



# Industry views concerning commissioning and the TAM process

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**Meeting Name** Performance Assurance Board

**Meeting Date** 28 April 2011

**Purpose of paper** For Information

**Summary** This paper presents the views of the Technical Assurance of Metering Expert Group (TAMEG) on issues related to Metering Equipment commissioning. It also presents the **views of the Energy Networks Association's** (ENA) Commercial Operations Group (COG), separately, concerning perceived shortcomings with the TAA process. This paper asks the PAB to note the issues being raised by both groups and to consider them in conjunction with the TAPAP check findings (PAB123/09).

The appendix to this paper explains what the BSC requirements are for Metering Equipment compliance and outlines the assurance technique used to monitor compliance with these requirements.

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## 1. TAMEG's Views on Commissioning

- 1.1 The TAMEG is concerned about the number of non-compliances issued for missing measurement transformer certificates and missing/incomplete commissioning records (and that these tend to remain outstanding) and has asked us to present a letter (Attachment A) to the PAB setting out what the TAMEG believes are the primary issues behind these non-compliances. The letter also gives an indication of the potential risks to the assurance of Metering Systems associated with missing certificates and missing/incomplete commissioning records, sets out what has been done by the industry to try and address the issues and proposes a possible solution which could involve changes to the BSC, BSCPs and CoP4 to address these issues.
- 1.2 The TAMEG believes that the main cause behind the large number of non-compliances in this area is due to an inconsistency between the BSC obligations and the established industry practice since the separation of metering businesses (MOAs) from their local distribution network businesses (LDSOs). **Business separation was brought about by Ofgem's Review of Electricity Metering Arrangements** (the REMA protocol) in 2001 which was designed to bring about competition in the provision of metering services.
- 1.3 The main problem lies in the fact that, typically, for current transformer (CT) operated and CT and voltage transformer (VT) operated Meters, LDSOs procure and own the measurement transformers and the switchgear containing them and sometimes will test this equipment themselves, or use a third party contractor - these tests may or may not satisfy the requirements of CoP4. All the while the MOA remains

responsible for commissioning the Metering Equipment, in accordance with CoP4, for the entire Metering System.

- 1.4 If these test/commissioning records are not passed on to/requested by the MOA appointed to the Metering System or the MOA is not able to be on site before energisation to either conduct or witness the measurement transformer commissioning tests, and confirm they have been carried out in accordance with CoP4, then they have to rely on the LDSO's 'commissioning' process **or other MOA's commissioning** and know who to contact to obtain these commissioning records (and measurement transformer certificates). Newly appointed MOAs need to be able to do this so that they can install and connect up a Meter to the measurement transformers, apply the correct CT/VT ratios to the Meter (including any necessary compensation for the measurement/power transformer errors) and complete the end-to-end commissioning process to confirm overall accuracy is being maintained within the relevant CoP limits.
- 1.5 The TAMEG believes that the degree of potential impact on the accuracy of the Metering System will vary depending on what certificates and records are missing and what cannot be confirmed through subsequent testing by the appointed MOA. If measurement transformer certificates are missing then there could potentially<sup>1</sup> be an error in the order of 0.5% to 2% outside overall accuracy limits. However, if the CT ratio cannot be confirmed the potential error could be in the order of 50%, 100% or even 1000% or more.
- 1.6 The TAMEG highlights the steps taken by the industry so far to try and address these issues. For example:
- by creating generic measurement transformer certificates (the National Measurement Transformer Error Statement maintained by ELEXON) to substitute for missing individual certificates;
  - ELEXON facilitating workshops in this area;
  - the publication of contact details by some LDSOs on various industry websites; and
  - the introduction of the D0215<sup>2</sup> data flow for new installations (more recently a change was introduced to get LDSOs to resend this flow anytime there is a change to technical details for a site (e.g. changes to supply voltage, CT ratio, VT ratio).
- 1.7 The letter concludes that a possible solution would be to transfer the responsibility for commissioning items of Metering Equipment, and providing relevant certificates and records to the MOA, to the Equipment Owner.
- 1.8 Finally, the TAMEG suggests that the contents of the letter be considered in conjunction with the findings of the recent TAPAP Check (paper PAB123/09) and any recommendations made by other industry bodies.

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<sup>1</sup> In most cases the errors of the individual components of the Metering System will result in a figure which is within the overall accuracy limits of the relevant CoP even without providing the actual errors from a certificate, e.g. CoP5 overall accuracy limit is +/-2.5% at Unity Power Factor and the minimum accuracy class for a Meter is +/- 2% and for a CT is +/- 0.5% giving a potential overall accuracy of +/-2.5%. In reality the errors for the individual components would be within the accuracy class limits for the item or they would not be sold and labelled as conforming to that accuracy class.

<sup>2</sup> 'Provision of Site Technical Details'

## 2. COG's View on the TAM technique

- 2.1 The [Commercial Operations Group](#) (COG) is a sub group of the [Energy Networks Association](#) (ENA<sup>3</sup>). The COG was formed 'by the distribution network operators (DNOs) to represent legitimate common interests of DNOs in fulfilling their licence obligations and to co-operate in the improvement of commercial and contractual services provided to network users'.
- 2.2 In January 2011 the COG chairman wrote a letter (Attachment B) to the chairman of the TAMEG **expressing the COG's concerns**, and reiterating LDSOs' concerns, about the TAM process. The COG believes that changes are required to CoP4 to ensure the assurance regime is fit for purpose and that it focuses on areas that have a real impact on the accuracy of Settlement data. The COG considers that there is a risk that by focusing on the provision of test certificates, the industry may be losing sight of the fundamental requirement to ensure the overall accuracy of the Metering System.
- 2.3 Following a discussion of the paper at the TAMEG meeting on 11 January 2011, the chair forwarded the minutes of the meeting to the COG chair who then requested a meeting with ELEXON and the TAA to discuss the issues and to assist the COG to draft a BSC Change Proposal. The meeting took place on 8 March 2011.
- 2.4 At the meeting the COG cited a recent audit carried out by a LDSO on all of its High Voltage sites where a number of significant problems were found which resulted in 23 Trading Disputes being raised. ELEXON noted to the COG that if these sites had been selected as part of the TAA process then the issue with them would have been found. The COG noted that those responsible for causing such errors should be brought to task and this is a failing of the TAA process.
- 2.5 We informed the COG that we believe there are fundamental concerns with commissioning of Half Hourly Metering Equipment which, if resolved, will prevent the issues the COG have identified and that we are taking steps to address these, for example, with the TAPAP checks.
- 2.6 We agreed to work with the COG to develop any BSC changes it feels are required.

## 3. ELEXON's View

- 3.1 The TAMEG acknowledges that there are issues with commissioning which have the potential to conceal significant problems affecting Settlement and we agree that there are. The TAMEG's recommended solution may potentially address the commercial difficulties currently facing MOAs. However, it is not clear whether such a fundamental BSC change would resolve the issues without creating further problems. Separating responsibility for Metering Equipment to that of the Equipment Owner will in itself create new problems. For example, if a customer were to own CTs and VTs by virtue of owning HV switchgear, it would not be possible to place a BSC obligation on a non-BSC Party. Although the BSC is

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<sup>3</sup> The ENA 'represents the interests of its member companies who operate the national and regional networks for energy to transport gas and electricity into UK and Ireland homes and businesses'.

concerned with responsibility for Metering Equipment it is questionable whether ownership is a matter for the BSC.

- 3.2 The TAA process is not designed to capture every issue. However, the fact that there are issues which exist and remain undetected by any BSC process is a concern.
- 3.3 We remain concerned that the issues of commissioning, in particular, and records in general, remain to some extent an uncontrolled risk. The PAB will be presented with a further paper (PAB123/09) detailing the findings of the recent TAPAP check in this area. The findings have identified failings of both MOAs and LDSOs. We therefore fully endorse the recommendations contained in the TAPAP check findings paper as a practical way forward.

## 4. Recommendations

- 4.1 We invite you to:
- a) **NOTE** the letter from the TAMEG to the PAB;
  - b) **NOTE** the letter from the COG to ELEXON; and
  - c) **NOTE** the issues being raised in conjunction with the TAPAP check findings.

### Appendix:

Appendix 1 - BSC requirements are for Metering Equipment compliance

### Attachments:

Attachment A – Letter from the TAMEG to the PAB on commissioning  
Attachment B – Letter from the COG to the TAMEG on TAM



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## Appendix 1:

### 1. Metering Equipment Compliance

- 1.1 Section L 'Metering' of the Balancing and Settlement Code (BSC) requires that the Registrant of a Metering System be responsible for ensuring that Metering Equipment, comprised within that Metering System, is installed, commissioned, maintained and operated in accordance with Section L and the relevant metering Code of Practice (CoP) and that a Meter Operator Agent (MOA) is appointed to perform these obligations. There are ten CoPs however, CoP4<sup>4</sup> applies to commissioning and testing for Metering Equipment complying with any other CoP.
- 1.2 CoP4 sets out the requirements for calibrating Metering Equipment prior to installation and, for Meters, periodically during the life of the Metering Equipment. CoP4 also sets out the requirements for commissioning and testing Metering Equipment and for maintaining<sup>5</sup> calibration certificates and commissioning records.
- 1.3 The purpose of CoP4 commissioning is to establish and confirm that a Metering System measures and records the volumes of energy flowing at System Connection Points and Boundary Points accurately and within the overall accuracy limits set out in the appropriate metering CoP that the Metering System is registered against.

### 2. Technical Assurance of Metering

- 2.1 Section L sets out the requirements for Metering Equipment and also the functions of the Technical Assurance Agent (TAA). The role of the TAA is to monitor compliance by BSC Parties, for Half Hourly Metering Systems, with the requirements set out in Section L, the metering Codes of Practice and BSC Procedures (e.g. BSCP27<sup>6</sup>).
- 2.2 The TAA carries out a sample of site inspections on Metering Equipment and where the TAA finds that a requirement is not being complied with then a non-compliance is issued.
- 2.3 The scope of the sample<sup>7</sup> is set by the Performance Assurance Board (PAB) every year using a risk based approach based on the principles set out in Section L7.3.3, and any other principles it considers appropriate to apply, providing the sample is not biased towards any particular Registrant, MOA, GSP Group or type of Metering Equipment.
- 2.4 Under the Performance Assurance Framework (PAF) the technique applied to Metering Systems and delivered by the TAA, is called the Technical Assurance of Metering (TAM) technique.

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<sup>4</sup> 'Code of Practice for the Calibration, Testing and Commissioning Requirements of Metering Equipment for Settlement Purposes'

<sup>5</sup> Section L2.5.3 of the BSC requires the Registrant to prepare and maintain these calibration certificates and commission records for the life of the Metering Equipment and pass these certificates/records to an incoming MOA.

<sup>6</sup> 'Technical Assurance of Half Hourly Metering Systems for Settlement Purposes'

<sup>7</sup> The 2010/2011 sample was based on a 5% sample of CVA Metering Systems (approximately 50) and a 1% sample of SVA Metering Systems (approximately 1100).

- 2.5 Of particular relevance to this paper, the TAM technique continues to identify high levels of failures to provide measurement transformer certificates and failures to provide, or provide complete, commissioning records for Metering Systems - this audit year alone (2010/2011), out of the 1076 SVA inspections, 336 inspections resulted in non-compliances for missing measurement transformer certificates and 497 inspections resulted in non-compliances for missing or incomplete commissioning records. Where measurement transformer certificates cannot be provided then there is a potential for a small accuracy error (in excess of the overall accuracy limit) to exist of around 0.5% - 2% or so. However, of much more concern is missing or incomplete commissioning records which can conceal errors (sometimes far) in excess of 100%.

### **3. What is the TAMEG?**

- 3.1 The Technical Assurance of Metering Expert Group (TAMEG) is an industry expert group which provides an opportunity for industry participants to discuss issues and exchange ideas with ELEXON on the **operation of the TAM technique, the TAA and the TAA's findings.**
- 3.2 The TAMEG was formed in March 2009, not as a BSC obligation or a Committee of the BSC Panel, but as a value added service to help ensure the TAM service is effective and efficient - the TAMEG is chaired by ELEXON who also provide a secretariat function.
- 3.3 Membership of the TAMEG is open to BSC Parties, BSC Party Agents and Local Distribution System Operators (LDSOs) (or appointed representatives) that have the TAM technique applied to them. The TAA also attends the quarterly meetings and we sometimes invite other industry experts as necessary.
- 3.4 Where the TAMEG requires guidance or approval of its business, we present that information to the PAB.



# Letter from TAMEG to PAB

**PAB123/08 – Attachment A**

**April 2011**

## **Risk to Assurance of Commissioning and Calibration of Measurement Transformers for Metering**

The purpose of this report is to outline observed inconsistency between specific obligations within the Balancing and Settlement Code (BSC) / Codes of Practices and established industry practice relating to commissioning and certification of measurement transformers for the purpose of metering. This report seeks to highlight areas of risk to assurance and to suggest possible solutions.

This inconsistency has caused considerable, wide spread, difficulty for Meter Operator Agents (MOAs) and Registrants of Metering Systems to fulfil certain obligations under Section L of the BSC, Code of Practice Four (CoP4) and other Metering Codes of Practice; specifically the complete commissioning and calibration of Metering Systems.

This is evidenced by high and increasing numbers of long standing non-compliances identified by the Technical Assurance Agent (TAA). A consensus within the Technical Assurance of Metering Expert Group (TAMEG) is that there is sufficient risk to assurance that consideration should be given to alternative practice and potentially changes to the BSC and Codes of Practice.

### **Background**

To ensure a Metering System registers the true volume of energy at an acceptable level of accuracy, commissioning of the Metering System and calibration (and record keeping) of the Meter(s) and the measurement transformer(s) is required. The overall accuracy of energy measurements is required to be within the limits specified in the relevant Code of Practice and assessment of this level depends on the successful and complete commissioning and calibration of the Metering System and the components thereof.

While ultimate responsibility for compliance of commissioning and calibration lies with the Registrant, this responsibility is largely discharged through the MOA, whose expertise and day to day activities should ensure compliance. Similarly, any non-compliance identified by the TAA is the responsibility of the Registrant to rectify but corrective actions must normally be taken by the MOA.

Existing industry practice means that the MOA is well placed to ensure compliance of the calibration of the Meters. Given the relevant information and calibration certificates for measurement transformers, the MOA is well placed to make assessments of overall accuracy and to confirm the compliance of the Metering System by means of commissioning.

COP4 requires that measurement transformers be calibrated before installation and traceable calibration certificates be held and made available to the BSCCo. However, the selection, procurement and installation of measurement transformers is not the responsibility of the MOA (it is commonly, but not exclusively, the responsibility of the Local Distribution System Operator (LDSO)). This gives rise to a significant number of incidences where the MOA is not enabled to carry out full commissioning of those items directly, or to effectively manage their calibration and record keeping.



# Letter from TAMEG to PAB

Notable conditions where commissioning by the MOA is commonly prevented include: High Voltage (HV) Metering Systems, Low Voltage (LV) Metering Systems where the Current Transformers (CTs) are located on live bars or are inaccessible and Metering Systems where the load is either extremely erratic or is generally used as stand-by.

Historically, the risk presented was limited by the high correlation of regional LDSOs and MOAs being part of a single business. However, the current regional nature of LDSOs and national operation of MOAs has led to varying levels of success in managing this issue. For example, in situations where an LDSO opts to pre-commission measurement transformers (perhaps by primary injection) and make commissioning and calibration records available to the appointed MOA, that MOA is enabled to complete full commissioning and assessment of the overall measurement error. Where an LDSO does not provide such records as a matter of course, the industry currently employs work-arounds with varying success, including the National Measurement Transformer Error Statement (NMTES), formal (and informal) contact networks and reliance on assumptions and unsubstantiated sources of reference such as the D0215 'Provision of Site Technical Details' dataflow.

## Implications

Disparity in the responsibilities for procurement and commissioning of measurement transformers contributes to the volume of non-compliances identified by the TAA against the Metering Systems sampled for audit. It can be assumed that this condition can be expected across the wider population of Metering Systems and is not peculiar to the 1% sample of SVA Metering Systems audited.

The implications could vary considerably. For example, in the event that measurement transformer calibration records are not available, the limit of inaccuracy of the measured energy might reasonably be expected to be in the order of 0.5 - 2% outside of specified tolerance (or might not be outside of tolerance at all).

However, in the event that the ratio or polarity of CTs or Voltage Transformers (VTs) is not confirmed to be appropriate and matched to the Meters, the error in measured energy could be in the order of 50%, 100% or even 1000%. Examples have occurred of errors of this order remaining undetected for considerable periods of time and it might be assumed that occurrences exist that have not yet been detected.

This issue is further compounded by the fact that HV Metering Systems (which are commonly higher consumption supplies) are at greater risk of large errors occurring due to the very low frequency of MOA commissioned measurement transformers.

Inability to confirm measurement transformer ratios and unavailability of their calibration records are two issues that are likely to present an immediate risk to assurance. Less immediate, but still relevant, is the inability of MOAs to complete other aspects of commissioning in accordance with CoP4 including assessment of the appropriate limits of burden on the measurement transformers, assessment of power transformer loss compensation and assessment of measurement transformer error compensation.

## Solutions

Actions that have been carried out to address this issue include:

- Introduction and expansion of the NMTES;
- Workshops facilitated by ELEXON;





# Letter from TAMEG to PAB

- Voluntary (and incomplete) publication of contact details by some LDSOs and their agents for the provision of measurement transformer details and certificates; and
- Introduction of D0215 dataflow

It is suggested that this report is considered in conjunction with the TAPAP Check and any recommendations made by bodies such as MOCOPA, the ENA and the AMO.

A possible solution has been proposed that might be considered. The responsibilities of the measurement transformer equipment owner would be increased to include (by themselves or their agents) on-site commissioning of measurement transformers and provision of measurement transformer commissioning records, calibration certificates, manufacturer details, serial numbers, ratios, burden ratings and accuracy class ratings.

This would enable the MOA to reasonably complete Metering System commissioning tests and overall accuracy assessments and to hold all calibration certificates available for inspection by the TAA or the BSC Company (BSCCo) as required.

## **Relevant Responsibilities Currently Specified in the BSC and Codes of Practice**

The responsibilities and functions of Parties and Party Agents relevant to this concern are laid out in Section L, and summarised below:

- The Principal Function of Meter Operator Agents is to install, commission, test, maintain, rectify faults and provide a sealing service in respect of Metering Equipment (including if applicable associated Communications Equipment), in accordance with Party Service Line 100 and the relevant BSC Procedures and Codes of Practice (clause 1.2.3).
- The Registrant shall ensure that Metering Equipment is installed, commissioned, maintained and operated in accordance with Section L and with the relevant Code of Practice (clause 2.1).
- The Registrant shall use reasonable endeavours to obtain the agreement of the Equipment Owner of measurement transformers to assist the Registrant (for compliance and acceptable level of accuracy) (clause 3.1)
- The Equipment Owner of measurement transformers (where they are a BSC Party) shall provide reasonable assistance to the Registrant (for compliance and acceptable level of accuracy) (clause 3.1)
- The Registrant shall ensure that Metering Equipment is commissioned in accordance with Code of Practice Four (clause 3.6.1)

And the responsibilities laid out in Code of Practice Four include:

- The obligations and requirements of this CoP4 are described as being the obligations and requirements on the Meter Operator Agent (MOA) responsible for the Metering System.
- Under the BSC the ultimate responsibility for compliance with this CoP4 is that of the Registrant.

**To Chair of Technical Assurance of Metering Expert Group**

**From Chair of ENA Commercial Operations Group**

**6<sup>th</sup> January 2011**

**11 January 2011 TAMEG Workshop to consider improvements to Technical Assurance of Metering (TAM)**

In advance of your workshop on 11th January, I thought it would be useful if I re-iterated points raised by the DNOs previously on the technical assurance of metering. We believe changes to COP4 are necessary to ensure the assurance regime is fit for purpose and is focused on areas that have a real impact on the accuracy of settlement data. We expect your review to bring forward change proposals in the near future. Whilst DNOs have considered raising change proposals in this regard, we feel it would be better if such changes were raised by a BSC group.

In the Technical Assurance of Metering Systems Annual Report, the scope of which was to provide assurance that the HH metering systems installed for settlement purposes complied with the relevant COPs and BSCPs, a number of the issues identified have been outstanding for many years:

- CT/VT certificates – a large number of non-compliances (commissioning records account for approximately 40% of all SVA non-compliances) are related to the issue of missing certificates. The reality is that if an historic certificate is missing then the only way that non-compliance can be addressed is to replace the equipment with new equipment that does have a certificate. This will involve a supply interruption and inconvenience to customers. This is not a cost effective solution and will not happen, so the non-compliance remains and continues to grow. Where a certificate is missing there is also likely to be a non-compliance raised in respect of overall accuracy.
- Meter Certificates – similar to CT/VT certificates but ownership is with the Meter Operator Agent.

CTs and VTs should be to a minimum accuracy class and the assurance regime should ensure that any meter connected to them will be accurate to within the specified tolerances for the overall system. The fact that a certificate can be produced does not prove that this is actually the CT installed on site and hence the production of large number of CT/ VT certificates does not in fact provide any assurance of the accuracy of settlement metering.

The risk is that in focussing on test certificates we lose sight of the fundamental requirement to maintain the overall accuracy of the metering system.

To determine the overall accuracy of a metering system CT/VT ratios are required. Whilst these can be obtained from CT/VT certificates it is better if these were checked on site with no reliance on paper records. Where these cannot be checked then post commissioning on load checks are undertaken which can verify that the metering is recording correctly and correct VT/ CT ratios applied. This could make use of secondary metering if available. In some circumstances, where the meter operator cannot validate the accuracy than a shutdown and primary injection test may be needed.

The main issues in commissioning metering systems are:

- CT ratios
- VT ratios for HV.
- Orientation of CTs to give the correct orientation of power flows. Potential is for AI and AE to be on the wrong channel. MOA can correct errors providing they know the primary CT orientation by crossing on the secondary wiring. DNO switchgear drawings should show primary orientation and therefore need to be made available to the MOA at the right time (i.e. before commissioning).
- Whilst the COPs require calibration of metering to take account of CT/VT errors. To undertake this would need calibration certificates detailing make, accuracy class, serial numbers and burden, however this process introduces more potential scope for error. It is better if standard accuracy class meters were fitted to stand CTs.
- Phase rotation
- Multiple ratio CTs – possibility of connecting to wrong ratio.
- For LV CTs, generic values are taken and metering is calibrated to those values – MOCOPA has a statement to this effect. However, non-compliances are frequently raised as a consequence of this compensation being applied to metering systems where no certificates are available. This is again a distraction and diverts attention from real technical assurance issues.
- Multiple feeder sites – check that correct metering/ communications relate to the appropriate feeder

The problems with CT metering systems is not whether they are just outside the measurement tolerances, it is whether the meters are out by factors of two or three and the audit regime should be focussed on this. Audits of VT/ CT certificates do not provide any assurance in this area.

I hope you find these views useful in your considerations and please contact me if you wish to discuss further.

Regards

Tony McEntee

Chair, ENA Commercial Operations Group