required	Usage
1	IEC 60044-2	0.2	2 VTs (or 1 VT with two (2) or more secondary windings)	1 VT secondary winding dedicated to the Main Meter for Settlement Activities purposes only. A second VT secondary winding for the Check Meter, which may also be used for other purposes providing the capacity market accuracy requirements are met.
2	IEC 60044-2	0.5	1	VT secondary winding shall be dedicated to Settlement Activities supplying both Main Meters and Check Meters. An additional VT or secondary winding may be used for the Check Meter which may also be used for other purposes providing the capacity market accuracy requirements are met.
3	IEC 186	1	1	Settlement Activities purposes, but other uses if capacity market accuracy requirements are met.

Fusing and testing facilities

29. Testing facilities shall be provided close by to the Meters of each circuit, which enables such Meters to be routinely tested and/or changed safely with the circuit energised.

30. Separately fused VT supplies shall be provided locally for:

- the Main Meter;
- the Check Meter; and
- any other Metering Equipment burden.

31. Local fusing shall discriminate with the source fusing.

32. Where current transformers are used on low voltage installations, the voltage supply to the Metering Equipment shall be fused as close as practicable to the point of that supply with a set of isolating links, suitably identified, provided locally to the Metering Equipment. If that point of supply is close to the Metering Equipment, then the isolating links may be omitted.

Displays and facilities

33. The Metering Equipment shall display the following primary information (not necessarily simultaneously):

- measured quantities as per the accuracy requirements;
- current time ("UTC") and date;
- the CT and/or VT ratios that the Meter has been programmed to, where appropriate; and
- the compensation factor that has been applied for Measurement Transformer errors and/or system losses, where this is a constant factor applied at security level 3 (i.e. where the Meter is combined with the display and/or Outstation).

Outstation

34. An Outstations system shall be incorporated into Meters which receives and transfers data from Settlement Instations and the data shall be to a format in accordance with Settlement Activities and approved by the ESC.

35. Where a separate modem associated with the Outstation system is used, then it shall be provided with a separately fused supply either from a secure supply or from a measurement VT. Alternatively, line or battery powered modem types may be used.

36. For the purpose of transferring stored metering data from the Outstation to the Settlement Instation, a unique Outstation ID shall be provided.

37. An interrogation port shall be provided for each Outstation.

38. Remote interrogation facilities shall be provided with error checking of the communications between the Outstation system and the Settlement Instation.

39. It shall not be possible to disconnect the remote communications connection to/from the Outstation without the breaking of an appropriate seal.

Data storage

40. Data storage facilities for metering data shall be provided as follows:

- each demand value shall be identifiable to its respective date and time;
- a storage capacity of 48 periods per day for a minimum of 50 days for all demand values and the stored values shall be integer multiples of kW;
- the resolution of the energy transferred into the demand registers shall be within $\pm 0.1\%$ (at full load) of the amount of Active Energy measured by the associated Meter;
- the value of any energy measured in a Demand Period but not stored in that Demand Period shall be carried forward to the next Demand Period;
- where a separate Outstation is used, cumulative register values shall be provided in the Outstation which shall be set to match and increment with the Meter Registers;
- in the event of an Outstation supply failure, the Outstation shall protect all data stored up to the time of the failure, and maintain the time accuracy;
- partial demand values, those in which an Outstation supply failure and/or restoration occurs, and zero demand values associated with an Outstation supply failure, shall be marked so that the Settlement Instation can identify them;
- to cater for continuous supply failures, the clock, calendar and all data shall be supported for a period of 20 days without an external supply connected;
- any "read" operation shall not delete or alter any stored metered data; and
- an Outstation shall provide all of the metered data stored from the commencement of any specified date upon request by the Settlement Instation.

Time keeping

41. The Outstation time shall be set to Co-ordinated Universal Time Clock (UTC). No switching between UTC and British Summer Time (BST) shall occur for Settlement Activities data storage requirements.
42. Time synchronisation of the Outstation may be performed remotely by the provider (or its data collection agent) as part of the normal interrogation process or locally by an Interrogation Unit.
43. When time synchronisation occurs, the relevant period(s) shall be marked with an alarm indication.
44. The overall limits of error for the time keeping allowing for a failure to communicate with the Outstation for a period of 20 days shall be:
 - the completion of each Demand Period shall be at a time which is within ± 20 seconds of UTC; and
 - the duration of each Demand Period shall be within $\pm 0.1\%$, except where time synchronisation has occurred in a Demand Period.

Monitoring facilities

45. Monitoring facilities shall be provided for each of the following conditions and shall be reported, as separate alarm indications, tagged to the relevant Demand Period(s), via online communications and the local interrogation unit:

- phase failure of any one or a combination of phases;
- Metering Equipment resets caused by other than a supply failure (where fitted);
- battery monitoring (where battery fitted);
- interrogation port access which changes time and/or date;
- where different from (iv), Demand Period(s) which have been truncated or extended by a time synchronisation;
- interrogation port access which changes data other than time and/or date; and
- reverse running (if fitted).

46. In addition, detected errors in Metering Equipment functionality should be recorded as an event alarm with date and time.

47. Any alarm indications shall not be cancelled or deleted by the interrogation process and shall be retained with the data until overwritten. The alarm shall reset automatically when the abnormal condition has been cleared.

Communications

48. Outstations shall provide both local and remote interrogation facilities, from separate ports.

49. To prevent unauthorised access to the data in the Metering Equipment a security scheme, as defined below and shall be incorporated for both local and remote access. Separate security levels shall be provided for the following activities:

Level 1 – Password for:

Read only of the following metering data, which shall be transferable on request during the interrogation process:

- Outstation ID;
- demand values as defined for Main Meters and Check Meters;
- cumulative measured quantities as defined for Main Meters and Check Meters;
- maximum demand for kW/MW or kVA/MVA per programmable charging period i.e.

monthly, statistical review period;

- multi-rate cumulative Active Energy as specified by the Capacity Provider;
- the Measurement Transformer ratios, where appropriate;
- the Measurement Transformer error correction factor and/or system loss factor, where this is a constant factor applied to the entire dynamic range of the Meter and the Meter is combined with the display and/or Outstation;
- alarm indications; and
- Outstation time and date.

Level 2 – Password for:

- corrections to the time and/or date; and
- resetting of the maximum demand.

Level 3 – Password for: Programming of:

- the displays and facilities;
- the Measurement Transformer ratios, as appropriate;
- the Measurement Transformer error correction and/or system loss factor where this is a constant factor applied to the entire dynamic range of the Meter and the Meter is combined with the display and/or Outstation; and
- the Passwords for levels 1, 2 and 3.

50. In addition, it shall be possible to read additional information within the Metering Equipment to enable the programmed information to be confirmed.

Level 4 – Password or removal of Metering Equipment cover(s) necessitating the breaking of a seal for:

- calibration of the Metering Equipment;
- setting the Measurement Transformer ratios, as appropriate;
- programming the Measurement Transformer error correction factor and/or system loss factor where this is other than a single factor; and
- programming the level 3 Password and the level 4 Password, if appropriate.

51. In addition to the functions specified for each level it shall be feasible to undertake the functions at the preceding level(s). For example, at level 3 it shall also be possible to carry

out the functions specified at levels 1 and 2. This need not apply at level 4 when access is obtained via removing the cover.

52. Different Passwords shall be utilised for each level.

Interrogation

53. To enable local interrogation an interrogation port shall be provided for each Outstation.

54. Remote interrogation facilities shall be provided with error checking of the communications between the Outstation system and the Settlement Instation.

55. It shall not be possible to disconnect the remote communications connection to/from the Outstation without the breaking of an appropriate seal.

Interrogation Unit

56. The ESC may interrogate the Metering Equipment using an Interrogation Unit (“IU”).

57. The IU may be used for programming, commissioning, maintenance/fault finding and when necessary the retrieval of stored metering data. The data retrieved by the IU shall be compatible with the Settlement Instation.

58. The IU shall have a built-in security system, such as a password, so that the IU becomes inoperative and non-interrogatable if it is lost, stolen, etc. Such password can be applied at power-on of the device and/or on entry to the IU software application.

Sealing and security

59. The provider shall ensure that the Metering Equipment is appropriately sealed so as to provide assurance that the following parameters are met:

- all standards applicable to the provider under Electricity Safety, Quality and Continuity Regulations 2002; and
- a reasonable and prudent standard of anti-tamper protection.

60. The provider shall ensure that the Metering Equipment shall be as secure as is possible in all the circumstances.

61. The provider shall notify the ESC if the Metering Equipment’s seal is broken or damaged and inform them of any consequential faults or damage to the Metering Equipment or if incorrect data is flowing to the ESC.

Defective Metering Equipment

62. If at any time any Metering Equipment is destroyed or damaged or otherwise ceases to function, or is or is found to be outside the applicable limits of accuracy, the Capacity Provider shall:

- notify the ESC of such defective Metering Equipment within five working days of identifying such defective Metering Equipment; and
- ensure that any defective component is back in service and the Metering Equipment is operating within the applicable limits of accuracy as quickly as is reasonably practicable in all the circumstances. The provider should notify the ESC within 1 working day of discovering the fault and within 5 working days either correct the fault or submit a rectification plan outlining how and when the fault will be corrected.

Validation of meter data

63. If any of the following faults are identified, the ESC shall be entitled (but not obliged) to undertake a full investigation of the Metering Equipment at the provider's expense:

- where the Outstation is interrogated, or when data is received from the Outstation automatically, and the 'electronic serial number' of the Outstation differs from that expected;
- where the Outstation is interrogated, or when data is received from the Outstation automatically, and the number of channels of the Outstation differs from that expected;
- where the Outstation is interrogated, and the time of the Outstation differs by more than 15 minutes from that expected, and the time; or
- where the Outstation is interrogated, or when data is received from the Outstation automatically, and the individual alarms required by the Bespoke Technical System Requirements are flagged.

Main/Check comparison

64. Where the Main Meters and Check Meters are installed in accordance with the Bespoke Technical Requirements, the metering data recorded by each Meter must be compared for each circuit. Allowance shall be made for low load discrepancies. Any discrepancy between the two values in excess of 1.5 times the accuracy requirements prescribed for the individual Meters at full load, as defined in the Bespoke Technical Requirements, shall be investigated by the ESC.

Meter checks - commissioning, records and proving

65. All Metering Equipment must be fully commissioned prior to a Metering Assessment and Metering Test taking place within the timeframes set out in Rule 8.3.3. The purpose of

commissioning is to ensure that the electricity flowing across a Metering Point is accurately recorded by the associated Metering System. Meter Commissioning Tests shall be performed on site to confirm and record, so far as appropriate, that:

- the current transformers are of the correct ratio and polarity and correctly located to record the required power flow;
- the voltage transformers are the correct ratio and polarity and correctly located to record the required power flow;
- the relationships between voltages and currents are correct and that phase rotation is standard at the Meter terminals;
- the burdens on the Measurement Transformers are within the correct limits;
- the Meters are set to the same current transformer and voltage transformer ratios as the installed Measurement Transformers;
- the Meters have the correct compensation for errors in the Measurement Transformers/connections and losses in power transformers where appropriate;
- the output of the Metering System correctly records the energy in the primary system at the provider Metering Point and the Customer Metering Point; and
- Metering Equipment detects phase failure and operates the required alarms.

66. Where individual items of Metering Equipment are to be replaced, then only those items need to be commissioned at that time. For clarification, Metering Systems in their entirety do not need to be recommissioned when items are replaced within that system unless there is a Material Change to the Metering System.

67. Correct Energy Measurement Test can be used as a way to prove the output of the Metering System correctly records the energy in the primary system at the provider's Meter Point in the Meter checks – commissioning, records and proving section.

68. For the purposes of the Correct Energy Measurement Test, Primary Energy may be established using the following methods by:

- comparing the demand derived from independently measured primary values to the Meter's instantaneous demand reading for the same period;
- comparing the demand derived from independently measured secondary values where the primary/secondary ratios can be established to the Meter's demand reading for the same period;
- using an alternative measurement device for comparison with the Meter; or
- using appropriate commissioning records which the Generator shall provide the ESC Body if requested.

Instruments for commissioning

69. The provider shall establish and maintain a process to periodically calibrate the instruments used for commissioning (from which measurements are recorded). Each instrument shall be traceable to an Accredited Laboratory. The provider shall maintain records to show the instruments used for commissioning by the provider. All instruments for commissioning shall be re-calibrated every two years. If an instrument is found to be outside of the required accuracy limits specified in the Technical Requirements, the provider shall consider what impact that inaccuracy has had on previous Meter Commissioning Tests and inform the ESC.

Proving Test

70. A provider must undertake a proving test to confirm that the stored metered data associated with the energy imported to, or exported from the Total System (including System Connection Points), can be satisfactorily transferred via a suitable communications link to, and correctly recorded by, the data collection parties.

71. The following are Key Meter Technical Details that, if changed, require performance of a Proving Test:

- Outstation ID;
- Meter Serial Number;
- Outstation Number of Channels;
- Measurement Quantity ID;
- Meter Multiplier;
- Pulse Multiplier; CT and/or VT Ratios

72. Consumption Data Comparison Check is a way to prove the validity of the data from the transfer process and shall take the following format:

- the Meter Technical Details and the load (or generation) provided by the capacity provider a half-hour settlement period shall be compared to that observed on-site. Consideration shall also be given to commissioning and historic Proving Test information;
- a reading (for the dominant Active Energy flow direction at the time) of the cumulative register on the Meter's display at the beginning and end of the half-hour settlement period that is to be downloaded from the Meter's Outstation shall be taken; and
- the true Meter Register half-hour advance for the half-hour period shall be calculated using the Meter Register multiplier.

Maintenance checks

73. The Measurement Transformer specification (where appropriate) may be checked to ensure it complies with the standards set out in the Technical Requirements and is consistent with the information provided by the provider.
74. The Meter Technical Details may be checked to ensure that they conform to those recorded in capacity market Settlement Activities systems using information submitted by the provider, including any Measurement Transformer error offsets and commissioning details.
75. The overall accuracy of the Metering System is to be determined by the ESC or any other appointed agent.
76. To verify that the Metering System is recording the correct amount of energy, checks may be carried out to compare the Primary Energy with that being recorded by the Metering System.
77. Checks shall also be carried out to ensure that the Metering System meets the standards required by the Technical Requirements.
78. All points may be checked as specified in the Technical Requirements, including (but not limited to):
- labelling of equipment; and
 - general standard of installation, i.e. good working practice.

Timing of maintenance checks

79. A routine maintenance check will be conducted in each of the following years for the life of the Metering Equipment:
- year four;
 - year seven;
 - year ten; and
 - year thirteen.

Information and records

80. The provider of each Metering System shall:
- maintain records of maintenance checks for the life of the relevant item of Metering Equipment and where requested provide these to the ESC;
 - provide information to the ESC relating to how the Metering Equipment meets the Technical Requirements if requested; and

- submit information to the ESC regarding the dates and time periods for installation of new metering equipment and the dates in accordance with Rule 8.3.3 (f).

81. Records required to be provided to the ESC if requested shall include, as a minimum and where applicable, the following information:

- site name;
- site address;
- Meter Serial Number;
- name of commissioning body (even if the provider does it);
- date of commissioning;
- name of person responsible for undertaking commissioning (and organisation);
- reason for commissioning;
- Meter details (including any certificate identity);
- current transformers details (including any certificate identity);
- voltage transformers details (including any certificate identity);
- circuit name (where more than one);
- results of inspections, tests and observations; and
- Evidence of compensation calculations for transformer losses.

Ownership of metering data

82. The provider shall own the metering data acquired from a Metering System, and may provide to any person access to and use of such data. Data requirements from the provider to the ESC including frequency are set out in Rule 14.5.

83. The provider shall not exercise any rights in relation to, or provide to any person any use of or access to, metering data in a manner which would interfere with the capacity market Settlement Activities.

Access to property

84. The provider shall allow site access as part of the Metering Test and inspections, and in addition will provide access to records of checks and tests.

Data flow and communications with the ESC

85. Meter data must be sent to the ESC in settlement period format.

86. The method of data transfer for all CMUs is set out in the EMR Consultation on Proposals for the Capacity Market Interconnection, Metering Configuration Solutions and Settlement.

Disputes process

87. Any disputes arising from a Metering Test relating to the Metering Equipment and metering set-up will follow the process outlined in Rule 13.3.

Changes to technical requirements

88. When small updates are made to the metering requirements, CMUs will be able to choose whether to implement the new metering requirements or stay on their original standards. However, any major alterations to the metering configuration must comply with the latest metering requirements.

89. To prevent having to maintain inadequate legacy data transfer systems, there will be no grandfather provisions for the process of submitting metered data to the ESC.

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