



McGill Engineering Services Pty Ltd

Engineering, Adjudication & Arbitration Services ABN 45 106 691 169

Electricity Industry Metering Code Metrology Procedure Technical Assessment

Prepared By Kevan McGill
11 September 2006

Electricity Industry Metering Code – Metrology Procedure Technical Assessment

Executive Summary

The proposed metrology procedure submitted by Western Power and Horizon Power has been assessed against the criteria in the *Electricity Industry Metering Code 2005 (Code)*. There is one outstanding issue where agreement could not be reached between Western Power and Synergy but despite this issue, the proposed metrology procedure meets the requirements for acceptance by the *Authority*.

Synergy has raised a concern, namely that meters should be read before the internal storage is overrun and energy data is lost.

The issue relates to the capacity of current meters to store data and the ability to read these meters before this capacity is reached. Where a communication link is provided additional reading is a cost but not a major cost whereas more frequent visual readings have considerable costs. Where a fault is detected and a site visit is required to determine the problem the concern is that such activity can be scheduled before the capacity is reached. This has not occurred in the past as the reading frequency leaves time to rectify but Western Power do not wish to guarantee higher frequency reading without recompense. Western Power advise that data overflow should be a very rare event and have indicated that if, say a communications problem existed they would read more frequently while the communications (telemetry) problem is fixed. Western Power is limited by the capacity of the meter to store data. It is proposed that the metrology procedure be approved as drafted by Western Power and should problems arise the metrology procedure could then be reviewed when the frequency of occurrence is known. Substitution procedures are provided for such occasions where actual data cannot be used.

Western Power has made all the other changes required by Synergy and the Secretariat.

Western Power's current metering management plan has been approved by the Director of Energy Safety to ensure that meters meet requirements in regulations under its control. The proposal is that the *Authority* approves the current meter management plan while the legislative overlap can be investigated and resolved.

In addition, it is recommended that the Office of Energy examine the *Energy Operators (Powers) Act* for redundant meter requirements and consider amending the Metering Code to facilitate removal of overlap with the *Electricity Act 1945* and to allow for improved transitional accuracy requirements for metering installations.

It is recommended that the *Authority* approve the proposed metrology procedure.

Introduction

The requirement is to assess the Metrology Procedure submitted by Western Power and Horizon Power for compliance with statutory and other requirements. The relevant legislation and codes, standards have been examined and the proposed metrology procedure assessed against the applicable requirements.

Background

The *Electricity Industry Metering Code 2005* (Code) sets out the need for a metrology procedure. The definition in the Code is:

“**metrology procedure**”, in relation to a *network operator’s network*, means a metrology procedure under clause 6.8 and this *Code*, approved by the *Authority* under Division 6.2.

And clause 6.2 says:

6.2 Network operator must establish documents

Subject to clause 6.3, a *network operator* must as soon as practicable and in any event within 6 months after the date this *Code* applies to the *network operator* submit to the *Authority* for its approval under Division 6.2:

- (a) a proposed *model service level agreement*;
- (b) proposed *communication rules*;
- (c) a proposed *metrology procedure*; and
- (d) proposed *mandatory link criteria* under clause 3.6,

each of which is a proposed “**document**”.

And clause 6.8 says

6.8 Requirements for a metrology procedure

A *metrology procedure* must at least:

(a) as a minimum, contain information on the *devices* and *methods* that are used by the *network operator* to:

- (i) measure, or determine by means other than a device, *electricity* produced and consumed at a *metering point*, and
- (ii) convey the measured or determined information to other devices using *communications links*, and
- (iii) prepare the information using *devices* or *methods* to form *energy data*; and
- (iv) provide access to the *energy data* from a telecommunications network;

and

(b) specify the minimum requirements for *meters* and *metering installations*, including:

- (i) *accumulation meters*; and
 - (ii) interfaces that allow *interval energy data* to be downloaded;
- and

(iii) direct connected *meters* for *Type 4 to Type 6 metering installations*; and

(iv) *CTs and VTs*; and

(v) programmable settings under clause 3.10.

(c) specify the procedures for *estimating, substituting and validating energy data* under this *Code*; and

(d) be consistent with the approved asset management system required by section 14 of the Act; and

(e) specify the date from which the *metrology procedure* takes effect which must be no less than 3 months after it is *published*.

{Note: Without limiting clause 6.8, a *network operator's metrology procedure* must, at least:

(a) specify the technical parameters for the provision, installation, operation and *maintenance of metering installations* under clause 3.5(1) which are consistent with this *Code*; and

(b) specify the methods for determining the accuracy of *estimated energy data* under clause 5.25(a); and

(c) specify test and audit procedures under clause 5.21; and

(d) specify how *accumulated energy data* from a *Type 6 metering installation* or *Type 7 metering installation* is to be converted into *trading interval data* within the *metering database* in accordance with clauses 3.16(4); and

(e) specify the devices and methods to ensure the accuracy of *data* relating to each *metering point* by the application of appropriate *CT* or *VT* ratios and pulses in accordance with clause 5.25(b); and

(f) specify what the *network operator* must do to comply with clause 5.20(4); and

(g) specify the methods for comparing *market generator interval energy data* against *SCADA data* for the purposes of A2.6(2)(b).}

These are the principal requirements against which the proposed metrology procedure is to be assessed. However there are other requirements for meters. The statutory and other requirements are:

- The *Wholesale Electricity Market Rules*;
- The Code of Conduct for the Supply of Electricity to Small Use Customers;
- The Customer Transfer Code;
- The *Electricity Act 1945* and regulations;
- The *Energy Operators (Powers) Act 1979* ;
- The National Measurement Institute specifications; and
- Australian / International standards and Codes.

The metrology procedure will be assessed firstly against the requirements of 6.8 of the Code and then against the other requirements.

Approval by the Authority

The Code sets out the requirements for approval of a document such as the metrology procedure.

6.5 Requirements for all documents

A *document* must:

- (a) comply with this *Code*; and
- (b) not impose inappropriate barriers to entry to a market; and
- (c) be consistent with *good electricity industry practice*; and
- (d) be reasonable; and
- (e) be consistent with the *Code objectives*; and
- (f) be consistent with the *market rules*; and
- (g) unless this *Code* requires otherwise, be consistent with other enactments.

Recommendation

- (a) The proposed metrology procedure complies with the Code. Western Power has made adjustments to the proposed metrology procedure to meet the requirements of the Code.

The Code (3.16.4) requires the network operator to specify how it is to produce the “Notional Wholesale Meter” for the purposes of the market rules. The “Notional Wholesale Meter” is the conversion of accumulated non-interval data to market interval data. Non-contestable customers such as the domestic meters are not interval (half hour meters) but simple accumulation meters and there are no meters at the distribution boundary to measure this load in interval terms. The Market Rules have subsequently removed this requirement for the network operator. The responsibility for the production of the estimate has moved from the metering data agent to the independent market operator. (Amendment regulations for Market Rules 31 March 2006)

The proposed metrology procedure is now in accordance with the Code with respect to transition issues. A high voltage large capacity metering installation has three components, current transformers, voltage transformers and a meter. The Code allows as a transitional matter, over specification transformers but not meters, providing that the total installation meets the specified accuracy. Western Power has agreed to replace meters that are over specification to meet the Code even though the installation met accuracy requirements. An amendment to the Code could avoid this unnecessary cost;

- (b) The proposed metrology procedure does not impose unreasonable barriers to entry. It is reasonable that participants have a standard of accuracy commensurate with their use and the costs related with that accuracy. The specified metering installations are not significant cost elements and should not be a barrier to entry;
- (c) The proposed metrology procedure is consistent with *good electricity industry practice*. The metrology procedure is consistent with good industry practice, is consistent with industry standards such as Australian Standard AS 1284.13:2002 “Electricity metering – Part 13 In service compliance testing” and is largely consistent with the proposed NEM metrology procedure;
- (d) The proposed metrology procedure is reasonable. The proposed metrology procedure is considered reasonable;
- (e) The proposed metrology procedure is consistent with Metering Code objectives.

2.1 Code Objectives

(1) The *Code objectives* are to:

- (a) promote the provision of accurate metering of *electricity* production and consumption;
- (b) promote access to and confidence in *data* of parties to commercial *electricity* transactions;
- (c) facilitate the operation of Part 8 and Part 9 of the Act, the *Customer Transfer Code* and the *Code of Conduct*.

(2) *Code participants* must have regard to the *Code objectives* when performing an obligation under this *Code*, whether or not the provision under which they are performing refers expressly to the *Code objectives*.

The proposed metrology procedure covers accurate metering and access and confidence in the data for electricity transactions. The Customer Transfer Code (CTC) issues for standing data and historical readings are covered by the proposed metrology procedure. The CTC also requires an interval meter to be installed to make a customer transfer, as all contestable customers are required to have interval meters. The proposed metrology procedure is silent on this matter, which is a Market and CTC issue, and the metrology procedure covers the requirements for interval meters where they are installed;

- (f) The proposed metrology procedure is consistent with market rules. The proposed metrology procedure is consistent with market requirements. There is a parallel obligation by the IMO to have wholesale market metering requirements; and it is for the IMO to decide if its requirements are met. The issue of the Notional Wholesale Meter has been discussed above.
- (g) The proposed metrology procedure is consistent with other enactments, particularly when the suggested Code and legislative amendments are made. It is recommended that a small amendment to the Code to require addressing the population of meters in accordance with AS 1284.13, could allow the repeal of metering requirements under the *Electricity Act 1945* and the requirement for Energy Safety to approve the metering management plan. It is also recommended that the Office of Energy examine amendments to the *Energy Operators (Powers) Act 1972* as that Act has some provisions that conflict with the Code requirements.

Synergy has a concern that energy data is not lost before it overflows the data registers.

The current technology of meters has limited on-board storage of energy data. Energy data would be lost if a reading cannot be made within that storage period. The proposed metrology procedure states that readings will be made within that time. However there is always a possibility that due to unusual circumstances a reading cannot be made. To date Western Power have advised that no data has been lost but Synergy are seeking guarantees that data will not be lost and they do not want to pay for a more frequent regular reading schedules or an upgrade to the meters to deal with the possibility. Western Power have proposed in the metrology procedure, that if the problem occurs more than twice in 12 months, it will seek an agreed remedy with the retailer and will read more frequently while the solution is implemented. This proposal; should address this matter.

My recommendation is that based on current experience the proposed metrology procedure remains as drafted by Western Power but if the issue of data being lost

emerges as a serious problem, and then the Code allows Synergy to request an amendment to the metrology procedure.

The references to an asset management plan has been changed to meter management plan which is the plan approved by the Director of Energy Safety and is recommend for approval as part of this metrology procedure.

I recommend that the *Authority* approve the proposed metrology procedure.

Requirements of a metrology procedure

The requirements of a metrology procedure will be assessed against the section below dealing with clause 6.8 of the Code.

Technical parameters of clause 3.5(1) of the Code

The requirements for the components of a metering installation are set out in the Code at schedule 1 for types 1 to 4 meters, schedule 2 for type 5 meters and schedule 3 for type 6 meters.

Types 1 to 4

Provision of metering installation

The issues in the earlier draft of the proposed metrology procedure have been resolved satisfactorily.

The proposed metrology procedure is now in accordance with the Code with respect to transition issues. A high voltage large capacity metering installation has three components, current transformers, voltage transformers and a meter. The Code allows as a transitional matter, over specification transformers but not meters, providing that the total installation meets the specified accuracy. This seems to be an unreasonable restraint where the meter may be out of specification but not the total installation and require costs when accuracy requirements are already satisfied. The Code should be amended to allow for any of the components to be over specification providing the total metering installation meets requirements. This cannot apply for small installation where there is only a meter and no other offsetting components. The Office of Energy should be approached to amend the Code accordingly.

Installation of a metering installation

The issues in the earlier draft of the proposed metrology procedure have been resolved satisfactorily.

Operation of metering installation

The issues in the earlier draft of the proposed metrology procedure have been resolved satisfactorily.

Maintenance of metering installation

Maintain is defined in the Code as “renew, replace or update”. Testing and verification requirements fall within the scope of “maintain”.

The issues in the earlier draft of the proposed metrology procedure have been resolved satisfactorily.

The Australian Standard AS 1284.13:2002 “Electricity metering – Part 13 In service compliance testing” is relevant to the proposed metrology procedure. The proposed metrology procedure (reference 5.78) has been amended to be consistent with the standard with respect to retesting periods for meters. The standard does not cover instrument transformers yet.

Type 5

Provision of metering installation

The issues in the earlier draft of the proposed metrology procedure have been resolved satisfactorily.

Installation of metering installation

The issues in the earlier draft of the proposed metrology procedure have been resolved satisfactorily.

Operation of metering installation

The issues in the earlier draft of the proposed metrology procedure have been resolved satisfactorily.

Maintenance of metering installation

The issues in the earlier draft of the proposed metrology procedure have been resolved satisfactorily.

Type 6

Provision of metering installation

The issues in the earlier draft of the proposed metrology procedure have been resolved satisfactorily.

Operation of metering installation

The issues in the earlier draft of the proposed metrology procedure have been resolved satisfactorily.

Maintenance of metering installation

The issues in the earlier draft of the proposed metrology procedure have been resolved satisfactorily.

Accuracy of estimated data under clause 5.25(a) of the Code

Clause 3.9 addresses the Code requirements for energy data accuracy.

Test and Audit procedures under clause 5.21 of the Code

There are tests and audit procedures foreshadowed for metering installations in the meter management plan. This systemic approach is not detailed for other than whole current meters but testing on request is covered (clause 3.9 of the proposed metrology procedure).

A validation test for the metering database is specified in clause 3.8 of the proposed metrology procedure but for manually read types 5 and 6 meters, the manually read data has to be entered into the database which has transcription error possibilities but metering types with communication links have direct access to the metering database.

The issues in the earlier draft of the proposed metrology procedure have been resolved satisfactorily.

The remaining part of clause 5.21 of the Code is about service level agreements, which are not a matter for the metrology procedure.

Conversion of type 6 and type 7 meter data to interval data – clause 3.16(4) of the Code

Western Power claims that the Wholesale Notional Meter to convert bulk data to interval data is no longer a requirement on the Network Operator. . The responsibility for the production of the estimate has moved from the metering data agent to the independent market operator. (Amendment regulations for Market Rules 31 March 2006).

Accuracy of processing of data clause 5.25(b) of the Code

Clause 3.9 of the proposed metrology procedure sets out processes for testing of metering installation and comparison with the energy data.

Compliance with request to validate energy data clause 5.20(4) of the Code

A validation test for the metering database is specified in clause 3.8 of the proposed metrology procedure for manually read types 5 and 6.meters.

Clause 3.9 of the proposed metrology procedure sets out processes for testing of metering installation and comparison with the energy data.

Comparison of market generator data against SCADA data – Appendix 2 clause A2.6 (2) (b) of the Code

The issues in the earlier draft of the proposed metrology procedure have been resolved satisfactorily.

Requirements against clause 6.8(a) of the Code

The requirements of a metrology procedure are set out in clause 6.8 of the Code;

A metrology procedure must at least:

(a) as a minimum, contain information on the devices and methods that are used by the network operator to:

(i) measure, or determine by means other than a device, electricity produced and consumed at a metering point, and

(ii) convey the measured or determined information to other devices using communications links, and

(iii) prepare the information using devices or methods to form energy data; and

(iv) provide access to the energy data from a telecommunications network;

The proposed metrology procedure addresses the requirements set out in clause 6.8(a) with the comments on the adequacy or clarifications sought addressed in the analysis above.

Requirements against clause 6.8(b) of the Code

Clause 6.8(b) states:

(b) specify the minimum requirements for *meters* and *metering installations*, including:

- (i) *accumulation meters*; and
- (ii) interfaces that allow *interval energy data* to be downloaded; and
- (iii) direct connected *meters* for *Type 4* to *Type 6 metering installations*; and
- (iv) *CTs* and *VTs*; and
- (v) programmable settings under clause 3.10.

The proposed metrology procedure addresses the requirements set out in clause 6.8(b) with the comments on the adequacy or clarifications sought addressed in the analysis above.

Requirements against clause 6.8(c) of the Code

Clause 6.8(c) states:

(c) specify the procedures for estimating, substituting and validating energy *data* under this *Code*; and

The proposed metrology procedure addresses the requirements set out in clause 6.8(c) with the comments on the adequacy or clarifications sought addressed in the analysis above.

Requirements against clause 6.8(d) of the Code

Clause 6.8(d) states:

(d) be consistent with the approved asset management system required by section 14 of the Act; and

The proposed metrology procedure is consistent with the meter management plan, which is a simile for the asset management system referred to in section 6.8(d) insofar as it applies to metering assets.

Requirements against clause 6.8(e) of the Code

The clause 6.8(e) states:

(e) specify the date from which the *metrology procedure* takes effect which must be no less than 3 months after it is *published*.

The proposed metrology procedure identifies the publication date as 10 days after the approval by the *Authority* and the commencement date as 3 months after the publication date.

The Wholesale Electricity Market Rules requirements

The Wholesale Market Rules (WEM) note that the possibility of a single Metering Code being available for all market participants. At such time as the Metering Code is created, the Metering Protocol may be replaced with the Metering Code.

The Metering Code was gazetted in December 2005 and it is up to the IMO to identify whether the proposed metrology procedure meets their needs for a Metering Protocol. There are obvious advantages to have the same document cover the different obligations for the same electricity transported, generated or consumed.

Code of Conduct for the Supply of Electricity to Small Use Customers

Part 4, Division 1 of the Code of Conduct for the Supply of Electricity to Small Use Customers provides for billing cycles. The Code of Conduct allows for billing between one and three months unless the customer has consented or there are payment issues. The proposed metrology procedure provides for monthly or bi monthly readings as agreed with the retailer. This division also allows for shortened billing cycles down to 10 business days. This option for reading or estimating frequencies is not reflected in the proposed metrology procedure. The options are daily or monthly readings but an intermediate frequency would improve the options.

Part 4, Division 2 covers registry type data and does not appear to be an issue

Part 4, Division 3 provides for the reading of meters and estimations / substitutions. These are obligations on the retailer that the Code in turn applies to the network operator.

Part 4, Division 4 covers meter tests and require the retailer to request the network operator to test the meter. The Code provides the basis for the tests. It does not provide for the user to witness the tests.

Part 10, Division 2 provides for supply of historical data to users but only security issues appear in the metrology procedure.

Part 12 deals with complaints and allows for the energy ombudsman to deal with disputes rather than the dispute resolution process set out in the Code.

The Electricity Act 1945 and regulations requirements

Section 39 has obligations to keep the meter in good order but the section is not relevant to the proposed metrology procedure as the section applies to a supply authority and Western Power is not a supply authority nor is Horizon Power. For the same reason sections 14, 40, 41, 49 and 50 are not relevant for the current assessment.

The *Electricity (Supply Standards and System Safety) Regulations 2001, Part 3 – Metering* has requirements for maximum error of revenue meters. These regulations require an accuracy of $\pm 2\%$ (from section 41 (4) of the *Electricity Act 1945*), which is essentially only relevant to general-purpose meters. The Authority and the Director of Energy Safety should try to ensure that there is minimal if any overlap in these requirements. A minor amendment to the Metering Code to add to clause 6.8(d) to require systematic treatment of populations of meters in accordance with AS 1284.13 may address any overlap matters.

Energy Operators (Powers) Act 1979 requirements

In the absence of regulations under section 45 (1) of the *Electricity Industry Act 2004* this Act only applies to Western Power and Horizon Power.

Section 64 has provisions for meters where section 64 (1) allows the Energy Operator discretion about the appropriateness of the meter. Section 64(2) allows for the placement of the meter, function of the meter and entry rights for actions on the meter. Section 64(3) allows for charging for costs incurred and section 64(4) allows for the provision of other meters.

Section 64 is general in nature but has wide powers, which may be interpreted at the discretion of the Energy Operator in conflict with the metrology procedure. The Office of Energy should examine the retention of these provisions in *Energy Operators (Powers) Act 1979*.

Section 65 covers metered accounts. Section 65(1) gives the meter reading as evidence of energy consumed. The remaining subsections of section 65 allow for substitution and estimation procedures. These procedures are in the Metering Code and in the proposed metrology procedure and The Office of Energy should examine the retention of these provisions in *Energy Operators (Powers) Act 1979*.

Section 66 covers meter tests, which are also covered in the Metering Code and proposed metrology procedure. The provisions can only apply to general purpose meters as the referred accuracy ($\pm 2\%$) is coarser than all the classes of meters but closest to the requirement for general purpose meters ($\pm 1.5\%$) and samples of general purpose meters are allowed to be $\pm 2\%$ in the AS 1284.13. The accuracy is a reference to a section of the *Electricity Act 1945*. There is an argument that the accuracy limit in the *Electricity Act 1945* does not apply as the section in that Act is for supply authorities and Western Power is not a supply authority, but the subsection containing the accuracy requirement does not mention a supply authority. The Office of Energy should examine the retention of these provisions in *Energy Operators (Powers) Act 1979*.