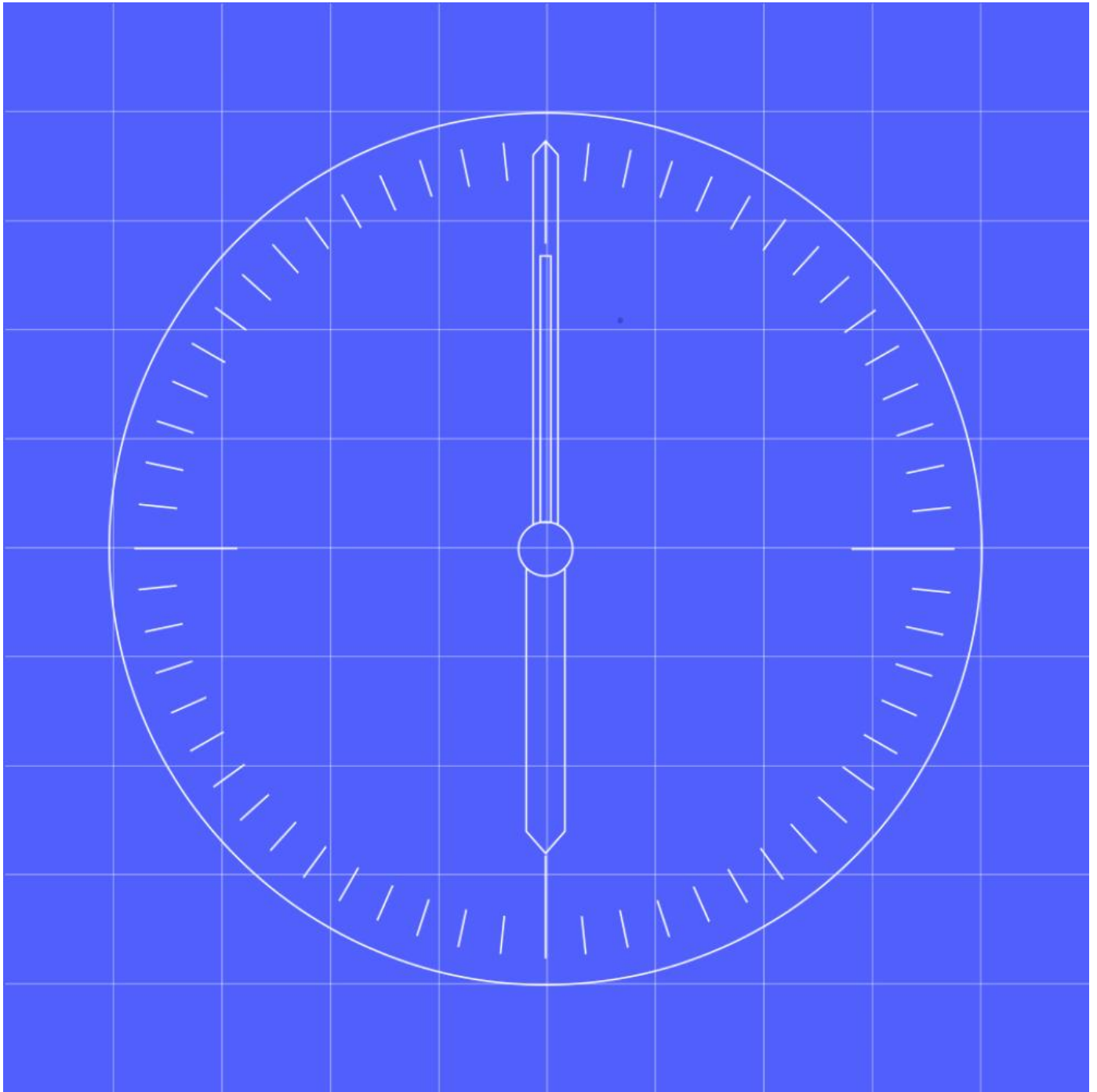




**Advanced Data Service
Validation and Estimation:
Methodology Statement**
Version 5.1 31 May 2023



Contents

Contents	1
1. Background	2
2. Where UTC Period Consumption data is available for settlement	2
3. UTC Period Consumption data is not available for settlement	11
4. Appendices	18

1. Background

- 1.1 This document sets out the Advanced Data Service (ADS) requirements for the validation of consumption data and register reads and the estimation processes required where data is invalid or missing. It also sets out the additional estimation process for Metering Systems where the customer has the right under the Data Access and Privacy Framework to opt out of provision of data for Market-wide Half Hourly Settlement.
- 1.2 This document also sets out the methodology by which Meter Advances are calculated based on Register Readings for Advanced Meters. It also describes how such Meter Advances are used in calculations within the estimation processes.
- 1.3 The following methods and techniques are covered in this document:
 - Validation of Advanced Meter data at UTC Period Level
 - Validation of Advanced Meter Register Readings
 - Identifying Load Shape Categories using Registration data
 - Calculating Meter Advances, Daily Advances, and Daily Advance Estimates
- 1.4 This document sets out how to identify **Load Shape Categories** for each Metering Point and the estimation methodologies to be used using each type of advance that is available.
- 1.5 **UTC Period Consumption** refers to consumption or export data that is of UTC Period granularity. The ADS must have flexibility to amend the duration of a UTC Period.
- 1.6 The UTC Period duration will not change within a UTC Settlement Date and there will not be different UTC Period durations within a Load Shape Category. All services should, where possible, build in the ability to configure the settlement period duration during their solution design, in order to support any future move to a UTC Period duration other than a Half Hour.
- 1.7 This document sets out the Validation and Estimation Methods that are required to change under MHHS. It is not an exhaustive list of all activities required for Advanced Meters where there is no change. These activities are currently set out in BSCP502 'Half Hourly Data Collection for SVA Metering Systems Registered in SMRS'
- 1.8 When formally documented in the BSC, the enduring ADS Validation and Estimation Methods will form part of an enduring BSCP702 'Advanced Data Collection for SVA Metering Systems Registered in SMRS', which will combine the contents of this document with processes carried over from BSCP502, including:
 - Market Data Activities
 - Registration Activities
 - Metering Activities
 - Collection Activities
 - Proving a Metering System
- 1.9 These processes in BSCP502 are currently carried out by the HHDC for Advanced HH Metering Systems.

2. Where UTC Period Consumption data is available for settlement

Advanced Meter data with UTC Period Consumption

- 2.1 Where UTC Period Consumption is available from the meter for import or export this consumption data shall be treated as actual data and used for Settlement provided it is deemed valid according the requirements set out below. Where deemed invalid by the ADS, it should not be used for Settlement.

ADS validation requirements (General)

- 2.2 Unless the ADS is informed by the MSA that the retrieved data is incorrect, the ADS shall accept UTC Period Consumption data collected from the Meter for validation processing. The ADS shall record all occurrences where data entering Settlements has been changed following instruction from the Supplier.

- 2.3 The ADS shall retain the original values along with any alarms recorded in the Meter, the reason for failure where the value is invalid and the reason for accepting data previously flagged as suspect.
- 2.4 The data retrieval process shall include the following checks; however in the case where data is received from the Outstation automatically, the step 'Outstation Time Check' shall be performed at least every 20 calendar days by interrogation only.
- 2.5 The ADS shall perform a validation check of Reactive Power UTC Period Consumption values in addition to the Active Power UTC Period Consumption values within step 'Cumulative/Total Consumption Comparison' and 'Main/Check Comparison'.

Outstation Id (Device Id)

- 2.6 When the Outstation is interrogated, or when data is received from the Outstation automatically the 'electronic serial number' of the Outstation is compared with that expected. If they differ then no data should be processed or submitted and the failure should be investigated.

Outstation Number of Channels

- 2.7 When the Outstation is interrogated, or when data is received from the Outstation automatically, the number of channels of the Outstation is compared with that expected. If the number differs then no data should be processed or submitted and the failure should be investigated.

Outstation Time Check

- 2.8 When the Outstation is interrogated, the time of the Outstation is compared with that expected. If they differ by more than 20 seconds and less than 15 minutes then the outstation time is corrected by the data collection system. If the time differs by more than 15 minutes then the problem should be investigated

Alarms

- 2.9 When the Outstation is interrogated, or data is received from the Outstation automatically and a persistent alarm flag is detected, this shall be investigated prior to processing any retrieved UTC Period Consumption as required by the relevant Code of Practice (CoP). Some Meters may not have all the alarm flags specified in the relevant CoP, in which case a Dispensation under BSCP32 is required.

Meter Advance Reconciliation Check (Cumulative/Total Consumption Comparison)

- 2.10 A Meter Advance Reconciliation (MAR) is the reconciliation of the advance on the Meter register between two specific date(s) and time(s) compared with the summation of the relevant Settlement Period data used in Settlement over the same date(s) and time(s).
- 2.11 Care should be exercised where the Meter register reading does not align with the end of a Settlement Period, and this should be taken into consideration in the reconciliation.
- 2.12 Meters with either separate Outstations or integral Outstations which do not provide an electronic cumulative reading of the prime Meter register equivalent to the total consumption or production of the Meter as part of its normal function.
- 2.13 The ADS shall perform a MAR:
 - a) at least once every three months for Meters over 100kW; or
 - b) at least once every twelve months for Meters below 100kW.
- 2.14 Where a change of ADS has occurred, the new ADS shall perform a MAR within the first six months of the appointment for Meters below 100kW using the last physical Meter register reading taken on site provided by the old HHDC.
- 2.15 Meter readings recorded from the physical Meter register during a site visit may be used for the purpose of the MAR under a) or b) above.
- 2.16 Using the Meter register readings taken during any site visit, the following checks shall be performed:
 - i) Ensure that the UTC Period Consumption data between two different date(s) and time(s), as used in Settlements, sums to the Meter advance from site readings of the prime Meter registers for the same date(s) and time(s), i.e. that the difference between successive cumulative Meter register readings and the total of the UTC Period Consumption for the same time interval, is within a tolerance of $\pm 0.1\%$.

Specifically:

Sum(pulses * pulse multiplier) for all UTC Periods in the time interval = (Meter advance * Meter multiplier) for the time interval.

The calculation below outlines how the discrepancy should be calculated when performing tolerance checks.

Discrepancy = $((\sum \text{UTC Period Consumption} - \text{MA}) / \text{MA}) * 100\%$

Where:

$\sum \text{UTC Period Consumption}$ is the sum of UTC Period Level Energy volumes in kWh and/or kVAh; and MA is the corresponding Meter Advance, i.e.

$\text{MA} = \text{M2} - \text{M1}$

Where:

M2 is the cumulative reading (in kWh or kVAh) returned from the last time that the Meter was interrogated; and M1 is the cumulative reading (in kWh or kVAh) returned from the previous time that the Meter was interrogated (or retrieved automatically) spanning the same time period as the UTC Period Consumption.

- ii) Where a main and check Meter is fitted, the main and check Meter advances are compared for any discrepancy between the two values in excess of 1.5 times the class accuracy requirements for the individual Meters at full load, as defined in the relevant CoP.
- 2.17 If the discrepancy is outside the prescribed tolerances, it shall be investigated. Data failing the Meter Advance Reconciliation check will be deemed invalid. However, allowances should be made at low loads where this falls outside the meter's accuracy range, in which case the ADS can apply discretion in determining validity.
 - 2.18 Where data has been deemed invalid the ADS shall investigate. If the UTC Period Consumption is deemed valid following investigation then the data can be published, otherwise the ADS shall estimate UTC Period Consumption data for all UTC dates within the period of the MAR.
 - 2.19 Meters with integral Outstations which provide an electronic cumulative reading of the prime Meter register equivalent to the total consumption or production of the Meter as part of its normal function.
 - 2.20 A MAR is not obligatory providing that the Cumulative / Total Consumption Comparison can be carried out. Where this validation cannot be carried out, a MAR shall be performed as described in 2.12

Main/Check Comparison

- 2.21 Where main and check Meters are installed in accordance with the relevant CoP, ensure that the Metered Data recorded by each Meter is compared for each circuit. Any discrepancy between the two values in excess of 1.5 times the accuracy requirements of that prescribed for the individual Meters at full load, as defined in the relevant CoP, shall be investigated.

Where data is received externally, ADS checks data is from expected source

- 2.22 The ADS shall validate that the data has been received from one of the expected source(s) e.g. from the MSA or Supplier associated with the MPAN or the previously appointed ADS.
- 2.23 Where UTC Period Consumption has been retrieved from additional on-site metering other than the main or check meter, this can be used in Settlement and should be estimated using Standard Method e(vi).

ADS stores validated data

- 2.24 The ADS must store all data for the appropriate amount of time according to the non-functional requirements set out in the BSC for validation, estimation, error resolution and audit purposes.

ADS validates UTC Period Consumption is not negative

- 2.25 The ADS shall validate that every period of UTC Period Consumption data is greater than or equal to 0.

ADS validates UTC Period Consumption against permissible maximum energy

2.26 During validation where the energy recorded for one or more UTC Periods exceeds the Max kWh for the relevant Metering Code of Practice (CoP), the ADS will notify the Supplier.

CoP	Max. kW	Max kWh / Half Hour	Permissible Allowed: kWh per Half Hour
1	675,000	337,500	400,000
2	100,000	50,000	50,000
3	10,000	5,000	5,000
5	1000	500	600
6 & 7	76	38	50
10	76	38	50

Following instruction from the Supplier, the ADS will enter the actual data into Settlements or will replace the actual data with estimated data and enter this into Settlements.

Where the Supplier does not provide instructions to the ADS, the ADS will apply the following rules, either:

- use actual consumption data if the energy exceeds the Max kWh / UTC Period but not the Permissible Allowed; or
- use estimated, rather than the actual, consumption data if the energy has exceeded the Permissible Allowed.

Note that:

CoPs 1, 2 and 3 are circuit capacity based and it is assumed that the Maximum Demand will not exceed the maximum kWh / Half Hour value.

CoP 5 is demand based and may occasionally exceed the maximum kWh / Half Hour value.

CoPs 6 & 7 are whole current Meters and the values are based on maximum voltage and current values of 3 phases x 253 Volts x 100 Amps. For these MSs, the fact that they are fused at 100 Amps limits the energy passed. Therefore, any recorded energy greatly higher than the maximum shown in the above table can be assumed to be erroneous.

Where the ADS has reliable evidence that the CoP is set incorrectly, it may accept excess consumption as actual

2.27 If valid the ADS shall enter the actual data into Settlements. Where this is subsequently found to be invalid, the ADS shall replace the actual data with estimated data and enter this into Settlements.

ADS identifies missing or corrupted data

2.28 If the UTC Period Consumption is missing, uncollected or corrupted or if for any other reason the data is deemed to be invalid then the data shall be estimated using the data estimation processes for Advanced Meters set out in below.

ADS treatment of a Site where Supply is de-energised

2.29 In the absence of Actual data recovered from the Smart Meter or an Advance Meter Reading received from the MRS or Supplier, no submission to settlements is required in these circumstance (ie there is no need to submit zero consumption for de-energised MPAN's).

ADS Estimates of UTC Period Consumption

2.30 The ADS shall ensure that UTC Period Consumption data will be estimated for any periods of missing or invalid data (except where access to UTC Period Consumption is not permitted) using a hierarchy of Estimation Methods. The lowest numbered (earliest in the precedence order) Estimation Method must always be used. Estimated UTC Period Consumption will be labelled with the Estimation Reason Code used.

2.31 Estimation must be re-calculated if newer data becomes available.

ADS amends consumption data following detection of theft from RPU service or other consumption adjustments

- 2.32 The ADS must enter abstracted units of electricity into settlement, or for any other adjustment, in the appropriate time period when notified by the BRP (supplier) according to the rules set out in the BSC or BSC subsidiary documents. Where this is not available at UTC Period Consumption level, the ADS shall apply the most applicable estimation method and set the Estimation Reason Code accordingly.

The ADS estimates UTC Period Consumption data where a Meter Advance is not available.

- 2.33 The ADS must be able to estimate the consumption for UTC Dates where a Meter Advance is not available according to the Estimation Rules and method and flag each estimation according to its method.

ADS validates estimated data

- 2.34 When UTC Period Consumption has been estimated, this data shall be validated against the maximum permissible kWh limit prior to being used in subsequent processing. Any data that fails validation following estimation should be flagged appropriately and investigated. If deemed to be correct it shall be passed as valid. Otherwise, it should be recalculated using an alternative method before being allowed to be used.

ADS receives actual UTC Period data when data has previously been estimated

- 2.35 If the ADS receives new data, and this new data from an expected source is successfully validated, it shall be published in accordance with the relevant Operational Choreography timescales.

ADS receives new data when data has previously been estimated

- 2.36 If the ADS receives new data which is not UTC Period Consumption data but allows a better estimate to be calculated the ADS must recalculate the estimate and update the estimate type flag if required.

Estimation for export MPANs

- 2.37 Export may be estimated for Advanced Meters with communication issues or non-Advanced Meters with an Export register installed at current transformer (CT) connections, provided there is a valid Meter Advance that spans the UTC Date. Otherwise, the ADS shall estimate zero consumption for any export MPANs where UTC Period Consumption or Register Reading data is unavailable.
- 2.38 If subsequently the UTC Period Consumption data is retrieved (and successfully validated) the estimated data shall be replaced. Similarly, if a Meter Advance that was previously unavailable is subsequently retrieved then the estimated zero should be replaced by a better estimate.

ADS Estimation Methods for import MPANs where actual UTC Period Consumption is unavailable

- 2.39 The ADS shall use the following hierarchy when estimating UTC Period Consumption. The ADS shall apply the Data flags to the data as defined below and the reason for estimation should also be recorded.

ADS uses data where Main Meter data available but check Meter data missing.

Standard Method a. Data from main meter available but data from check meter is missing. Data from main Meter should be used providing that data has passed validation.

Data Flag 'A1'

ADS estimates data where Main Meter data missing and check Meter data available

Standard Method b. Data copied from the check Meter providing that data has passed validation.

Data Flag 'A2'

Note that a. and b. do not apply where main and check data is collected, but the data fails the main / check validation

ADS estimates where one UTC Period missing or incorrect where a Total Cumulative Meter register reading can be taken.

Standard Method c. Missing or incorrect UTC Period data calculated from the Total Cumulative Meter register advance and other actual UTC Period Consumption data recorded for the specific period of the calculation. Note that the Total Cumulative Meter register advance may not correlate to UTC Periods if the periods span multiple days.

Data Flag 'A3'

ADS estimates data where two or three UTC Periods missing or incorrect for Total Cumulative Meter register or one UTC Period missing or incorrect where a Total Cumulative Meter register reading cannot be taken.

Standard Method d. Values may be entered which ensure a match with real data trends.

Data Flag 'EA1'

ADS estimates data where Meter advance available using data from MSA Interrogation Unit

Standard Method e(i) MSA. Data automatically retrieved by the MSA via an Interrogation Unit. Information to be supplied by the Supplier to the ADS in a format agreed by both parties.

Data Flag 'A'

ADS estimates data where Meter advance available using actual data from previous or following month

Standard Method e(ii). UTC Period Consumption data constructed by using the average profile based on actual Metered Data for the same day of week and UTC Periods over the previous or following month taking into account weekends and public holidays.

Data Flag 'EA2'

ADS estimates data where Meter advance available using actual data from previous or following 2-3 weeks

Standard Method e(iii). UTC Period Consumption data constructed by using the average profile based on actual Metered Data for the same day of week and UTC Periods over the previous or following 2-3 weeks taking into account weekends and public holidays.

Data Flag 'EA3'

ADS estimates data where Meter advance available using actual data from previous or following week

Standard Method e(iv). UTC Period Consumption data constructed by using the average profile based on actual Metered Data for the same day of week and UTC Periods over the previous or following week taking into account weekends and public holidays.

Data Flag 'EA4'

ADS estimates data where Meter advance available using actual data from an alternative 4 week period

Standard Method e(v). Where actual Metered Data is not available to satisfy the criteria for e(i), e(ii) or e(iii) above, the UTC Period Consumption data shall be constructed using the average profile based on actual data for the same day of week and UTC Periods over the nearest 4 week period to that for which data estimation is required.

Data Flag 'EA5'

ADS estimates data where Meter advance available using operational data or additional information

Standard Method e(vi). Operational data or additional information will be used to construct the profile supplied from another source (e.g. MSA, BRP or additional on-site metering) to the ADS in a format agreed by both parties.

Data Flag 'EA6'

ADS estimates data where Meter advance unavailable using actual data from previous or following month

Standard Method f(i). UTC Period Consumption will be constructed based on average actual Metered Data for the same day of the week and UTC Periods in the previous or following month, taking into account weekends and public holidays.

Data Flag 'EA7'

ADS estimates data where Meter advance unavailable using actual data from previous or following 2-3 weeks

Standard Method f(ii). The average energy values and profile will be constructed based on actual Metered Data for the same day of week and UTC Periods over the previous or following 2-3 weeks taking into account weekends and public holidays.

Data Flag 'EA8'

ADS estimates data where Meter advance unavailable using actual data from previous or following week

Standard Method f(iii). The average energy values and profile will be constructed based on actual Metered Data for the same day of week and UTC Periods over the previous or following week taking into account weekends and public holidays.

Data Flag 'EA9'

ADS estimates data where Meter advance unavailable using actual data from an alternative 4 week period

Standard Method f(iv). Where actual data is not available to satisfy the criteria for f(i), f(ii) or f(iii) above, the average energy values and profile will be constructed based on actual Metered Data for the same day of week and corresponding UTC Periods over the nearest 4 week period to that for which a data estimation is required.

Data Flag 'EA10'

ADS estimates data where Meter advance unavailable using operational data or additional information

Standard Method f(v). Operational data or additional information will be used to construct the profile supplied from another source (e.g. MSA, BRP(Supplier)) to the ADS in a format agreed by both parties. In some cases this data may be of higher quality than other Standard Methods within f, in which case it can take precedence over f(i) to f(iv).

Data Flag 'EA11'

ADS estimates where No Meter advance, historical data, operational data or additional information available.

Standard Method g. The ADS will use the Annual Consumption or Supplier Nominated Annual consumption together with the Advanced Load Shape associated with the MPAN Registration data to perform the estimation of consumption.

Where a year of Load Shape Totals (LS_TOT_Y) is available then the calculation for UTC Period *j* on UTC Date *D* is:

$$UTCP_{Dj} = (LSPV_{Dj} / LS_TOT_Y) * AC_Y$$

Where less than a year of Load Shape Totals are available then the SDS shall use the Annual Consumption (AC_Y) to calculate a DAE for the Settlement Date *D*:

$$DAE_D = AC_Y / 365$$

Then the calculation for UTC Period *j* on UTC Date *D* is:

$$UTCP_{Dj} = LSPV_{Dj} / LS_ROLL_TOT_D * (DAE_D * 7)$$

Data Flag 'EA12'

ADS estimates data where no Annual Consumption or Supplier Nominated Annual Consumption available

Standard Method h. Where the Supplier has not provided the data specified in standard method 'g', the ADS will use the Advanced Load Shape associated with the MPAN Registration data to derive the UTC Period Consumption estimates for the missing UTC Periods.

Data Flag 'EA13'

ADS Standard Estimation Methods for Export MPANS

2.40 The Estimation Methods in b. to g. below (i.e. excluding Standard Method a) may be used only where the MPAN has a specific channel for gross Export and no netting of Import and Export occurs at the site.

Export Measurement Quantity with missing values where netting occurs at site.

Export Standard Method a. Export Measurement Quantity with missing values where netting occurs at site. The UTC Period Consumption values for the period of missing data shall initially be set to zero, until such time that evidence of Export energy transfer is provided.

Data Flag 'EAE1'

ADS uses data where Main Meter data available but check Meter data missing.

Export Standard Method b. Main Meter data available but check Meter data missing. Data from main Meter should be used providing that data has passed validation.

Data Flag 'AAE1'

ADS estimates data where Main Meter data missing and check Meter installed. Data copied from the check Meter providing that data has passed validation.

Export Standard Method c. Main Meter data missing and check Meter installed. Data copied from the check Meter providing that data has passed validation. Note that b. and c. do not apply where main and check data is collected but the data fails the main / check validation.

Data Flag 'AAE2'

ADS estimates data where one UTC Period missing or incorrect where a Total Cumulative Meter register reading can be taken.

Export Standard Method d. One UTC Period missing or incorrect where a Total Cumulative Meter register reading can be taken. Missing or incorrect UTC Period data calculated from the Total Cumulative Meter register advance and other actual UTC Period data recorded for the specific period of the calculation. Note that the Total Cumulative Meter register advance may not correlate to UTC Periods if the periods span multiple days.

Data Flag 'AAE3'

ADS estimates data where Main and check Meter data missing or incorrect.

Export Standard Method e. Main and check Meter data missing or incorrect. The HH metered values for the period of missing or invalid data shall be initially set to zero until generation can be calculated using f. or g. below.

Data Flag 'EAE2'

ADS estimates data where Meter advance available - Operational data or additional information used to construct the profile supplied from another source (MSA, BRP (Supplier)).

Export Standard Method f. Meter advance available Operational data or additional information is used to construct the profile supplied from another source (e.g. MSA or BRP (Supplier)). Information to be supplied by the Supplier to the

ADS in a format agreed by both parties. This additional information may include UTC Period Consumption that has been retrieved from additional on-site metering other than the main or check meter, or from the customer.

Data Flag EAE3 except where the data is automatically retrieved by the MSA via an Interrogation Unit, in which case it will have an 'AAE1' flag as it is equivalent in quality to Export Standard Method b.

ADS estimates data where Meter advance unavailable - Operational data or additional information used to construct the profile supplied from another source (MSA, BRP (Supplier)).

Export Standard Method g. Meter advance unavailable Operational data or additional information will be used to construct the profile supplied from another source (e.g. MSA or BRP (Supplier)). Information to be supplied by the MSA or BRP (Supplier) to the ADS in a format agreed by both parties. This additional information may include consumption that has been retrieved from additional on-site metering other than the main or check meter, or from the customer.

Data Flag 'EAE3'

ADS Standard Estimation Methods for Reactive Power

- 2.41 Standard methods (b) through to (f) are also applicable to Reactive Import and Reactive Export respectively, and the ADS will use these methods to provide estimates of missing Reactive Power data.
- 2.42 These estimation requirements will only apply where the Meter Technical Details indicate that the Meter has been configured to Record period values but has not been possible to read these values from the Meter for one or more UTC Periods. ADSs are not required to (and should not) estimate Reactive Power data for Metering Systems that do not have Reactive Power channels defined in the Meter Technical Details.
- 2.43 The ADS may vary the standard methods (b) to (h) to use available Active Power data in estimating Reactive Power data.
- 2.44 Where it is not possible to use the above methods to provide estimates of missing Reactive Power data, the ADS shall not submit estimated data. Zero estimates shall be provided only where these represent genuine estimates of missing Reactive Power data, not as a method of signalling that estimates could not be provided.

3. UTC Period Consumption data is not available for settlement

The methods set out below are based on those in the Smart Data Service (SDS) Method Statement, and only apply where consent to access UTC Period Consumption data for an import MPAN is not granted due to a customer opt-out under the Data Access and Privacy Framework, identified in the MPAN Registration data by the Consent Granularity. Where future changes are made to the SDS Method Statement, these methods may have to be realigned.

Identifying Load Shape Categories using Registration data

3.1 The ADS shall use the Registration data for each MPAN to identify the appropriate Load Shape Category. These data items are configurable if new LSCs are introduced in the future.

Data Item	Definition	Comment
Market Segment	An enumeration of Smart/Advanced/Unmetered.	Must be 'A' for ADS processing.
GSP Group ID	Identifies the distinct grid supply point group (physical region of the country) where the metering point is located.	Not used for Advanced Segment Load Shapes
Domestic Premises Indicator	A flag that indicates if the MPAN of the registration appointment is used to identify a domestic premise.	True or False Indicator
Measurement Quantity ID	Identifies UTC Period if the data is Active Import or Active Export.	The Measurement Quantity Table in ISD maps Measurement Quantity ID to the Direction of Flow Indicator which matches the Registration data item.
Connection Type	A code to indicate the type of connection	Whole Current (W), Low Voltage Current Transformer (L), High Voltage Current Transformer (H) or Extra High Voltage Current Transformer (E).

Please note: The Metered Indicator data item is not required and should be ignored.

3.2 The ADS shall identify the correct Advanced Load Shape for the MPAN using the Registration data. These Load Shapes should be used for opted-out Micro Businesses as defined in the Supply License or opted-out Domestic CT MPANs. The Data Items are set out in the headers of the following table for Advance MPANs:

Market Segment Indicator	GSP Group	Domestic Premises Indicator	Measurement Quantity	Non-Advanced Switched Load Profile Class	Off-Peak Period (UTC)	Connection Type Indicator	De-minimis Data Count
A			AI			W	[50]
A			AE			W	[50]
A			AI			L	[50]
A			AE			L	[50]
A			AI			H	[50]
A			AE			H	[50]

A			AI			E	[50]
A			AE			E	[50]

3.3 For Domestic Whole Current Opt-out Advanced MPANs the following domestic Load Shapes defined for the Smart Segment shall be used by matching the opted-out MPAN to the relevant GSP Group:

Market Segment	GSP Group	Domestic Premises Indicator	Measurement Quantity	Non-Advanced Switched Load Profile Class	Off-Peak Period (UTC)	Connection Type Indicator	De-minimis Data count
S	_A	T	AI	02	00:00-07:00	W	[50]
S	_B	T	AI	02	00:30-07:30	W	[50]
S	_C	T	AI	02	00:30-07:30	W	[50]
S	_D	T	AI	02	00:30-07:30	W	[50]
S	_E	T	AI	02	00:30-07:30	W	[50]
S	_F	T	AI	02	00:00-07:00	W	[50]
S	_G	T	AI	02	00:30-07:30	W	[50]
S	_H	T	AI	02	00:30-07:30	W	[50]
S	_J	T	AI	02	00:30-07:30	W	[50]
S	_K	T	AI	02	00:30-07:30	W	[50]
S	_L	T	AI	02	00:00-07:00	W	[50]
S	_M	T	AI	02	00:30-07:30	W	[50]
S	_N	T	AI	02	00:00-07:00	W	[50]
S	_P	T	AI	02	00:00-07:00	W	[50]

Load Shape Data Items

The relevant Load Shape data items can be found in: **MHHP-IF-022 - Consumption Central Settlement LSS Period to Data Service**

Load Shape Totals definition using Industry Standing Data (ISD) for Advanced MPANs

The following Load Shape totals will be provided for each LSC:

Load Shape Total	Description
Load shape total	The sum of all Period Values for the UTC Date.

Load shape 7 day rolling total	The sum of the Load Shape Total defined above and the Load Shape Total for the past 6 UTC Dates.
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Meter Advances, Actual Daily Advances and Daily Advance Estimates

The estimation methods will use different types of advances according to the estimation Method being deployed:

Advance Type	Definition
Period Meter Advance (PMA)	A Meter Advance is defined as an Advance Calculated over two or more UTC Dates
Daily Advance (DA)	An advance calculated between two midnight reads for the Total Cumulative Register of an Advanced Meter
Daily Advance Estimate (DAE)	An estimated advance to be used for a UTC Date until an actual Daily Advance is available.
Annual Consumption	An estimate of annual consumption in kWh calculated by BSC Central Systems or provided by the Supplier

Validation of DA Values

- 3.4 The DA values must be validated against previous DA values for the same day type within the nearest four week period, and any DA values exceeding [twice] the previous data should be investigated.

Daily Advance Estimate Calculations

- 3.5 The Daily Advance Estimate will depend on the type of Advance that is available for an MPAN and in the following hierarchy (a to c):
- For a Period Meter Advance (PMA) the DAE is calculated by dividing the PMA by the duration of the Meter Advance and scaling to 24 hours where it spans part days);
 - For Daily Advance Estimate (DAE) the calculation is an average of the previous 7 consecutive DAs; or
 - where Daily Advance records are available either in the past or future and less than 3 months different from the settlement day requiring a daily meter advance - use the mean actual meter advance from the closest 4 weeks for the same day of the week.
 - Where DAEs are required to be calculated the ADS shall use the data closest to the Settlement Day.

Readings Used for Calculating Meter Advances

- 3.6 The Total Cumulative Register Readings are required for two purposes. Firstly, for use in Meter Advance Reconciliation processes and secondly for estimation where UTC Period Consumption is not available for use in settlement under the Data Access and Privacy Framework, as set out in Section 3.
- 3.7 The minimum validation rules apply equally for whether the reading to be validated lies after other valid Meter readings, before other valid Meter readings or between other valid Meter readings.
- 3.8 The ADS shall always use actual Register Reading data where available in favour of Supplier supplied reads. The exception to this rule, is where Supplier provides an "Agreed" or "Override" reading, in these cases the ADS must use this data in his estimation calculation(s) with the acceptance that the supplier will have taken greatest of care when deciding to submit these readings and that the resulting impact on settlement submissions is the suppliers responsibility to monitor and resolve.
- 3.9 The validation requirements described below are the minimum requirements that the ADS shall carry out for each Meter register that is being used for reconciliation purposes or in combination with Load Shapes:

- Check that where data is collected at site the Meter Serial Number (MSN) for the MPAN to which the ADS is appointed is the same as the serial number held in the Registration Service for that MPAN. Where the MSN of the meter at the site is not the same as the MSN in the Registration data for the MPAN, the ADS shall notify the MSA to determine if the meter has been exchanged and update the Registration data.
 - Check for zero consumption, where the zero consumption on the Meter register is not expected based on previous history for the MPAN, and if so:
 - a) check for previous instances of zero consumption;
 - b) check the Site Visit Report where available;
 - c) check whether Metering System is being estimated as a Long Term Vacant site notified by the Supplier; and
 - d) check if the site is de-energised.
- 3.10 If zero explained by historical consumption, Site Visit Reports, remote disablement or Metering System being settled correctly at zero consumption then valid, otherwise invalid.
- Check for negative consumption and if so:
 - a) check for Meter rollover
 - b) check if the previous Meter register reading is a deemed reading and that the reading prior to the deemed reading is an actual Meter register reading, and that the current Meter register reading advance creates a positive consumption with respect to the last actual Meter register reading (i.e. obtained prior to the deemed reading), making allowance for any Meter register rollover. If so then reading valid, otherwise invalid.

ADS Estimation Method for MPANs where consent to retrieve UTC Period Consumption is not granted

- 3.11 To determine whether a customer has the right under the Data Access and Privacy Framework to opt out of provision of UTC Period Consumption, this is identified by the Consent Granularity in the MPAN Registration data for the relevant UTC Date. This right is limited to domestic and micro-business import customers.
- 3.12 Estimation for opted-out Whole Current Advanced domestic import will follow the Methods set out in the Smart Data Service Method Statement where such methods do not relate to methods involving missing UTC Period Consumption data. The estimation Data Flags will also align with those in the SDS Methods.
- 3.13 Where notified by a Supplier that a site is Long Term Vacant (LTV) the ADS shall use Method 12. Otherwise, the ADS shall use the following hierarchy when estimating UTC Period Consumption.
- 3.14 Where Load Shape data is used in the estimation Method it is assumed that the ADS has identified the correct Smart Load Shape C for the MPAN based on the Registration data. The ADS shall apply estimation flags to the data as set out below and a reason for estimation should be recorded (e.g. Opt-out or no communications):

Identifiers used in this Method Statement

- 3.15 The following Identifiers are used in this document which will form part of the BSC Technical Glossary (link below table):

Identifier	Data item
<i>C</i>	Load Shape Category
<i>D</i>	UTC Date
<i>E</i>	Previous UTC Date
<i>J</i>	UTC Period
<i>K</i>	MPAN
<i>M</i>	Missing UTC Periods
<i>N</i>	Period Meter Advance duration
<i>P</i>	Valid available Periods

Identifier	Data item
X	DA 7 Day Average DA Data
Y	Year

Note: Where identifiers are in italics these are new MHHS Identifiers and do not have the same meaning as those set out in: <https://www.elexon.co.uk/documents/bsc-codes/bsc-sections/bsc-section-x-2-technical-glossary/>

3.16 The below estimation methods are based on those used in the Smart Data Service (SDS) Method Statement. For that reason, **methods 0, 1, 6, 11 and 13** have been omitted as they are only applicable to Smart meters.

Method 2: ADS estimates data for Advanced meter with a Daily Advance available

Where a DA is available, allocate the daily advance consumption to UTC Periods using the appropriate load shape obtained from the LSS. Flag the estimated data as "E2" flag.

Calculation for UTC Period j on UTC Date D and LS_D is the Load shape total for UTC Date D ;

$$UTCP_{Dj} = LS_{Dj} / LS_D * DA_D$$

Method 3: ADS estimates using a non-daily meter advances

In the absence of a DA consumption data to calculate daily Meter advances, the ADS should calculate UTC Period data for any period where valid actual UTC Period data is not present, from a valid PMA spanning the UTC Period and scaling the Load Shape and daily totals data from the LSS, and store these records as "E3"

Calculation for UTC Period j on UTC Date D and Meter Advance Period N where LS_TOT_N is the Load shape totals summed over Meter advance period N and $UTCP_N$ is the sum of the valid actual UTC period data during the PMA and $LSPV_N$ is the sum of the LSPV values that coincide with the valid actual UTC period data during the PMA::

$$UTCP_{Dj} = (LSPV_{Dj} / (LS_TOT_N - LSPV_N)) * (PMA_N - UTCP_N)$$

Method 4: ADS estimates where Advanced Meter daily register reads are unavailable but daily register read history is present

Where DA values for the relevant UTC day are unavailable from the Advanced Meter but a DA is available either in the past or future and less than 3 months different from the UTC Date requiring a daily Meter advance - use the average actual Meter advance from the closest 4 weeks for the same Day Type (DAE). The average of 7 daily advances will then be applied to the appropriate Load Shape for the UTC Date. Record the estimated as "E4".

Calculation for UTC Period j on UTC Date D and using DAE_x (DA) based on the y DA average data X and $LSPV_D$ is the Load shape total:

$$UTCP_{Dj} = LSPV_{Dj} / LS_ROLL_TOT_D * (DAE_x * 7)$$

Method 5: ADS estimates where previous DAs are available (Import only)

Where DAs for the UTC date are unavailable and the most recent actual settlement data is 7 consecutive previous DAs the ADS shall calculate the UTC Period data using the average daily consumption for the most recent 7 consecutive actual daily advances and the normalised Load Shape and Load Shape volume from the LSS. This estimate shall be store as type "E5"

Calculation for UTC Period j on UTC Date D and using DAE (DA) for the period X is the most recent actual settlement data is 7 consecutive previous Das and where $LS_ROLL_TOT_D$ is the Load shape 7 day rolling total:

$$UTCP_{Dj} = LSPV_{Dj} / LS_ROLL_TOT_D * (DAE_x * 7)$$

Note: use this method if the Daily Consumption is the most recent data, if there is more recent register read data use the next method

Method 7: ADS estimates where no recent meter data is available (Import only)

Where daily DA values and register consumption data are unavailable and the most recent actual settlement data is a period covered by actual meter register advances the ADS shall calculate the UTC Period data using the Daily Advance Estimate (DAE) defined above and the 7 day normalised Load Shape and the appropriate Load Shape from the LSS. This estimate shall be store as type ""E7""

Calculation for UTC Period j on UTC Date D and using DAE (PMA) for the most recent PMA period N and $LS_ROLL_TOT_D$ is the Load Shape 7 day rolling total:

$$UTCP_{Dj} = LSPV_{Dj} / LS_ROLL_TOT_D * (DAE_N * 7)$$

Method 8: ADS processes Supplier provided 'Agreed' or 'Override' Readings

Where the Supplier has provided an Agreed Read or and 'Override' Read then the SDS shall process the data as follows:

The Supplier will provide a gross volume, together with 'Effective From' and 'Effective To' Settlement dates. This data shall be processed as though it is a PMA. The SDS should calculate UTC Period data for any period where valid actual UTC Period data in not present, from the PMA (Agreed or Override gross volume) spanning the UTC Period and scaling the Load Shape and daily totals data from the LSS, and store these records as "E8"

Calculation for UTC Period j on UTC Date D and Supplier provided Meter Advance Period N where LS_TOT_N is the Load Shape totals summed over Meter advance period N and $UTCP_N$ is the sum of the valid actual UTC period data during the PMA (Agreed or Override gross volume) and $LSPV_N$ is the sum of the LSPV values that coincide with the valid actual UTC period data during the PMA:

$$UTCP_{Dj} = (LSPV_{Dj} / (LS_TOT_N - LSPV_N)) * (PMA_N - UTCP_N)$$

Method 9: ADS estimates using an Annual Consumption (AC) or an Supplier Nominated Annual Consumption (SNAC)

Where only an Annual Consumption value, or Supplier Nominated Annual Consumption (AC_Y) is available then the ADS shall process the data as follows and store these records as "E9":

Where a year of Load Shape Totals (LS_TOT_Y) are available then the calculation for UTC Period j on UTC Date D is as follows:

$$UTCP_{Dj} = (LSPV_{Dj} / (LS_TOT_Y)) * AC_Y$$

OR

Where less than a year of Load Shape Totals are available then the ADS shall use the Annual Consumption (AC_Y) to calculate a DAE for the Settlement Date D :

$$DAE_D = AC_Y / 365$$

Then the calculation for UTC Period j on UTC Date D is as follows:

$$UTCP_{Dj} = LSPV_{Dj} / LS_ROLL_TOT_D * (DAE_D * 7)$$

Method 10: ADS estimates where no meter data or Daily Advance Estimate (DAE) is available

Where there is no previous data is available the ADS shall use the appropriate Load Shape. This data will be recorded as "E10".

Calculation for UTC Period j on UTC Date D :

$$UTCP_{Dj} = LS_{Dj}$$

Method 12: Estimation for Long Term Vacant Sites

The precise entry and exit criteria for a future MHHS Long Term Vacant process are still to be developed. However, this Method Statement assumes that the Supplier is responsible for notifying the ADS where they have evidence that the site is vacant and expected to remain vacant for a period of time. This will support the ADS in validating zero or low consumption values or estimating when UTC period consumption cannot be retrieved remotely.

Where the Supplier has notified that a Site is LTV and where no access to consumption data is possible, then presence of this flag the ADS will estimate zero and set a LTV estimation reason code. This data will be recorded as "ZE2"

UTCP_{Dj} = 0

Deeming Reads on Change of Supplier (CoS) by outgoing ADS

Where there is a CoS and no CoS reading is available the out-going ADS shall estimate a deemed Meter Reading(s) by calculating a DAE and extrapolating from the last Meter Reading for the MPAN until the CoS date using **Method 7** above. The deemed reading shall be provided to the incoming ADS.

Deeming Reads on Change of Supplier (CoS) by incoming ADS

Where there is a CoS and no CoS reading is available from the out-going ADS, the incoming ADS shall estimate a deemed Meter Reading by calculating a DAE following the first Meter Advance calculated for the Site and extrapolating backwards from the first Meter Reading collected by the incoming ADS until the CoS date using **Method 7** above.

Estimation of 'back-stop' Readings

The ADS shall estimate 'back-stop' readings where required:

1. Change of metering equipment: As a 'back-stop' in situations where no reading(s) are provided alongside the change in metering, the ADS shall, after 5wd, generate an estimated reading(s) for the Date of Removal of the previous meter(s) using the most appropriate method above. Any newly installed meter should be assumed to have been installed with an index position of Zero.
2. Change of Energisation Status: As a 'back-stop' in situations where no reading(s) are provided alongside the change in Energisation Status, the ADS shall where required, by 5wd, generate an estimated reading(s) for the Date of the Change of Energisation Status (reflecting the nature of the Energisation Change) using the most appropriate method above.

4. Appendices

Estimation Reason Codes

4.1 The following are the initial set out Estimation Reason Codes:

Estimation Reason Code	Commentary
Opt Out	The customer has Opted Out of providing HH Data for MHHS
Missing	The data is missing
Invalid	The data failed validation
Comms Fault	There is a communications fault with the smart Meter
De-Energised	The MPAN is de-energised
Disconnected	The MPAN is disconnected
LTV	The Supplier has flagged the MPAN as Long Term Vacant
Disabled	The Supplier has flagged the MPAN as remotely disabled
Adjustment	The Supplier has provided adjusted Settlement data

Site Checks of Advanced (SVA) Metering System - Site Visit Report

4.2 Where the ADS is required to visit a Site, the following checks shall be carried out:

1. Any evidence of suspected faults to the MS including phase/fuse failure.
2. Any evidence of damage to metering and associated equipment.
3. Any evidence of tampering of any sort with the MS or associated equipment, particularly seals.
4. Any evidence of supply being taken when the Meters are de-energised.

4.3 The Local Interrogation Unit (IU) or Hand Held Unit (HHU) should be set to ensure agreement with the UTC clock at least every week.

4.4 Sites with polyphase supplies should be visited at least annually and single phase supplies at least at two yearly intervals to perform the checks described above, although exemptions for whole current and domestic sites may apply.

4.5 Site visits made for other reasons may be used to carry out these checks. Any problems identified should be investigated and a report issued. The ADS shall ensure that where a site visit was not possible, the reasons are explained sufficiently such that appropriate.

Change Record

Date	Author	Version	Change Detail
16/02/2023	SI Design	V5.0	Initial Version
31/05/2023	SI Design	V5.1	DIN 93 and 204.