Issue Report

Issue 58 'Obligation to estimate missing or correct defective Reactive Energy measurements from CVA metering systems'

Contents

About This Document

This document is the Issue 58 Group's Report to the BSC Panel. ELEXON will table this report at the Panel's meeting on 12 March 2015.

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Issue 58
Issue Report

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1 Summary

Background

The Proposer considers that a process for estimating missing or correcting defective Reactive Energy measurements for CVA Metering Systems should be put in place. They have identified occasional cases of exceptionally abnormally high Reactive Energy measurements for one embedded site with a Central Volume Allocation (CVA) Metering System. These measurements have the potential to result in incorrect Distribution Use of System (DUoS) charges being levied by the relevant Licensed Distribution System Operators (LDSO).

Conclusions

The Issue Group considered several options for resolving the identified defect, but noted no other LDSOs appeared to have experienced the same issues as the Proposer. It therefore considered that the costs of implementing any changes would outweigh the benefits that would be realised, and concluded that no Balancing and Settlement Code (BSC) changes should be progressed.

2 Background

DUoS charges and provision of Reactive Energy measurements

(LDSOs require the provision of accurate actual or estimated data for both Active Energy and Reactive Energy in order to comply with their approved charging methodologies for DUoS charges. These methodologies are a licence obligation under electricity distribution Standard Licence Condition (SLC) 12, and require the accurate provision of both Active and Reactive Energy measurements on a Half Hourly (HH) basis.

Most customers have their electricity traded through a Supplier under the Supplier Volume Allocation (SVA) arrangements. The existing BSC obligations have already been amended to require the provision of estimated or corrected Reactive Energy measurements for these SVA Metering Systems through Change Proposal (CP) 1303 'Requirement on Half Hourly Data Collectors to Estimate Missing Reactive Power Demand Values', implemented in February 2010.

Those embedded generators with CVA Metering Systems are still obligated to provide Reactive Energy readings for their Metering Systems. However, the current BSC requirements for data provided from CVA Metering Systems requires only the estimation of missing or correction of defective Active Energy measurements, with Reactive Energy explicitly excluded from the data estimation and substitution processes in BSC Procedure (BSCP) 03 'Data Estimation and Substitution for Central Volume Allocation'.

What is the issue?

The Central Data Collection Agent (CDCA) is responsible for collecting, validating and estimating metered data from all CVA Metering Systems. As the CDCA does not estimate or correct Reactive Energy metered data, the Proposer considers that LDSOs are unable to accurately determine the maximum usage (in kilovolt-amperes (kVA)) of Distribution System connected sites with CVA Metering Systems. They are also unable to correctly determine any excess Reactive Power usage. Both aspects are relevant for Use of System charging and both are relevant for accurate determination of compliance or breach of the LDSO's connection terms.

The Proposer has identified occasional cases of exceptionally abnormally high Reactive Energy measurements for one embedded site with a CVA Metering System. They consider that electrical interference at this extra-high voltage (EHV) sites has interfered with the correct passing of error checked measurements to data concentrators prior to collection by the CDCA. This has led to exceptional anomalous Active and Reactive Energy readings. Some examples of this can be found in Appendix 1.

It has been noted by the Proposer that the Registrants concerned generally estimate and correct the Active Energy measurements via the CDCA but cannot or do not correct the related Reactive Energy reading. Currently, with no correction of Reactive Energy readings being undertaken, the DSO is obliged to levy DUoS charges, in accordance with its licence obligated charging methodology, on potentially spurious data. Where this happens, this can lead to anomalous DUoS charges being levied against the relevant customer.

3 Issue Group's Discussions

Should defective Reactive Energy measurements be corrected by the CDCA?

The Proposer suggested that a process be put in place to have the CDCA estimate missing or correct defective Reactive Energy measurements as it does for Active Energy measurements. This would require a Modification to be raised to allow the necessary obligations to be added in to BSC Section R 'Collection and Aggregation of Meter Data from CVA Metering Systems'. The CDCA also informed the Group that significant changes to its systems would be required to implement such a solution, and that the cost to do so would likely be large.

Currently, for Active Energy, the CDCA can identify potential erroneous data through mismatches between the main and check readings for a Metering System, which is carried out around one to two Working Day following receipt of the metered data. If a discrepancy is identified or if metered data needs to be estimated then the CDCA will contact the Registrant and ask them to resend or confirm the relevant information. A similar process could be implemented for Reactive Energy measurements. However, while Code of Practice (CoP) 1 requires all Meters to provide both main and check readings, this is not the case for the other CoPs, particularly CoPs 2, 3 and 5 which do not require the provision of check Meters for Reactive Energy. This means that the main and check readings required for this process may not be available for all Metering Systems.

Further to this, erroneous data may not show up as a difference between the main and check readings, and that another approach was suggested in identifying 'spikes' in readings. However, the CDCA systems are not set up to be able to look for these early on in the validation process. It was also considered to be unclear what would constitute a 'spike' that needs to be picked up and investigated, and it was questioned whether the raw data would be sufficient to carry out such validation checks. It was also queried whether this process would need to extend across different Volume Allocation Runs.

It was flagged that whenever the CDCA estimates Active Energy data, it notifies the Registrant. It sends the Registrant the estimated metered data, and the Registrant would then need to agree this estimation or submit correct metered data to replace it. In some cases the CDCA has a long-standing agreement with a Registrant to apply such estimations automatically. In the remaining cases, the CDCA is reliant on the Registrant responding to individual requests, which does not always happen. It does chase Registrants over the course of several months, continuing to use the estimated reading in Settlement during this time. If it doesn't hear from the Registrant by the Final Reconciliation Settlement Run (RF) then the estimated reading is deemed to stand. The same issues would likely occur should a similar process for Reactive Energy be put in place.

Timescales were also considered as a potential issue. Even if the anomalous metered data was picked up on the Working Day following the relevant Settlement Day, it would be very unlikely that a response and corrected metered data values would be available ahead of the Interim Information Settlement Run (II). The Proposer noted that DUoS bills are not sent out until 14 days after the end of a calendar month, which would leave time to correct data at the end of each month if a process could be developed that allowed changes to be identified, agreed and resubmitted within 10 Working Days. The updated information could then be entered into the LDSO's billing system to check for any resulting changes to bills. If necessary, historic bills could be re-calculated to account for such erroneous data being corrected at a later date.

The CDCA Representative highlighted that a process to follow would still need to be developed to identify such errors, which would be difficult without check metered data for Reactive Energy measurements. One suggestion was that, should a 'spike' be identified then the main and check readings, where both are available, could be compared to assess if there is a discrepancy. The Proposer considered whether historic readings could be used to identify trends in the Metering System's measurements. These could then be used to derive suitable estimates, as Reactive Energy measurements were considered to be relatively predictable compared to output. Bounds for the Reactive Energy measurements could be derived on a pragmatic basis and readings outside of these bounds could be considered anomalous.

The CDCA systems contain a parameter to flag when a reading for a given Metering System is high. This is set using the Outstation Channel Maximum value within the Meter Technical Details (MTDs), which is typically set up by the Meter Operator Agent (MOA) as 999,999Mvarh/HH for Reactive Energy measurements due to the variability in readings. This would mean only exceedingly large 'spikes' would be picked up. This could be lowered to a more realistic figure for each Metering System using the information supplied in the Meter Technical Details (MTDs). However, the CDCA Representative queried whether this may also require the CDCA needing to look up the MTDs every time a 'spike' was identified to check whether it was anomalous or not, which could become burdensome. In any event, the CDCA would still need the Registrant's permission to apply any changes to the metered data. The Proposer noted that it was the excessively large 'spikes' that were causing the main issues, as they result in equivalently excessive DUoS charges being calculated for that customer, potentially hundreds or thousands of times higher than it should be.

Overall, the Issue Group felt that the costs and effort that would be required for the CDCA to implement and subsequently perform these processes for Reactive Energy would be too excessive compared to the scale of the issue and the number of Metering Systems impacted.

Should further checks be carried out on new Meters?

The Proposer believes that that the errors they highlighted to the Issue Group may be due to technical issues, most likely electrical interference but possibly a glitch with the Meter, producing the occasional abnormally high reading. They considered whether this may be a fault with the particular type of Meter being used at this site. It was thought that if interference was causing erroneous Reactive Energy measurements, it would likely be creating erroneous Active Energy measurements too, but it was noted that the latter could be corrected.

All Meter types are required to undergo thorough testing for billing purposes before they can be used. Further tests also need to be performed in accordance with BSCP601 'Metering Protocol Approval and Compliance Testing' before the Meter can be used for Settlement purpose too. As part of this, BSCP601 requires tests for electromagnetic interference to be carried out. Should a Meter type not pass these requirements, a compliance certificate would not be granted. It was considered whether the Metering System producing the erroneous Reactive Energy measurements was in an environment with more electrical interference than the Meter was designed for. It was also queried whether the 'data concentrator' might be having an effect on the Settlement readings from the Meters that are then stored in the Outstation for the Metering System, noting that it is the Outstation the CDCA dials to collect Settlement metered data.

The Group considered whether a Change Proposal (CP) could be raised to amend or augment the tests for electromagnetic interference under BSCP601. These additional tests would only apply on a prospective basis, but could go some way to preventing the problems highlighted by Issue 58 from occurring in the future. However, it was flagged that the costs of putting a meter type through the BSCP601 tests currently comes to around £5k each time, and adding new tests would likely increase this figure. It was questioned whether the benefits of these additional tests would outweigh these additional costs.

What restrictions are there on correcting defective measurements?

The Proposer noted that, for the example they highlighted to the Group, they knew that the readings were incorrect, but they couldn't do anything to correct it. However, while steps can be taken to prevent such errors occurring prospectively, the current arrangements do not allow for existing erroneous measurements to be corrected. The Proposer believes that the restrictions around correcting Reactive Energy should be removed.

Under the current DUoS charging methodologies, DSOs cannot amend the data they receive without agreement from the customer; such un-agreed modifications may be deemed as fraud. This means that DSOs are required to use the measurements they receive when issuing DUoS charges, even if that data is clearly erroneous. While allowing the CDCA to correct defective Reactive Energy measurements would be one way to resolve this issue, another route could be to allow DSOs to amend their methodologies to allow the removal of such readings when calculating charges. However, such a change would not affect the BSC, and so the Issue Group did not consider this option further.

How widespread is the issue?

Issue Group members considered how widespread this issue was, and in how many Metering Systems such excessive Reactive Energy readings were being observed. The Group felt it would be beneficial to seek the views of LDSOs on this, and issued a Request for Information (RFI) to these Parties. The responses received to this RFI can be found in Appendix 2.

The Group noted that only one LDSO, the Proposer's organisation, had noticed this issue, and that no other LDSOs who responded had considered this to be an issue. The CDCA had run a random sample of main and check readings for Reactive Energy measurements within its systems, but had not picked up any discrepancies. Furthermore, the Transmission Company was asked if it had noticed any issues where it used Reactive Energy measurements to charge participants, and it confirmed that it was not affected by the issues highlighted by Issue 58.

Members considered that this may be an issue with only the one Metering System, and that there did not seem to be sufficient evidence that the benefits of implementing either of the BSC solutions that had been considered would outweigh the associated costs. The Proposer noted these views and considered that, as the problem only seemed to have occurred in a single Metering System, it may be excessive to raise any of the BSC changes discussed by the Group in response to this problem. They agreed to close the Issue, and would investigate the issues with this single Metering System separately.

4 Conclusions

Issue Group's conclusions

The Issue Group noted that there are a number of solutions that could be progressed to resolve this Issue.

A Modification could be raised to place an obligation on the CDCA to validate Reactive Energy as it currently does for Active Energy, including estimating missing or defective metered data. This would also require CDCA system and process changes. The Group noted that this would be an expensive change to progress, and that the costs of implementing and then operating the new process would outweigh the benefits of the change. It therefore believed that this option should not be progressed.

The Proposer had considered that the cause of some of the observed measurements may be due to electromagnetic interference. The Group considered that a CP could be raised to include further checks on this area in BSCP601, to help prevent the risk of such interference affecting Meters installed going forward. However, the costs of performing these tests would likely increase as a result, and the Group questioned if these would outweigh the benefits.

Changes to the DUoS charging methodologies could be investigated to look at the current restrictions relating to the use of erroneous measurements in the calculation of charges. However, this would not require any BSC changes, and so the Issue Group did not consider this further, feeling that any such discussions should instead be held in the appropriate forums.

The Proposer noted that they had been the only one to observe the highlighted issue, and that they had only observed it for one Metering System. Having listened to the Issue Group's views, they agreed that it did not seem prudent to progress any changes at this time, but would instead investigate the issues with this Metering System separately.

The Issue Group therefore believes that no changes should be progressed from Issue 58.

Appendix 1: Anonymised Example

Below is an anonymised example provided by the Proposer of spurious Reactive Energy metered data passed to it via the CDCA for a CVA Metering System related to an embedded site. They note that this is quite an extreme example, but provided it to show that the issue identified by Issue 58 does happen and the magnitude of error can be very significant in terms of calculated maximum demand or export for the relevant user. They also note that these spurious values were not recorded in their systems as actual readings but as estimated readings.

Anonymised Example

Date	SP	Raw Active Import		Raw Active Export		Raw Reactive Import		Raw Reactive Export	
25 May 12	18	350	A	0	A	400	A	0	A
25 May 12	19	300	A	0	A	350	E	0	A
25 May 12	20	350	A	0	A	576,400	E	576,000	E
25 May 12	21	300	A	0	A	350	E	0	A
25 May 12	22	350	A	0	A	400	E	0	A
05 Oct 12	28	350	A	0	A	450	A	0	A
05 Oct 12	29	400	A	0	A	450	A	0	A
05 Oct 12	30	350	A	0	A	576,450	E	576,000	E
05 Oct 12	31	400	A	0	A	450	E	0	A
05 Oct 12	32	350	A	0	A	450	A	0	A
14 Oct 12	1	950	A	0	A	1,100	A	0	A
14 Oct 12	2	1,000	A	0	A	1,150	A	0	A
14 Oct 12	3	1,000	A	0	A	577,100	E	576,000	E
14 Oct 12	4	950	A	0	A	1,100	A	0	A
14 Oct 12	5	1,000	A	0	A	1,100	A	0	A
08 Nov 12	6	1,700	A	0	A	1,750	A	0	A
08 Nov 12	7	1,750	A	0	A	1,750	A	0	A
08 Nov 12	8	1,700	A	0	E	577,800	E	576,000	E
08 Nov 12	9	2,250	A	0	A	1,950	A	0	A
08 Nov 12	10	2,450	A	0	A	2,100	A	0	A
17 Feb 13	34	600	A	0	A	500	A	0	A
17 Feb 13	35	1,050	A	0	A	1,000	A	0	A
17 Feb 13	36	1,000	A	0	E	576,950	E	576,000	E
17 Feb 13	37	1,150	A	0	A	1,050	A	0	A
17 Feb 13	38	1,200	A	0	A	1,100	A	0	A
18 Feb 13	37	0	E	197,750	E	0	A	15,900	A
18 Feb 13	38	0	E	197,800	E	0	A	13,150	A
18 Feb 13	39	0	E	197,900	E	576,000	E	586,400	E
18 Feb 13	40	0	E	197,450	E	0	A	11,650	A
18 Feb 13	41	0	E	197,650	E	0	A	7,000	A

Appendix 2: Request for Information Responses

As part of its consideration of Issue 58, the Group requested information from LDSOs on the scale of the issue. It asked the following questions:

1) Have you noticed exceptionally abnormally high Reactive Energy measurements for any of your CVA Metering Systems?

2) Do you believe a process for estimating missing or correcting defective Reactive Energy measurements for CVA Metering Systems should be put in place?

3) Do you have any further comments on Issue 58 that you would like the Issue 58 Group to note?

The Group received three responses from LDSOs as detailed below. SSE later confirmed that it did not respond to the RFI as it had not noticed this issue.

The Transmission Company also confirmed separately that it was not affected by the issues highlighted under Issue 58.

UK Power Networks

Question 1

Yes. We have noted only one Metering System, of the twenty or so Metering Systems for premises presently being charged DUoS by UK Power Networks, which has been impacted. This was caused technically by signal interference in a noisy electrical environment that affected data concentrator data communications on the particular site between metering equipment and data concentrators. Though this has now been resolved by the customer through software changes to introduce higher standards of data error checking and the problem is less likely to be repeated for the particular site.

Question 2

Yes. In the round, despite low probability, we believe that there should be a process for estimating missing or correcting defective Reactive Energy measurements for CVA Metering Systems in place. This would enable parties to utilise the provided data with confidence within their licence obligated activities, most specifically licenced distributors in DUoS charging, based on data verified as correct or adjusted to be correct by the sending party, i.e. the customer or their BSC agent.

We are unable legally to unilaterally adjust the prior instances of incorrect data as to do so would cause our company to bill other than on the basis of data provided by our customer, i.e. it would be fraudulent to do so.

The impact in the instance we have identified would have been the calculation of a maximum demand in the order of 1140MVA [megavolt-amperes] rather than a maximum demand of 1MVA. The impact, in terms of the magnitude of DUoS charge presented to the customer, would have been immense and in all likelihood disputed and not paid. Without correction of the data the genuine usage for which DUoS should have been paid would have remained unpaid.

The issue has relatively low probability of occurrence but for legal/fraud reasons falls into a "high impact" category because of the inability of the distributor to resolve the matter of

data quality themselves without agreement of the customer. In the instance that we have experienced we undertook an auditable trail of communications with the affected customer to advise the problem, to propose replacement values and to record their agreement such that we were able to justify manually amending the data utilised for billing purposes. However this approach is undesirable given that the customer's agents should ideally be capable of identifying the data error and correcting within industry systems and dataflows. Additionally the placement of manually adjusted values into billing systems compromises the analysis for changes in measurement data, for rebilling purposes, thereafter, given that a continual mismatch between CVA data and previous billed measurement data would exist.

Question 3

UK Power Networks unfortunately ran out of time to analyse all the CVA metering systems within its GSP [Grid Supply Point] Group to determine if other CVA metering systems for premises or boundaries that are not currently charged DUoS might have similar errors from time to time. We are intending to conduct some analysis and submit this later but prior to the next Issue 58 meeting.

Electricity North West

We downloaded a complete set of HH Data from our system and carried out some analysis, so in answer to the request for information:

Question 1

We have not noticed exceptionally abnormal high reactive energy measurements for any of our CVA Metering Systems.

Question 2

Our analysis didn't highlight that there was an issue, but from a DUoS perspective it may be useful to have a process for estimating missing or correcting defective reactive energy measurements for CVA Metering.

Question 3

We have no further comments to add.

Western Power Distribution

Question 1

Western Power has not experienced any problems with exceptionally high Reactive power measurements in the context of the few CVA meter data channels which are configured to enter the DUOS billing systems.

Question 2

Western Power does not believe that the scale of this problem warrants the expense of setting up a sophisticated system for estimating reactive power. The functionality exists within the billing system for manually deleting out obvious "switching spikes". In our view, it would be sufficient to update the billing methodologies to formalise the replacement of occasional spurious reactive power "spikes" with a zero read.

Question 3

CVA billing in the Western Power areas includes some complex interconnection that is subject to random changes in power flow direction. For example, when the wind blows, Mid Wales exports power to South Wales, when the wind drops, South Wales sends power to Mid Wales. It would be expensive to create an automated system to estimate reactive power in this environment. In the near future, we can envisage similar situations arising on interconnectors in the South West becoming generator dominated during periods of bright sunshine.

In the CVA world, meters are only programmed to 4 channels. During half-hours where the power flow direction fluctuates this makes it difficult to correctly associate reactive power and active power quadrants. Copying the SVA world, where meters are programmed to six channels would mean somehow incorporating the concept of import and export MSIDs into the aggregation rules. 4 digit MSIDs [Metering System Identifiers] might be insufficient for this, requiring the update of many computer systems.

Interconnection between DNOs is only ever billed in a single power flow direction. In this scenario, selecting the correct 3 meter channels from the 6 available would be sufficient. This would mean that the reactive units associated with the unbilled quadrant would not be sent from the CDCA to the DNO [Distribution Network Operator]. But this would not solve the problem at the wholly embedded CVA power stations some of which are billed on all quadrants.

The majority of CVA billing channels in the Western Power DUOS systems are charged under the EDCM [EHV Common Distribution Charging Methodology]. This means that there are no explicit reactive unit rate charges. The reactive power data is only affecting the exceeded capacity charges. It is difficult to justify the expense of accurate reactive power estimates when considering the relatively low importance under the EDCM.

The above comments only consider the scenario where CVA meter data is passed to the DUOS billing systems. The majority of CVA meter systems are not directly connected to distributor-owned assets and so the meter readings are not passed to the DUOS billing systems. However, Western Power has been involved in calculating active power meter reads in some extremely complex situations such as the Uskmouth area. Here there are 2 GSPs side by side. linked to a steelworks and 3 power stations, 2 of which import at 132kV but export at grid volts. The situation is further complicated by the presence of supergrids on "hot standby" which are capable of being connected to different bus sections, depending on which bus section faults are occurring. The estimates were arrived at by differencing a mixture of meter data and SCADA data off WPD area feeders with reference to the switching configuration held on the control systems. The active power estimates have value as reference for the GSP correction factors in NHH [Non Half Hourly] settlements and in calculations of losses on the distribution network, but repeating the exercise for reactive power would add little or no value.

Appendix 3: Issue Group Membership

Issue Group membership and attendance

Issue 58 Group Attendance			
Name	Organisation	01 Oct 14	04 Feb 15
Claire Anthony	ELEXON *(Chair)*	✓	✓
David Kemp	ELEXON *(Lead Analyst)*	✓	✓
Mike Smith	ELEXON *(Technical Expert)*	✓	✓
Matthew Hays-Stimson	UK Power Networks *(Proposer)*	✓	☎
Joy Jones	EDF	✓	✗
Tim Porter	SSE	✓	☎
Sharon Harding	IMServ *(CDCA)*	✓	☎

Appendix 4: Glossary & References

Acronyms

Acronyms used in this document are listed in the table below.

Acronyms	
Acronym	Definition
BSC	Balancing and Settlement Code
BSCP	BSC Procedure *(Code Subsidiary Document)*
CDCA	Central Data Collection Agent *(BSC Agent)*
CoP	Code of Practice *(Code Subsidiary Document)*
CP	Change Proposal
CVA	Central Volume Allocation
DNO	Distribution Network Operator *(another name for LDSO)*
DUoS	Distribution Use of System *(charge)*
EDCM	EHV Common Distribution Charging Methodology
EHV	extra-high voltage
GSP	Grid Supply Point
HH	Half Hourly
II	Interim Information *(Settlement Run)*
LDSO	Licenced Distribution System Operator *(BSC Party)*
MOA	Meter Operator Agent *(Party Agent)*
MSID	Metering System Identifier
MTD	Meter Technical Details
NHH	Non Half Hourly
RF	Final Reconciliation *(Settlement Run)*
RFI	Request for Information
SLC	Standard Licence Condition
SVA	Supplier Volume Allocation

External links

A summary of all hyperlinks used in this document are listed in the table below.

All external documents and URL links listed are correct as of the date of this document.

External Links		
Page(s)	Description	URL
3	CP1303 page on the ELEXON website	https://www.elexon.co.uk/change-proposal/cp1303-requirement-on-half-hourly-data-collectors-to-estimate-missing-reactive-power-demand-values/
3, 5	BSCPs page on the ELEXON website	https://www.elexon.co.uk/bsc-related-documents/related-documents/bscps/
4	BSC Sections page on the ELEXON website	https://www.elexon.co.uk/bsc-related-documents/balancing-settlement-code/bsc-sections/
4	Codes of Practice page on the ELEXON website	https://www.elexon.co.uk/bsc-related-documents/related-documents/codes-of-practice/