METROLOGY PROCEDURE:

PART B: METERING DATA VALIDATION, SUBSTITUTION AND ESTIMATION PROCEDURE FOR METERING TYPES 1 – 7

PREPARED BY: Retail Markets and Metering

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| **CHIEF EXECUTIVE OFFICER** | **1 JANUARY 2014** |

Preface

This *metrology procedure* has been prepared by the Australian Energy Market Operator (AEMO) in accordance with the requirements of the *Rules*.

This version of the *metrology procedure*: Part B has been updated to reflect the provisions required for the introduction of Full Retail Competition in the Tasmanian jurisdiction ~~the Rule Change: Provision of Metering Data Services and Clarification of Existing Metrology Requirements (effective date 16 December 2010) and the extension of retail contestability to Tasmanian business customers consuming between 50 – 150 MWh per annum. This update includes:~~

~~Creation of a new category of person in the *Rules* called a *Metering Data Provider*; and~~

~~Transfer of responsibility for collection of metering data from type 1, 2, 3, and 4 metering installations generally from *AEMO* to the *responsible person,* except where the *responsible person* is a *Transmission Network Service Provider*; and~~

~~Terms used in Chapter 7 of the *Rules* have been modified to enhance clarity and effectiveness of the *Rules*.~~

AEMO acknowledges the assistance of industry participants who contributed to the final form of the *metrology procedure* through the Metrology Reference Group.

The effective date of this *metrology procedure* is 1 January 2014, in accordance with the *Rules*.

AEMO maintains a development program in relation to this *metrology procedure*. Please address any comments to Roy Kaplan, Specialist Metrology Regulation at: (roy.kaplan@aemo.com.au).

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Document History

Version	Date	Author	Comments
1.00	June 1997	Multi – Jurisdictional Working Group	Original procedure – *Nomenclature, Guidelines and procedures for National Metering Identifier, Registration and Transfer, Data Substitution, Data validation and Transmission Node Identifiers*.
	September 1997	*AEMO*	Incorporated as part of the *Service Level Requirements for Metering Data Agents*.
2.00	August 2000	MSWG	*NEM Data Substitution and Validation Procedure* published as a procedure.
3.00	August 2001	MSWG	Procedure updated to include *estimation* and *substitution* for *metering* types 5, 6 and 7.

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4.00	March 2008	MSWG	Procedure updated to include clarifications and the process by which accumulated data and *unmetered loads* are converted into *trading intervals*. Procedure to become Part B of the *metrology procedure*.
4.01	April 2009	*AEMO*	Uppdated to incorporate Victorian jurisdictional metrology material to support Victorian AMI rollout
4.01a	15 July 2011	*AEMO*	The extension of retail contestability to business customers consuming between 50 – 150 MWh per annum in Tasmania.
5	31 October 2011	*AEMO*	Updated to incorporate provisions of *Rules* Change: Provision of Metering Data Services and Clarification of Existing Metrology Requirements.
5.10	1 January 2014	*AEMO*	Introduction of FRC in Tasmania

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1	General

1.1   Introduction

1.1.1   The *Rules* define the obligations and responsibilities of *Registered Participants* in the *National Electricity Market* relating to the provisioning and operation of a *metering installation* and to the processes involved in the collection of *metering data*.

1.1.2   This document specifies the:

(a)   *Metering Data Provider's* obligations concerning the *validation*, *substitution* and *estimation* of *metering data* to satisfy the *Rules* and *metrology procedure* obligations of *AEMO* and the *responsible person*. These relate to all *metering installations* for *first-tier loads* and *second-tier loads* for which the *Metering Data Provider* has an obligation, as specified in *AEMO's* Market Settlement and Transfer Solution (MSATS); and

(b)   The process of collating or determining type 6 and 7 *metering installation* data into *trading intervals*.

1.1.3   These requirements must be read in conjunction with the relevant *AEMO service level procedures* for *Metering Data Providers*.

1.1.4   As part of any *substitution* and *estimation* data quality analysis, *AEMO* will be undertaking periodical performance monitoring and benchmarking of all accredited *Metering Data Providers*.

1.2   Related Documents

1.2.1   These documents are related to this *metrology procedure*: Part B:

(a)   *Metrology procedure:* Part A.

(b)   *service level procedure:* Metering Data Provider Services Category D for Metering Installation Types 1, 2, 3 and 4, Document No MT_MA280.

(c)   *service level procedure:* Metering Data Provider Services Category D for Metering Installation Types 5, 6 and 7, Document No ME_MT1681.

(d)   *service level procedure:* Metering Data Provider Services Category C for Metering Installations Type 5 and 6, Document No ME_MA1682.

(e)   Meter Data File Format Specification, Document No. ME_MA001.

(f)   Meter Churn Data Management Rules, Document No. ME_MA1818.

(g)   National Metering Identifier Procedure, Document No. ME_GN059.

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1.3 Definitions

1.3.1 A reference to a document or a provision of a document includes an amendment or supplement to, or replacement or novation of, that document or that provision of that document.

1.3.2 Words in this document and in the *metrology procedure*: Part A that are shown in *italics* have the meaning specified in clause 1.7 of the *metrology procedure*: Part A or, if they are not specified in this clause, they have the meaning specified in the *Rules*.

1.4 General Data Validation, Substitution and Estimation Requirements

1.4.1 The principles to be applied to *metering data validation*, *substitution* and *estimation* tasks for all areas of the *National Electricity Market* include the following:

(a) The *responsible person* or *AEMO* (as appropriate) must ensure that the *metering data* associated with a *metering installation,*accurately reflects the *energy* flow within the respective *metering installation*.

(b) The *Metering Data Provider* must authenticate all *validation* failures to ensure *metering data* accurately reflects the *energy* flow.

(c) The *Metering Data Provider* must *validate* all *substitutions* and e*stimations* before *metering data* is delivered to *AEMO* and *Registered Participants*.

(d) The *responsible person* must coordinate the resolution of issues arising from the non-performance of *metering* systems, including any liaison with associated Retailers, *Local Network Service Provider(s), Metering Provider(s)* and *Metering Data Provider(s).* The *responsible person* must respond promptly to requests for remedial action from the *Metering Data Provider* or *AEMO.*

(e) The timeliness of a *Metering Data Provider's* detection of *metering data* errors and the *responsible person's* response to *metering installation* malfunctions may place retailers at financial risk. The *responsible person* must, therefore, co-ordinate a response within the time frames required by the *Rules* and the *metrology procedure* and accordingly inform the affected *Market Participants*, so that they might implement remedial action to minimise their trading risks.

(f) The *Metering Data Provider* must notify all affected *Registered Participants* of any *metering data substitution* or *estimation* carried out.

(g) The *Metering Data Provider* must identify *metering data* errors resulting from data collection and processing operations using *metering data validation* processes in accordance with this *metrology procedure*. The *Metering Data Provider* must apply *metering data substitution* processes in accordance with these procedures including any default *substitution* procedures agreed to with the *responsible person* necessary to ensure that *metering data* is delivered to *AEMO* and *Registered Participants*.

1.5 Metering Data Substitution Requirement

1.5.1 The *Metering Data Provider* must undertake *substitutions* on behalf of *AEMO* or the *responsible person,* as appropriate, in a manner that is consistent with this *metrology procedure*. *Substitutions* may be required in the following circumstances;

(a) Where the system or equipment that supports the remote or manual collection of *metering data* has failed or is faulty.

(b) Where the *metering installation* for a *connection point* has failed or is removed from service.

(c) To enable timely provision of *metering data* to *AEMO* for *settlements* purposes.

(d) In situations where *metering data* has been irretrievably lost.

(e) Where the *metering data* obtained is found to be erroneous or incomplete.

(f) Where *metering data* has not completed *validation* within the registration process with the *Metering Provider* as detailed in clause 8 of this Procedure.

(g) Where *metering data* has failed or has not completed the *validation* process.

(h) Where *metering data* cannot be obtained in the performance time frames required for the data period in question:

　　i. Type 1, 2, 3 and 4 *metering data* must be *substituted* if *metering data* cannot be obtained to meet either settlement time frames or the required performance of the applicable *service level procedures*.

　　ii. Type 5 and 6 *metering data* must be *substituted* if *metering data* cannot be obtained on or within the expected time frame of the next *scheduled reading date* for a *connection point*. Any historical or previous *estimated metering data* must be replaced with *substituted metering data*.

(i) When an inspection or test on the *metering installation* establishes that a measurement error exists due to a *metering installation* fault.

(j) When the affected parties have all agreed and subsequently direct the *Metering Data Provider* that a previous *substitution* is in error and that a re-*substitution* of *metering data* is required. Where the parties cannot reach agreement, the *Rules'* dispute resolution procedures apply, and the existing *substituted* data should remain until the resolution of the dispute is achieved.

(k) When an inspection or test on the respective algorithms, *inventory table*, *load table* or *on/off table* for type 7 *metering data* establishes that an error exists in the *metering data* calculation or when a more accurate *inventory table* becomes available.

(l) Where the *metering data* calculation has failed the *validation* tests for a *metering installation* type 7.

(m) In situations involving *meter* churn as required by the Meter Churn Data Management Rules.

(n)   In response to customer transfers authorised by a *participating jurisdiction* or *retailer of last resort* events, as outlined in clause 15.

1.6   Metering Data Estimation Requirement

1.6.1   The *Metering Data Provider* must undertake *estimations* on behalf of the *responsible person* in a manner that is consistent with this *metrology procedure*. *Estimations* may be required in the following circumstances;

(a)   Routinely for a period that is equal to or just greater than the period to the next *scheduled reading date* or another forward period.

(b)   In response to customer transfers authorised by a *participating jurisdiction* or *retailer of last resort* events, as outlined in clause 15.

1.6.2   Where the current published *scheduled reading date* has changed due to a revised scheduled reading route, the *Metering Data Provider* must replace any existing *estimated metering data* with new *estimated metering data* related to the revised next *scheduled reading date*.

1.6.3   This clause only applies to a jurisdiction as specified in the following table:

Jurisdiction	Variation in accordance with jurisdictional policy
Victoria	Despite Clause 1.6.1(a) and 1.6.2, where *metering data* for a type 5 *metering installation* is collected more frequently than required by Metrology Procedure Part A Clause 3.3.9 (as allowed by Metrology Procedure Part A Clause 3.8.4A [Vic]), *estimations* need not be provided routinely or as a result of a change to the current published *scheduled reading date*. *Estimations* must, however, be provided where necessary to meet the data requirements of Schedule 8 of the Service Level Requirements for Metering Data Collection, Processing and Delivery Services for Metering Provider category 5D, 6D and 7D, but are not required to be for a period to the next *scheduled reading date*

Note: The effective date of this Jurisdictional provision is 1 July 2009. The review date of this Jurisdictional provision is 31 December 2017.

1.7   Metering Data Quality Flags

1.7.1   *Metering Data Providers* must assign the relevant *metering data* quality flags to *metering data* as follows:

(a)   **A** - For *validated* and accepted **actual** *metering data* recovered from the *metering installation*.

(b)   **S** – For any *substituted* *metering data* that is considered **temporary** and may be replaced by **actual** *metering data* at some time. *Metering data substitutions* apply to historical date/time periods at the time of *substitution*.

(c)   **E** – For any *estimated* *metering data* that is considered **temporary** and may be replaced by **actual** *metering data* or *substituted metering data* at some time. *Metering data estimations* apply to a future date/time period at the time of *estimation*.

    (d)   **F** – For *substitution*s that are of a permanent or **final** nature and subject to clause 1.7.3, the *metering data* would **not** be replaced by **actual** *metering data* at any time.

    (e)   **N** – This quality flag is only utilised within the participant *interval metering data* file for instances where no *metering data* exists within the *metering data service database* for the periods concerned.

1.7.2   Unless specified otherwise within this *metrology procedure*, *Metering Data Providers* must apply the following quality flag rules in the management of *metering data*:

    (a)   **A** *metering data* can only be replaced with **A**, **S** or **F** *metering data.*

    (b)   **S** *metering data* can only be replaced with **A**, **S** or **F** *metering data.*

    (c)   **E** *metering data* can only be replaced with **A**, **E, S** or **F** *metering data*.

    (d)   **F** *metering data* can only be replaced with **F** *metering data* as per clause 1.7.3 (f) or **A** *metering data* as per clause 1.7.3(b)or 1.7.3(h).

1.7.3   The *Metering Data Provider* must manage final *substitutions* as follows:

    (a)   The *Metering Data Provider* must undertake **final** *metering data substitutions* in the instance where a notice has been received from either the *responsible person* or the *Metering Provider* detailing a failure of the *metering installation* and that **actual** *metering data* cannot be obtained.

    (b)   In the rare instance where *validated* **actual** *metering data* is unexpectedly recovered from the *metering installation* and a **final** *substitution* has been undertaken in accordance with clause 1.7.3(a), the *Metering Data Provider* must replace the **final** *substituted metering data* with the **actual** *metering data* and maintain a record of the reason and instance.

    (c)   In the instance where the *Metering Data Provider* must undertake **final** *metering data substitutions* as identified within the Meter Churn Data Management Rules.

    (d)   In the instance where the *Metering Data Provider* has received a notice that the *financially responsible Market Participant*, the *Local Retailer* and the *Local Network Service Provider* have all agreed that the *metering data* is erroneous and that a **final** *metering data substitution* is required.

    (e)   In the instance of a r*etailer of last resort* event or where a Jurisdiction has requested *AEMO* to undertake authorised customer transfers requiring the provision of *metering data substitutions* and *final readings*, in accordance with clause 15.

    (f)   The *Metering Data Provider* may undertake to replace an existing **final** *metering data substitution* with a new **final** *metering data substitution* in accordance with this *metrology procedure*.

    (g)   In the instance where the *Metering Data Provider* has found previous *validated* **actual** *metering data* to be erroneous, then the **actual** *metering data* must be replaced with a **final** *metering data substitution*.

(h)   The *Metering Data Provider* may replace type 6 **final** *metering data substitutions* with **actual** *metering data* that spans consecutive *metering* readings on agreement with the *financially responsible Market Participant*, the *Local Retailer* and the *Local Network Service Provider.*

1.8   Summary Table of Substitution and Estimation types

Type	EST or SUB	Installation Type	Short Descriptor	Page
Type 11	SUB	1 - 4	Check	14
Type 12	SUB	1 - 4	Calculated	14
Type 13	SUB	1 - 4	SCADA	15
Type 14	SUB	1 - 4	Like Day	15
Type 15	SUB	1 - 4	Ave Like Day	16
Type 16	SUB	1 - 4	Agreed	17
Type 17	SUB	1 - 4	Linear	17
Type 18	SUB	1 - 4	Alternate	17
Type 19	SUB	1 - 4	Zero	17
Type 51	SUB or EST	5	Previous Year	19
Type 52	SUB or EST	5	Previous Read	19
Type 53	SUB	5	Revision	20
Type 54	SUB	5	Linear	20
Type 55	SUB	5	Agreed	20
Type 56	SUB or EST	5	Prior to First Read - Agreed	20
Type 57	SUB or EST	5	Customer Class	20
Type 58	SUB or EST	5	Zero	21
Type 61	SUB or EST	6	Previous Year	23
Type 62	SUB or EST	6	Previous Read	23
Type 63	SUB or EST	6	Customer Class	24
Type 64	SUB	6	Agreed	24
Type 65	EST	6	ADL	24
Type 66	SUB	6	Revision	24
Type 67	SUB	6	Customer Read	24
Type 68	SUB or EST	6	Zero	24
Type 71	SUB	7	Recalculation	26
Type 72	SUB	7	Revised Table	26
Type 73	SUB	7	Revised Algorithm	26
Type 74	SUB	7	Agreed	26
Type 75	EST	7	Existing Table	26

2 SUBSTITUTION FOR METERING INSTALLATION TYPES 1 - 4

2.1 Application of Clause 2

2.1.1 The requirements of clause 2.2 and clause 2.3 are applicable to all jurisdictions within the *National Electricity Market* and apply to *metering installation* types 1, 2, 3 and 4.

2.1.2 The requirements of clause 2.2 and clause 2.3 are applicable to all *metering data substitution* types to be undertaken by *Metering Data Providers* accredited for the collection, processing and delivery of *metering data* from *metering installation* types 1, 2, 3 and 4.

2.1.3 For all *metering data substitutions* undertaken under clause 2.2 and clause 2.3, for *metering installations* types 1, 2, 3 and 4, the *Metering Data Provider* must ensure the selected *metering data substitution* values correctly align with the adjoining intervals of *metering data* and that any intervals of *metering data* adjacent to the *substituted* period are valid.

2.2 Type 1 - 4 Substitution Rules

2.2.1 The *Metering Data Provider* must carry out all *metering data substitutions* in accordance with this *metrology procedure*.

2.2.2 The *Metering Data Provider* must obtain clear and concise identification as to the cause of any missing or erroneous *metering data* for which *substitutions* are required.

2.2.3 The *Metering Data Provider* must undertake to do a type 11 *substitution* and use *metering data* obtained from any *check metering installation* associated with the *connection point* as the first choice considered for the source of *metering data* for any *substitutions* undertaken.

2.2.4 Subject to clause 2.2.5, SCADA *metering data,* where available, may be used by the *Metering Data Provider* as *check metering data* for *substitutions*.

2.2.5 *Metering Data Providers* may only undertake *substitution* type 13 where *substitution* type 11 and type 12 are not applicable or cannot be carried out.

2.2.6 For *connection points* classified as *Generators*:

(a) *Metering Data Providers* may directly undertake type 11, type 12 or type 13 *substitutions* as a consequence of missing or erroneous *metering data* that has failed *validation*.

(b) *Metering Data Providers* may undertake type 16 (Agreed Method) or Type 18 (Alternate) *substitutions* following consultation and agreement with the *Generator* that the *substituted metering data* is an accurate reflection of the *interval metering data* concerned.

(c) In the situation where *metering data* cannot be recovered from the *metering installation* or *substituted* in accordance with this clause 2.2.6 within the required *metering data* delivery performance time frames, the *Metering Data Provider* must undertake type 19 *substitutions* as an interim until *metering data* can be recovered from the *metering installation* or *substituted*.

2.2.7   *Metering Data Providers* may only undertake *substitution* types 14, 15, 16, 17, 18, or 19 where *substitution* types 11, 12 and 13 are not applicable or cannot be carried out.

2.2.8   *Metering Data Providers* may perform all *metering data substitution* types except type 16 or type 18 without prior agreement from the affected parties. *Metering Data Providers* may however undertake to change the quality flag to an existing type 16 or type 18 *substitution* without seeking further agreement from the affected parties.

2.2.9   The *Metering Data Provider* must notify the *Local Network Service Provider, Local Retailer* and the *financially responsible Market Participant* for the *connection point* of any *metering data substitution* within two *business days* of the *metering data substitution* being carried out by the *Metering Data Provider*. Notification is to be achieved via the participant *metering data* file as detailed within the *service level procedures*.

2.2.10   Where a *metering installation malfunction* is a failure of the *remote acquisition* system, and the *responsible person* and *Metering Provider* cannot repair the data communications within the periods specified in the *Rules,* (2 days for type 1, 2 and 3 *metering installations* and 10 days for type 4 *metering installations*) then the *Metering Data Provider* must*:*

    (a)   Request from the *responsible person,* the provision of a manual download of *metering data* from the *metering installation* in the time frames to meet *metering data* delivery requirements; and

    (b)   Where the *malfunction* includes a failure of the *meter* to correctly record *interval energy data* and the *responsible person* has acquired an exemption to repair the *metering installation,* then the *Metering Data Provider* must *substitute* for the missing *metering data* in accordance with this *metrology procedure*.

2.2.11   The *Metering Data Provider* must ensure that all *metering data substitutions* are replaced with actual *metering data* when that *metering data* becomes available.

2.3   Type 1 - 4 Substitution Types

2.3.1   Type 11 - Check Data

The *Metering Data Provider* must use *interval metering data* obtained from another *metering installation* that has been identified by the *Metering Provider* as being the *check metering installation* for that *metering point*. The *metering data* used must be for the same *trading intervals* as the *trading intervals* that are being *substituted*. *Metering installations* of this type include but are not limited to:

    (a)   The *metering installation* and *check metering installation* are installed at the same *connection point*.

    (b)   The *metering installation* and *check metering installation* are installed on different ends of a *transmission line* where the difference due to line losses can be accurately determined.

    (c)   *Metering installations* across a parallel set of feeders having similar line impedances between a common set of *busbars*.

2.3.2   Type 12 - Calculated

The *Metering Data Provider* must calculate the *interval metering data* values to be *substituted* where they relate to a single unknown feed to a node, based on the other known *energy* flows to or from that node.

2.3.3   Type 13 - SCADA

(a)   The *Metering Data Provider* must use EMS or SCADA data, as provided by *AEMO* in the agreed format, for *substitution* purposes, which originates from a similar measurement point as the *meter*.

(b)   EMS or SCADA data may be data which is inferior in accuracy or resolution and which is in a dissimilar format to the *metering data*, (e.g. 30 Min. Demand values). The *Metering Data Provider* may have to adjust the data in both magnitude and form in order that the *substitution* is acceptable.

(c)   In any instance where SCADA data is to be used for *substitution*, both the provided E channel and B channel SCADA *data streams* must be used.

2.3.4   Type 14 - Like Day

The *Metering Data Provider* must *substitute* for the missing or erroneous *metering data* using the **nearest equivalent day** or **like day** method, as detailed in Table 1 below.

TYPE 14	Table 1
Substitution Day	**Preferred Day (in order of availability)**
Monday	Monday ##
Tuesday	Tuesday## Wednesday## Thursday## Wednesday# Thursday#
Wednesday	Wednesday## Tuesday# Thursday## Thursday# Tuesday##
Thursday	Thursday## Wednesday# Tuesday# Wednesday## Tuesday##
Friday	Friday##
Saturday	Saturday##
Sunday	Sunday##

Metering data substitutions for **like day** to be as detailed above, unless:

(a) No *metering data* is available on the first listed day, then the next listed preferred day is to be used. If there is no other suitable listed day, or no *metering data* is available on any of the listed days then type 15 *substitution* must be used.

(b) The *substitution* day was a public holiday, in which case the most recent Sunday is to be used.

(c) The *substitution* day was not a public holiday and the listed day is a public holiday, then the next listed preferred day that is not a public holiday is to be used.

#	Occurring in the same week as the *substitution* day.
##	Occurring in the week preceding that in which the *substitution* day occurs.

2.3.5 Type 15 - Average Like Day

The *Metering Data Provider* may *substitute* for the missing or erroneous *metering data* using the average **like day** method, as detailed in Table 2 below.

TYPE 15	Table 2

The *interval metering data* to be *substituted* will be calculated using an average of the *metering data* from each corresponding ~~trading~~ *interval* from the preceding four weeks, or part thereof. This averaging technique may be applied in either of the following ways:

(a) Where the averaged *interval metering data* is used to provide the value for the *trading interval(s)* requiring *substitution*.

(b) Where the averaged *interval metering data* is used to provide the *profile* and is scaled to a pre-determined consumption value for the ~~trading~~ *interval(s)* to be *substituted*.

Type 15 *substitutions* must not be used for public holidays.

2.3.6 Type 16 - Agreed Method

Where the *Metering Data Provider* is required to undertake a *metering data substitution* for any period greater than seven (7) days, consultation and agreement must be obtained from the *financially responsible Market Participant*, the *Local Retailer* and the *Local Network Service Provider* for the *connection point* as to the *metering data substitution* to be performed. This may include changes to existing *metering data substitutions* for any period which were carried out where the affected parties have directed that as a result of site or customer specific information, the original *metering data substitutions* are in error and a correction is required.

2.3.7 Type 17 - Linear Interpolation

The *Metering Data Provider* may *substitute metering data* for consecutive *interval* periods up to, but not exceeding two (2) hours, by using simple linear interpolation.

2.3.8 Type 18 - Alternate

The *Metering Data Provider* may use an alternate method of *metering data substitution* subject to an agreement between the *financially responsible Market Participant*, the *Local Retailer* and the *Local Network Service Provider* for the *connection point*. The specifics of this *substitution* type may involve a globally applied method or a method where an adjusted *profile* is used to take into account local conditions which affect consumption (e.g. local holiday or customer shutdown), or where alternate *metering data* may be able to be used for quality checks and minor adjustments of an *estimated profile*, such as using *meter* register data.

2.3.9 Type 19 - Zero

The *Metering Data Provider* must undertake *metering data substitutions* of 'zero' where:

(a) Either the *Local Network Service Provider* or the *Metering Provider* has informed the *Metering Data Provider* of a de-energised *connection point* or an inactive *meter* and where the consumption is known to be zero; or

(b) As specified within the Meter Churn Data Management Rules; or

(c) *Metering data substitutions* are applicable for *connection points* classified as *Generators* in accordance clause 2.2.6(c).

3 SUBSTITUTION AND ESTIMATION FOR METERING INSTALLATION TYPE 5

3.1 Application of Clause 3

3.1.1 The requirements of clause 3.2 and clause 3.3 apply to the jurisdictions of Victoria, New South Wales, South Australia, Australian Capital Territory, Queensland, and Tasmania.

3.1.2 The *substitution* and *estimation* types, as detailed within clause 3.2 and clause 3.3, are to be undertaken by *Metering Data Providers* accredited for the collection, processing and delivery of *metering data* from a *metering installation* type 5.

3.1.3 For all *metering data substitutions* and *estimations* undertaken under clause 3.2 and clause 3.3, for *metering installations* type 5, the *Metering Data Provider* must ensure the selected *metering data substitution* values correctly align with the adjoining *interval metering data* and that any *interval metering data* adjacent to the *substituted* period is valid.

3.2 Type 5 Substitution and Estimation Rules

3.2.1 The *Metering Data Provider* must carry out all *metering data substitutions* and *estimations* in accordance with this *metrology procedure*.

3.2.2 The *Metering Data Provider* must ensure that all *metering data substitutions* and *estimations* are replaced with actual *metering data* if and when that *metering data* becomes available.

3.2.3 The *Metering Data Provider* must obtain clear and concise identification as to the cause of any missing or erroneous *metering data* for which *metering data substitutions* are required.

3.2.4 The *Metering Data Provider* must only use type 56 or type 57 *substitutions* or *estimations* where the historical *metering data* does not support the application of a type 51 or type 52 *substitution* or *estimation.*

3.2.5 Subject to clause 3.2.4 the *Metering Data Provider* must only apply the following *substitution* and *estimation* types:

(a) *Substitutions* may be type 51, 52, 53, 54, 55, 56, 57 or 58.

(b) *Estimation*s may be type 51, 52, 56, 57 or 58.

3.2.6 The *Metering Data Provider* must notify the *Local Network Service Provider, Local Retailer* and the *financially responsible Market Participant* for the *connection point* of any *metering data substitution* or *estimation* within two *business days* of the *metering data substitution* or *estimation* being carried out by the *Metering Data Provider*. Notification is achieved via the participant *metering data* file as detailed within the *service level procedures*.

3.2.7 *Metering Data Providers* may not perform type 53 or type 55 *substitutions* or type 56 *substitutions* or *estimations* without prior agreement with the affected parties. *Metering Data Providers* may however undertake to change the quality flag to an existing type 53 or type 55 *substitution* or type 56 *substitution* or *estimation* without seeking further agreement from the affected parties.

3.3 Type 5 Substitution and Estimation Types

3.3.1 Type 51 - Previous Years Method (Nearest Equivalent Day or Like Day)

The *Metering Data Provider* must *substitute* or *estimate* the *metering data* using the *metering data* from the **nearest equivalent day** or **like day** from the same, or similar, *meter* reading period in the previous year. The **nearest equivalent day** or **like day** is to be determined from Table 3 below.

3.3.2 Type 52 - Previous Meter Reading Method (with the nearest equivalent day or like day method)

(a) The *Metering Data Provider* must *substitute* or *estimate* the *metering data* using the *metering data* from the **nearest equivalent day** or **like day** from the previous *meter* reading period. The **nearest equivalent day** or **like day** is to be determined from Table 3 below.

Type 51 or 52	Table 3
Substitution or Estimation Day	**Nearest Equivalent Day or Like Day (in order of availability)**
Monday	Monday## Monday #
Tuesday	Tuesday## Wednesday## Tuesday# Wednesday#
Wednesday	Wednesday## Tuesday## Thursday## Wednesday# Thursday# Tuesday#
Thursday	Thursday## Wednesday## Tuesday## Thursday# Wednesday# Tuesday#
Friday	Friday## Friday#
Saturday	Saturday## Saturday#
Sunday	Sunday## Sunday#

Metering data substitutions or *estimations* for **like day** to be as detailed above, unless:

(a) No *metering data* is available on the first listed *day*, then the next listed preferred day is to be used. If there is no other suitable day, or no *metering data* is available on any of the listed days then Type 52 must be used.

(b) The *substitution* or *estimation day* was a public holiday, in which case the most recent Sunday is to be used.

(c) The *substitution* or *estimation* day was not a public holiday and the listed day is a public holiday, then the next listed preferred day that is not a public holiday, Saturday or Sunday is to be used.

##	For type 51 utilise *metering data* from the corresponding week in the previous year.
##	For type 52 utilise *metering data* from the corresponding week of the previous *meter* reading period.
#	For type 51 utilise *metering data* from the week preceding the corresponding week in the previous year.
#	For type 52 utilise *metering data* occurring in the week preceding the corresponding week of the previous *meter* reading period.

(b) **Alternatively**, the *Metering Data Provider* must *substitute* or *estimate metering data* using the average like day method, as detailed in Table 4.

TYPE 52 (Alternate)	Table 4

The *interval metering data* to be *substituted* or *estimated* will be calculated using an average of the *metering data* from each corresponding *trading interval* from the preceding four weeks, or part thereof. This averaging technique may be applied in either of the following ways:

(a) Where the averaged *interval metering data* is used to provide the value for the *trading interval* requiring *substitution* or *estimations.*

(b) Where the averaged *interval metering data* is used to provide the *profile* and are scaled to a pre-determined consumption value for the *trading interval(s)* to be *substituted* or *estimated.*

Type 52 *substitutions* or *estimations* must not be used for public holidays

3.3.3 Type 53 - Revision of Substituted Metering Data

The *Metering Data Provider* must re-*substitute* or change previously *substituted metering data* prior to the *actual meter reading* or prior to the second revision in the *AEMO settlements* timetable (whichever occurs first), where the *financially responsible Market Participant*, the *Local Retailer* and the *Local Network Service Provider* have agreed, on the basis of site or customer specific information, that the original *substituted metering data* is in error and a correction is required.

3.3.4 Type 54 - Linear Interpolation

The *Metering Data Provider* may *substitute metering data* for consecutive *interval* periods up to, but not exceeding two (2) hours, by using simple linear interpolation.

3.3.5 Type 55 - Agreed Substitution Method

The *Metering Data Provider* may undertake to use another method of *metering data substitution* (which may be a modification of an existing *substitution* type), where none of the existing *substitution* types is applicable, subject to an agreement between the *financially responsible Market Participant*, the *Local Retailer* and the *Local Network Service Provider* for the *connection point.* The specifics of this *substitution* type may involve a globally applied method.

3.3.6 Type 56 - Prior To First Reading - Agreed Method

Prior to the first *actual meter reading* and where no previous *metering data* history exists for the *connection point*, the *Metering Data Provider* may *substitute* or *estimate* the *interval metering data* using a method agreed between the *financially responsible Market Participant*, the *Local Retailer* and the *Local Network Service Provider.*

3.3.7 Type 57 - Prior to First Reading - Customer Class Method

Prior to the first *actual meter reading* and where no previous *metering data* history exists for the *connection point*, the *Metering Data Provider* may *substitute* or *estimate* the *metering data* based on the given *Average Daily Load*. The *interval metering data* must be *profiled* to suit the relevant customer class. *Metering Data Providers* electing to undertake this type of *substitution* or *estimation* must develop a suite of *profiles* acceptable to the *responsible person* for use and application.

3.3.8 Type 58 - Zero

The *Metering Data Provider* must undertake *metering data substitutions or estimations* of 'zero' where:

(a) Either the *Local Network Service Provider* or the *Metering Provider* has informed the *Metering Data Provider* of a de-energised *connection point* or an inactive *meter* and where the consumption is known to be zero; or

(b) As specified within the Meter Churn Data Management Rules.

4 SUBSTITUTION AND ESTIMATION FOR METERING INSTALLATION TYPE 6

4.1 Application of Clause 4

4.1.1 The requirements of clause 4.2 and clause 4.3 apply to the jurisdictions of Victoria, New South Wales, South Australia, Australian Capital Territory, Queensland, and Tasmania.

4.1.2 The *metering data substitution* and *estimation* types as detailed within clause 4.2 and clause 4.3 are to be undertaken by *Metering Data Providers* accredited for the collection, processing and delivery of *metering data* from a *metering installation* type 6.

4.2 Type 6 Substitution and Estimation Rules

4.2.1 The *Metering Data Provider* must carry out all *metering data substitutions* and *estimations* in accordance with this *metrology procedure*.

4.2.2 The *Metering Data Provider* must replace all *metering data estimations* with either actual or *substituted metering data*:

(a) When actual *metering data* covering all or part of the *estimation* period is obtained; or

(b) When the next *scheduled meter reading* was unable to be undertaken, the *Metering Data Provider* must replace the *estimated metering data* with *substituted metering data* with a quality flag of F (final *substitution)*.

4.2.3 Any final *substituted metering data* provided by the *Metering Data Provider* must be re-*validated*, updated or recalculated by the *Metering Data Provider* when:

(a) The value of the *metering data* obtained at the next *actual meter reading* is found to be less than the previous final *substitution*; or

(b) The final *substituted* value is disputed and following consultation and agreement from the *financially responsible Market Participant*, the *Local Retailer* and the *Local Network Service Provider* for the *connection point* a new agreed value as per clause 4.3.4 (type 64) must be provided.

4.2.4 The *Metering Data Provider* must obtain clear and concise identification as to the cause of any missing or erroneous *metering data* for which *metering data substitutions* are required.

4.2.5 Where the *scheduled meter reading* frequency is less frequent than monthly, the *Metering Data Provider* may only use a type 62 *substitution* or *estimation* method when *metering data* from the same, or similar, *meter* reading period last year (i.e. type 61) is not available.

4.2.6 The *Metering Data Provider* must only use type 63 *substitutions* or *estimations* when the *metering data* from the same, or similar, *meter* reading period last year (i.e. type 61) and *metering data* from the previous *meter* reading period (i.e. type 62) is not available.

4.2.7 The *Metering Data Provider* must only use *estimation* type 65 when the *metering data* from the same, or similar, *meter* reading period last year or the *metering data* from the previous *meter* reading period is not available.

4.2.8   The *Metering Data Provider* must only use a type 67 *substitution* when:

     (a)   Directed by the *responsible person;* and

     (b)   Not expressly disallowed in the jurisdiction concerned; and

     (c)   The *end-use customer* provided *meter* reading meets the *validation* rules for that *data stream;* and

     (d)   The *Metering Data Provider* has no *actual metering data* for the *scheduled reading date* for this *connection point*.

4.2.9   Subject to clause 4.2.5, clause 4.2.6, clause 4.2.7 and clause 4.2.8 the *Metering Data Provider* may apply the following *substitution* and *estimation* types:

     (a)   *Substitutions* may be type 61, 62, 63, 64, 66, 67 or 68.

     (b)   *Estimations* may be type 61, 62, 63, 65 or 68.

4.2.10   *Metering Data Providers* may not perform type 64 or type 66 *substitutions* without prior agreement with the *financially responsible Market Participant*, the *Local Retailer* and the *Local Network Service Provider* for the *connection point*. *Metering Data Providers* may however undertake to change the quality flag to an existing type 64 or type 66 *substitution* without seeking further agreement from the *financially responsible Market Participant*, the *Local Retailer* and the *Local Network Service Provider* for the *connection point*.

4.2.11   The *Metering Data Provider* must notify the *Local Network Service Provider, Local Retailer* and the *financially responsible Market Participant* for the *connection point* of any *metering data substitution* or *estimation* within two *business days* of the *metering data substitution* or *estimation* being carried out by the *Metering Data Provider*. Notification is achieved via the participant *metering data* file as detailed within the *service level procedures*.

4.3   Type 6 Substitution and Estimation Types

4.3.1   Type 61 - Previous Year Method (Average Daily Consumption Method)

The Metering Data Provider must *substitute* or *estimate* the *meter* reading as per the following formula:

Meter Reading = ADC_{LY} $*$ number of days required

where

ADC_{LY} = average daily consumption from the same or similar *meter* reading period last year.

4.3.2   Type 62 - Previous Meter Reading Method (Average Daily Consumption Method)

The *Metering Data Provider* must *substitute* or *estimate* the *meter* reading as per the following formula:

Meter Reading = ADC_{PP} $*$ number of days required.

where

ADC_{PP} = average daily consumption from the previous *meter* reading period.

4.3.3 Type 63 Customer Class Method

The *Metering Data Provider* must *substitute* or *estimate* the *meter* reading as per the following formula:

Meter Reading = ADC_{CC} $*$ number of days required

where

ADC_{CC} = average daily consumption for this customer class with the same type of usage.

4.3.4 Type 64 - Agreed Method

The *Metering Data Provider* may undertake to use another method of *metering data substitution* (which may be a modification of an existing *substitution* type), where none of the existing *substitution* types is applicable, subject to an agreement between the *financially responsible Market Participant*, the *Local Retailer* and the *Local Network Service Provider* for the *connection point.* The specifics of this *substitution* type may involve a globally applied method.

4.3.5 Type 65 - Estimation by ADL

The *Metering Data Provider* must *estimate* the *meter* reading in accordance with the following formula:

Meter Reading = *Average Daily Load* $*$ number of days required.

4.3.6 Type 66 - Revision of Substituted Metering Data

The *Metering Data Provider* must re-*substitute* or change previously *substituted metering data*, prior to an *actual meter reading* or prior to the second revision in the *AEMO settlements* timetable (whichever occurs first), where the *financially responsible Market Participant*, the *Local Retailer* and the *Local Network Service Provider* have agreed to revise the original *substituted metering data*, on the basis of site or customer specific information.

4.3.7 Type 67 – End-use customer Reading

Subject to clause 4.2.8, the *Metering Data Provider* must *substitute* any previously *substituted* or *estimated metering data* based directly on an *end-use customer* provided *meter* reading.

4.3.8 Type 68 - Zero

The *Metering Data Provider* must undertake data *substitutions or estimations* of 'zero' where:

(a) Either the *Local Network Service Provider* or the *Metering Provider* has informed the *Metering Data Provider* of a de-energised *connection point* or an inactive *meter* and where the consumption is known to be zero; or

(b) As specified within the Meter Churn Data Management Rules.

5 SUBSTITUTION AND ESTIMATION FOR METERING INSTALLATION TYPE 7

5.1 Application of Clause 5

5.1.1 The requirements of clause 5.2 and clause 5.3 apply to the jurisdictions of Victoria, New South Wales, South Australia, Australian Capital Territory, Tasmania and Queensland. ~~They do not apply to the Tasmanian jurisdiction.~~

5.1.2 The *substitution* and *estimation* types detailed in clause 5.2 and clause 5.3 are to be undertaken by *Metering Data Providers* accredited for the calculation and delivery of *metering data* from a *metering installation* type 7.

5.2 Type 7 Substitution Rules

5.2.1 The *Metering Data Provider* must carry out all *metering data substitutions* and *estimations* in accordance with this *metrology procedure*.

5.2.2 The *Metering Data Provider* must obtain clear and concise identification as to the cause of any missing or erroneous *calculated metering data* for which *metering data substitutions* are required.

5.2.3 The *Metering Data Provider* must ensure that all *metering data substitutions* and *estimations* are based on *calculated metering data* and not on any previous *substitutions*.

5.2.4 The *Metering Data Provider* must base *calculated metering data* for type 7 *metering installations* on *inventory table* data as follows:

(a) Where the *inventory table* has not been updated for the period concerned, *calculated metering data* must be based on the most recent available information and provided as an *estimated* value; and

(b) Where the *inventory table* is correct for the period concerned, the *calculated metering data* must be provided as an actual value; and

(c) Where the *inventory table* in (b) above has a subsequent update for the period concerned, the *calculated metering data* must be provided as a *substituted* value.

5.2.5 Subject to clause 5.2.4, the *Metering Data Provider* may apply the following *substitution* and *estimations* types:

(a) *Substitutions* may be type 71, 72, 73, or 74.

(b) *Estimations* must be type 75.

5.2.6 The *Metering Data Provider* must notify the *Local Network Service Provider, Local Retailer* and the *financially responsible Market Participant* for the *connection point* of any *calculated metering data substitution* by the *Metering Data Provider* within two *business days* of the *calculated metering data substitution* being carried out by the *Metering Data Provider*. Notification is achieved via the participant *metering data* file as detailed within the *sevice level procedures*.

5.2.7 The *Metering Data Provider* must flag all *calculated metering data substitutions* as **final** (F).

5.2.8 *Metering Data Providers* may not perform a type 74 *substitution* without prior agreement with the affected parties.

5.3 Type 7 Substitution and Estimation Types

5.3.1 Type 71 - Recalculation

The *Metering Data Provider* must *substitute calculated metering data* with the *calculated metering data* obtained by a recalculation based on the current *inventory tables*, *load tables* and *on/off tables*.

5.3.2 Type 72 - Revised Tables

Where the error in the *calculated metering data* is due to errors in the *inventory table*, *load table* or *on/off table*, the *Metering Data Provider* must *substitute calculated metering data* obtained by a recalculation based on the most recent *inventory tables*, *load tables* and *on/off tables* in which there were no errors.

5.3.3 Type 73 - Revised Algorithm

Where the error in the *calculated metering data* is due to an error in the algorithm, the *Metering Data Provider* must *substitute* the most recent *calculated metering data* for which there was no error.

5.3.4 Type 74 - Agreed Method

The *Metering Data Provider* may use another method of *calculate metering data substitution* (which may be a modification of an existing *substitution* type), where none of the existing *substitution* types is applicable, subject to an agreement between the *financially responsible Market Participant*, the *Local Retailer* and the *Local Network Service Provider* for the *connection point.* The specifics of this *substitution* type may involve a globally applied method.

5.3.5 Type 75 – Existing Table

The *Metering Data Provider* must *estimate calculated metering data* based on the most recent *inventory table* information until such time as an updated *inventory table* is received for the period concerned.

6 GENERAL DATA VALIDATION REQUIREMENTS

6.1 Validation Requirements for Metering Installations Types 1 - 7

6.1.1 Metering Data Providers are requested to manage systems and processes on the basis that:

(a) Registration information given may not be inherently correct;

(b) Stored *metering data* held in the *meter* buffer may be subject to installation measurement error;

(c) Data delivered by reading systems, (e.g. Remote reading systems, hand held readers and conversion software) may not be recovered from the field m*eters* without corruption.

6.1.2 The market use of auditable *validation* procedures is of critical importance and may have a direct impact on disputes. It is essential that *Metering Data Providers* comply with these *validation* procedures and that all *metering data* is subjected to *validation* prior to delivery to *AEMO* and *Registered Participants*.

6.2 Validation of interval metering data alarms for Metering Installation Types 1 - 5

6.2.1 The *Metering Data Provider* must *validate interval metering data* from *metering installation* types 1, 2, 3, 4 and 5 against the following significant *metering data* alarms when these are provided in the *meter*:

- power failure / *meter* loss of supply,
- VT or phase failure,
- pulse overflow,
- CRC error, and
- time tolerance.

(a) Where *interval metering installations* assign alarms to the data channel and or the *interval metering data* concerned, the *Metering Data Provider* must process the alarm along with the *metering data* as part of the required *metering data validation* process.

(b) As a minimum requirement, the *Metering Data Provider* must have systems and processes in place that capture *metering data* alarms and process them by exception reporting.

(c) The *Metering Data Provider* must retain all *metering data* alarm exception reports for audit purposes.

(d) The *Metering Data Provider* must ensure that all *metering data* alarm reports are signed off and dated by the person actioning the data exception report review as part of the *validation* process.

(e) The *Metering Data Provider* must *validate* all *interval metering data* with all *metering data* alarms prior to despatch to *AEMO* or *Registered Participants*.

(f) All *Metering Data Provider* exception reports must provide, for all instances where the *interval metering data* was found to be corrupted e.g. intervals *substituted,* an indication of the subsequent actions undertaken by the *Metering Data Provider*.

7   VALIDATION WITHIN THE METER READING PROCESS

7.1   Application of Clause 7

7.1.1   The requirements of clause 7.2 are applicable to *Metering Data Providers* accredited for the provision of *metering data services* for type 5 *metering installations*.

7.1.2   The requirements of clause 7.3 are applicable to *Metering Data Providers* accredited for the provision of *metering data services* for type 6 *metering installations*.

7.2   Validations to be performed for Type 5 metering data collection

7.2.1   The *Metering Data Provider* responsible for the collection of *metering data* from type 5 *metering installations* must undertake the following *validations* within the *meter* reading process:

   (a)   The *meter* serial number is correct against the recorded *meter* serial number.

   (b)   The security of the *metering installation* is intact, e.g. *meter* seals in place and in good order.

   (c)   The time synchronisation of the *metering installation* is correct to AEST inclusive of any *load* control devices.

7.3   Validations to be performed for Type 6 metering data collection

7.3.1   The *Metering Data Provider* responsible for the collection of *metering data* from type 6 *metering installations* must undertake the following *validations* within the *meter* reading process:

   (a)   The value of *metering data* from the current *meter* reading >= the value of *metering data* from the previous *meter* reading.

   (b)   The value of *metering data* from the current *meter* reading is valid against an expected minimum value.

   (c)   The value of *metering data* from the current *meter* reading is valid against an expected maximum value.

   (d)   The *meter* serial number is correct against the recorded *meter* serial number.

   (e)   The security of the *metering installation* is intact, e.g. *meter* seals in place and in good order.

   (f)   The time synchronisation of the *metering installation* is correct to AEST inclusive of any *load* control devices.

   (g)   The dial capacity is checked against the recorded dial capacity.

8 VALIDATION WITHIN THE REGISTRATION PROCESS

8.1 General

8.1.1 This clause 8 relates to the *validation* of the *NMI* and respective *metering data* within the registration and *connection point* transfer process. This clause 8 is also applicable to current registered *connection points* which have a change of metrology and/or *Metering Data Provider*.

8.2 Application of Clause 8

8.2.1 The requirements of clause 8.3 are applicable to *Metering Data Providers* accredited for the provision of *metering data services* for type 1, 2, 3 and 4 *metering installations*.

8.2.2 The requirements of clause 8.4 are applicable to *Metering Data Providers* accredited for the provision of *metering data services* for type 5 *metering installations*.

8.2.3 The requirements of clause 8.5 are applicable to *Metering Data Providers* accredited for the provision of *metering data services* for type 6 *metering installations*.

8.2.4 The requirements of clause 8.6 are applicable to *Metering Data Providers* accredited for the provision of *metering data services* for type 7 *metering installations*.

8.3 Validation in the Registration Process for Type 1 – 4 Metering Installations

8.3.1 The *Metering Data Provider* must *validate* the *metering data* on registration of all type 1, 2, 3 and 4 *metering installations* to verify:

(a) That the *metering data* correctly pertains to the registered *metering installation,* in conjunction with the *Metering Provider*.

(b) That the magnitude and *profile* of the *metering data* is correct for the primary *energy*, in conjunction with the *Metering Provider*.

(c) That all *data streams* are captured, in conjunction with the *Metering Provider*.

(d) That the *NMI* is registered in MSATS.

(e) That the *NMI* is correct and is within the range allocated for that *Network Service Provider.*

8.3.2 The *Metering Data Provider* must undertake all *validations* as detailed in clause 8.3.1 following any changes to the *metering installation* (e.g. a *meter* change or *current transformer (CT)* ratio change).

8.3.3 The *validations* performed by the *Metering Data Provider* as detailed in clause 8.3.1, must be carried out prior to the distribution of any actual interval *metering data* to *AEMO* or *Registered Participants* for the purposes of *market settlements* or billing.

8.4   Validation in the Registration Process for Type 5 Metering Installations

8.4.1   The *Metering Data Provider* must *validate* the *metering data* on registration of all *current transformer* type 5 *metering installations* to verify:

(a)   That the *metering data* correctly pertains to the registered *metering installation*, in conjunction with the *Metering Provider*.

(b)   That the magnitude and *profile* of the *metering data* is correct for the primary *energy*, in conjunction with the *Metering Provider*.

(c)   That all *data streams* are captured, in conjunction with the *Metering Provider*.

(d)   That the *NMI* is registered in MSATS.

(e)   That the *NMI* is within the range allocated for that *Local Network Service Provider*.

8.4.2   The *Metering Data Provider* must undertake all *validations* as detailed in clause 8.4.1 following any changes to the *metering installation* (such as a *meter* change or *current transformer (CT)* ratio change).

8.4.3   The *validations* performed by the *Metering Data Provider*, as detailed in clause 8.4.1, must be carried out prior to the distribution of any actual interval *metering data* to *AEMO* or *Registered Participants* for the purposes of *market settlements* or billing.

8.4.4   The *Metering Data Provider* must *validate* the *metering data* on registration of all whole current type 5 *metering installations* to verify:

(a)   That the *metering data* correctly pertains to the registered *metering installation*.

(b)   That the *metering data* acquired is of an expected magnitude and *profile* for the customer type.

(c)   That all *data streams* are captured.

(d)   That the *NMI* is registered in MSATS.

(e)   That the *NMI* is within the range allocated for that *Local Network Service Provider*.

8.4.5   The *validation* performed by the *Metering Data Provider*, as detailed in clause 8.4.4, must be carried out prior to the distribution of any actual *interval metering data* to *AEMO* or *Registered Participants* for the purposes of *market settlements* or billing.

8.5   Validation in the Registration Process for Type 6 Metering Installations

8.5.1   The *Metering Data Provider* must *validate* the *metering data* on registration of all type 6 *metering installation*s to verify:

(a)   That the *metering data* correctly pertains to the registered *metering installation*.

(b)   That all *data streams* are captured.

(c)   That the *NMI* is registered in MSATS.

(d)   That the *NMI* is within the range allocated for that *Local Network Service Provider*.

8.5.2   The *Metering Data Provider* must undertake all *validations*, as detailed in clause 8.5.1, following any changes to the *metering installation* (such as a *meter* change or *current transformer (CT)* ratio change).

8.5.3   The *validations* performed by the *Metering Data Provider,* as detailed in clause 8.5.1, must be carried out prior to the distribution of any actual *metering data* to *AEMO* or *Registered Participants* for the purposes of *market settlements* or billing.

8.6   Validation in the Registration Process for Type 7 Metering Installations

8.6.1   The *Metering Data Provider* must *validate* the *calculated metering data* on registration of all type 7 metered sites to verify:

(a)   That the *inventory tables*, *load tables* and *on/off tables* are complete and correct for the specifics of the type 7 *metering installation*.

9 VALIDATION OF METERING DATA TYPE 1 - 4

9.1 General

9.1.1 For *connection points* where *AEMO* is required to appoint a *Metering Data Provider* to provide *metering data services, AEMO* may also request the respective *Metering Data Provider* to perform additional data *validations* (e.g. *busbar* or nodal *validation*) to further ensure the quality and completeness of the *metering data*.

9.1.2 Type 1 and 2 *metering installations* must have a *check metering installation* in accordance with the *Rules.*

9.1.3 Type 3, 4, 5 and 6 *metering installations* are not required to have (but may have) a *check metering installation* in accordance with the *Rules.*

9.2 Application of Clause 9

9.2.1 The requirements of clause 9.3 are applicable to all *Metering Data Providers* accredited for the provision of *metering data services* for *metering installation* types 1, 2, 3 and 4.

9.2.2 The requirements of clause 9.4 are applicable to *Metering Data Providers* accredited for the provision of *metering data services* for *metering installation* types 1, 2, 3 and 4 that have associated *check metering installations* or partial *check metering installations*.

9.3 Validations to be performed for all Metering Installations

9.3.1 The *Metering Data Provider* must, as a minimum, undertake the following *validations* on *metering data* within the *metering data services database*:

(a) A check of all *interval metering data* against a nominated maximum value.

    i. This *validation* is to ensure that erroneous *interval metering data* spikes are trapped and *substituted*.

    ii. This check may additionally be performed in the polling software.

(b) A check of the maximum value of *active energy* and *reactive energy*.

    i. For *current transformer (CT) metering installations* the maximum value is to be initially defined by the applied *current transformer (CT)* ratio of the *metering installation*.

    ii. For whole current *metering installations* the maximum rating of the *meter* is to be used.

(c) Check against a nominated minimum value or, alternatively, a 'zero' check which tests for an acceptable number of zero interval values per day to be derived from the site's historical *metering data*.

(d) Check for null (no values) *metering data* in the *metering data services database* for all *metering data streams*.

    i. The aim of this check is to ensure that there is a 100% *metering data* set (and *substitution* for any missing *interval metering data* is undertaken).

ii.   The minimum check required is to ensure that there is at least one non-null *active energy* or *reactive energy* value per interval per *metering data stream*.

(e)   Check for significant *meter* alarms (power failure, *voltage transformer (VT)* or phase failure, pulse overflow, CRC error and time tolerance).

i.   A process must be in place that captures these significant *meter* alarms within the *metering data validation* process and ensures that any *meter* alarm occurrences are retained as part of the *metering data* audit trail. Refer to clause 6.2 of this *metrology procedure*.

ii.   The *Metering Data Provider* must provide the occurrences of these alarms to relevant *Registered Participants* within the *metering data* file that has a format compliant with the Meter Data File Format Specification.

(f)   Where supported by the meter(s), *validation,* for a given period, of *interval metering data* by comparison of the totalised *interval energy data* values (accumulation register reading)and the change in the *meter* cumulative registers (*energy* tolerance). It is acknowledged that this check would not identify *current transformer (CT)* ratio changes that have occurred after initial commissioning and have not been advised to the *Metering Data Provider*.

9.4   Validations to be performed for Metering Installations with Check Metering or Partial Check Metering

9.4.1   The *Metering Data Provider* must undertake the following *validations* by comparison of the *metering data* and *check metering data* for all *metering installations* that have associated check or partial *check metering installations*:

(a)   For *metering installations* where the *check metering installation* duplicates the *metering installation* accuracy level, the *Metering Data Provider* must *validate* the *metering installation data streams* and *check metering data streams* on a per interval basis. The average of the two *validated metering data* sets will be used to determine the *energy* measurement.

(b)   For installations where the *check metering data validation* requires a comparison based on nodal balance (comparing the sum *energy* flow to the *busbar* against *energy* flow from the *busbar*), the *Metering Data Provider* must construct a *validation* algorithm within the *metering data services database* that will facilitate this test:

i.   The *Metering Data Provider* must construct a *validation* algorithm within the *metering data services database* that will facilitate comparison of *interval metering data* for each *energy* flow on a per interval basis.

ii.   The *Metering Data Provider* must conduct an analysis of the historical *metering data* for each *connection point* to ascertain whether error differences in nodal balance are acceptable.

iii.   The *Metering Data Provider* should use this information to refine its *validation* algorithms to minimise the error difference

value for each *connection point*, based on historical *metering data*.

    iv.   The maximum error difference considered acceptable for any *connection point* is 1% on a per interval basis. The *Metering Data Provider* should minimise this value for each *connection point*, based on historical data.

(c)   Where the *check metering installation* is remote from the *metering installation* (e.g. at the other end of a *transmission line* or the other side of a *transformer*), the *validation* system must employ the following functionality:

    i.   The *Metering Data Provider* must construct a *validation* algorithm within the *metering data services database* that will facilitate comparison of *interval metering data* from the *metering installation* and the *check metering installation* on a per interval basis with adjustment for respective *transformer* or line losses.

    ii.   The *Metering Data Provider* must conduct an analysis of the historical *metering data* for each *connection point* to ascertain whether error differences between the *metering data* from the *metering installation* and *check metering installation* is acceptable.

    iii.   The *Metering Data Provider* should use this information to refine its *validation* algorithms to minimise the error difference value for each *connection point*, based on historical *metering data*.

    iv.   The maximum error difference considered acceptable for any *connection point* is 5% on a per interval basis. The *Metering Data Provider* should minimise this value for each *connection point*, based on historical data.

(d)   For installation *connection points* where SCADA *metering data* is made available by *AEMO* for the purposes of *metering data* validation, the *Metering Data Provider* must *validate* the *metering data* by comparison of the *interval metering data* against the SCADA *metering data* as provided by *AEMO* in the agreed format. The *validation* system must employ the following functionality:

    i.   The *Metering Data Provider* must construct a *validation* algorithm within the *metering data services database* that will facilitate comparison of *interval metering data* from the *metering installation* and the SCADA *metering data* on a per interval basis.

    ii.   The *Metering Data Provider* must conduct an analysis of the historical *metering data* for each *connection point* to ascertain whether error differences between the *interval metering data* from the *metering installation* and the SCADA *metering data* is acceptable.

    iii.   The *Metering Data Provider* should use this information to refine its *validation* algorithms to minimise the error difference

value for each *connection point*, based on historical *metering data*.

iv. The *Metering Data Provider* must construct an appropriate *validation* algorithm as the SCADA *metering data* may be derived from a different measurement point, have a different interval collection period and/or have a different base unit of measurement, (e.g. power not *energy* value) with allowances for a larger error of measurement.

v. The *Metering Data Provider* is only required to undertake *validation* of *metering data* against the SCADA *metering data* on the primary data channel i.e. only 'B' channel *validation* for *Generators* and only 'E' channel *validation* for loads such as pumps.

10 VALIDATION OF METERING DATA TYPE 5

10.1 Application of Clause 10

10.1.1 *Metering Data Providers* accredited for the provision of *metering data services* for type 5 *metering installations* must apply the requirements of:

(a) Clause 10.2 for current transformer (CT) connected type 5 *metering installations*.

(b) Clause 10.3 for whole current type 5 *metering installations*.

10.2 Validations to be performed for Type 5 Metering Installations with CTs

10.2.1 The *Metering Data Provider* must, as a minimum, undertake the following *validations* on *metering data* within the *metering data services database*:

(a) Check of all *interval metering data* against a nominated maximum value.

    i. This *validation* is to ensure that erroneous *interval metering data* spikes are trapped and *substituted*.

    ii. This check may additionally be performed in the collection software.

    iii. A check of the maximum value of *active energy*. (Maximum *reactive energy* checks may also be performed as an option).

    iv. The maximum value in 10.2.1(a)(iii) is to be initially defined by the applied *current transformer (CT)* ratio of the *metering installation*.

    v. On a per installation basis, the maximum value in 10.2.1(a)(iii) may be increased to cater for situations where the *responsible person* has confirmed that the *current transformer (CT)* is overloaded on a short-term basis.

(b) Check against a nominated minimum value or, alternatively, a 'zero' check which tests for an acceptable number of zero interval values per day to be derived from the site's historical *metering data*.

(c) Check for null (no values) *metering data* in the *metering data services database* for all *metering data streams*.

    i. The aim of this check is to ensure that there is a 100% *metering data* set (and *substitution* for any missing *interval metering data* is undertaken).

    ii. The minimum check required is to ensure that there is at least one non-null *active energy* or *reactive energy* value per interval per *metering data stream*.

(d) Check for significant *meter* alarms (power outage or power failure, VT or phase failure, pulse overflow, CRC error and time tolerance).

    i. A process must be in place that captures these significant *meter* alarms within the *metering data validation* process and ensures that any *meter* alarm occurrences are retained as part of the *metering data* audit trail. Refer to clause 6.2 of this *metrology procedure*.

      ii.   The *Metering Data Provider* must provide the occurrences of these *meter* alarms to relevant *Registered Participants* within the *metering data* file that has a format compliant with the Meter Data File Format Specification.

    (e)   Where supported by the meter(s), *validation,* for a given period, of *interval metering data* by comparison of the totalised *interval energy data* values (accumulation register reading)and the change in the *meter* cumulative registers (*energy* tolerance). It is acknowledged that this check would not identify *current transformer (CT)* ratio changes that have occurred after initial commissioning and have not been advised to the *Metering Data Provider*.

    (f)   A check of the *metering data* for continuity and reasonability over the *meter* reading period.

      i.   Check that no gaps in the *metering data* exist.

      ii.   Check that *metering data* for the expected period has been delivered based on the expected reading date.

10.3 Validations to be performed for Whole Current Type 5 Metering Installations

10.3.1   The *Metering Data Provider* must, as a minimum, undertake the following *validations* on *metering data* within the *metering data services database*:

    (a)   Check of all *interval metering data* against a nominated maximum value.

      i.   This *validation* is to ensure that erroneous *interval metering data* spikes are trapped and *substituted*.

      ii.   This check may additionally be performed in the collection software.

      iii.   A check of maximum value of *active energy*. (Maximum *reactive energy* checks may also be performed as an option). The maximum value is to be initially set to the rating of the *meter*.

    (b)   Check for null (no values) *metering data* in the *metering data services database* for all *metering data streams*.

      i.   The aim of this check is to ensure that there is a 100% *metering data* set (and *substitution* for any missing *metering data* is undertaken).

      ii.   The minimum check required is to ensure that there is at least one non-null *active energy* or *reactive energy* value per interval per *metering data stream*.

    (c)   Check for significant *meter* alarms (voltage transformer (VT) or phase failure, pulse overflow, CRC error and time tolerance). The *Metering Data Provider* is **not** required to *validate* the interval *metering data* for power outage or power failure alarms.

      i.   A process must be in place that captures these significant *meter* alarms within the *metering data validation* process and ensures that any *meter* alarm occurrences are retained as

part of the *metering data* audit trail. Refer to clause 6.2 of this *metrology procedure*.

ii. The *Metering Data Provider* must provide the occurrences of these *meter* alarms (inclusive of the occurrences of power outage or power failure alarms) to relevant *Registered Participants* within the *metering data* file that has a format compliant with the Meter Data File Format Specification.

(d) Where supported by the meter(s), *validation,* for a given period, of *interval metering data* by comparison of the totalised *interval energy data* values (accumulation register reading)and the change in the *meter* cumulative registers (*energy* tolerance).

(e) A check of the *metering data* for continuity and reasonability over the *meter* reading period.

i. Check that no gaps in the *metering data* exist.

ii. Check that *metering data* for the expected period has been delivered based on the expected reading date.

11 VALIDATION OF METERING DATA TYPE 6

11.1 Application of Clause 11

11.1.1 The requirements of clause 11.2 are applicable to *Metering Data Providers* accredited for the provision of *metering data services* for *metering installations* type 6.

11.2 Validations to be performed for Type 6 Metering Installations

11.2.1 The *Metering Data Provider* must undertake the following *validations* on *metering data* within the *metering data services database*:

(a) Check against a nominated minimum value of *metering data* collected from the *metering installation*.

(b) Check against a nominated maximum value of *metering data* collected from the *metering installation*. This is to be applied to both the *metering data* collected from the *metering installation* and the calculated *energy* consumption values.

(c) The current value of *metering data* collected from the *metering installation* >= previous value of *metering data* collected from the *metering installation*.

(d) The current value of *metering data* collected from the *metering installation* is numeric and >= 0.

(e) The current date that *metering data* is collected from the *metering installation* > the previous date that *metering data* was collected from the *metering installation*.

(f) Check for null (no values) *metering data* in the *metering data services database* for all *metering data streams*.

    i. The aim of this check is to ensure that there is a 100% *metering data* set (and *substitution* for any missing *metering data* is undertaken).

12 VALIDATION OF METERING DATA TYPE 7

12.1 Application of Clause 12

12.1.1 The requirements of clause 12.2 are applicable to *Metering Data Provid*ers accredited for provision on *metering data services* for type 7 *metering installations*.

12.2 Validations to be performed for Type 7 Metering Installations

12.2.1 The *Metering Data Provider* must undertake the following *validations* on *calculated metering data* within the *metering data services database*:

(a) Check against a nominated maximum *calculated metering data* value.

(b) *Calculated metering data* value is numeric and >= 0.

(c) Check for null (no values) *calculated metering data* in the *metering data services database* for all *metering data streams*.

i. The aim of this check is to ensure that there is a 100% *calculated metering data* set (and *substitution* for any missing *calculated metering data* has been undertaken).

(d) Check the *inventory tables*, *load tables* and *on/off tables* with a process approved by the *responsible person* to ensure that the correct version of the tables is being used for the production of *calculated metering data*.

(e) Check against a nominated minimum value or alternatively a 'zero' check which tests for an acceptable number of zero interval values per day.

(f) *Calculated metering data* date > previous *calculated metering data* date.

13 LOAD PROFILING – CONVERSION OF ACCUMULATED METERING DATA

13.1 Application of Clause 13

13.1.1 A *load profiling* requirement for the conversion of *accumulated metering data* into *trading intervals* applies to the jurisdictions of Victoria, New South Wales, Queensland, South Australia, Australian Capital Territory, and Tasmania.

13.2 Requirement for Load Profiling

13.2.1 *Load Profiling* is required in order to determine *trading interval metering data*, for wholesale market settlement purposes, for type 6 *metering installations*.

13.2.2 The requirements for *Load Profiling* in Victoria, Australian Capital Territory, and Tasmania are to:

(a) Determine an *estimate* of the average *load profile* for a *profile area* over a given period of time (*Profile Preparation Service*); and

(b) Allocate that *load profile* to *end-use customers* in that *profile area* (*Basic Meter Profiler*).

13.2.3 The requirements for *Load Profiling* in NSW and Queensland are to:

(a) Determine an *estimate* of the average *load profile* for *first-tier* and *second-tier controlled loads* for a *profile area* over a given period of time (*Profile Preparation Service – Controlled Load Profile*);

(b) Allocate that *profile* to both *first-tier* and *second-tier controlled loads metering data* (*Basic Meter Profiler – Controlled Load Profile*);

(c) Determine an *estimate* of the average *load profile* of the remaining *first-tier* and *second-tier loads* for a *profile area* (that is, excluding the *first-tier* and *second-tier controlled loads*) over a given period of time (*Profile Preparation Service – Net System Load Profile*); and

(d) Allocate that *load profile* to *second-tier non-controlled loads* in that *profile area* (*Basic Meter Profiler – Net System Load Profile*).

13.2.4 The requirements for *Load Profiling* in South Australia are to:

(a) Determine an *estimate* of the average *load profile* for *first-tier* and *second-tier controlled loads* for a *profile area* over a given period of time (*Profile Preparation Service – Controlled Load Profile*);

(b) Allocate that *profile* to *second-tier controlled loads* in that *profile area* (*Basic Meter Profiler – Controlled Load Profile*);

(c) Determine an *estimate* of the average *load profile* of the remaining *first-tier* and *second-tier loads* for a *profile area* (that is, excluding the *first-tier* and *second-tier controlled loads*) over a given period of time (*Profile Preparation Service – Net System Load Profile*); and

(d) Allocate that *load profile* to *second-tier non-controlled loads* in that *profile area* (*Basic Meter Profiler – Net System Load Profile*).

13.3 Controlled Load Profile

13.3.1 Clause 13.3 applies to the *Profile Preparation Service – Controlled Load*. The requirements for the *Profile Preparation Service - Controlled Load* and the actions to be undertaken in each applicable jurisdiction are as specified in the following sub-clauses.

13.3.2 *Profile Preparation Service – Controlled Load* does not apply to the jurisdictions of the **Australian Capital Territory** and **Tasmania**.

13.3.3 *Profile Preparation Service - Controlled Load* is applied in the jurisdiction of **New South Wales** as follows:

(a) In accordance with clause 3.10.2 of the *metrology procedure:* Part A, *Controlled Load Profile(s) (CLP)* for each *profile area* must be *estimated* by AEMO using *interval metering data* from a sample (or samples) of *controlled load interval meters* in accordance with clause 13.3.8 and sub-clauses 13.3.3 (b) and (c).

(b) The sample *meter*s, which will be installed by the NSW *Local Network Service Providers,* must be a type 4 *metering installation*.

(c) Two *NMIs* must be allocated to each sample *meter*.

    i. One *NMI* must be used for the *interval metering data* from the sample *meter* that is used to *estimate* the *CLP* in accordance with this clause 13.3.3; and

    ii. Where the *metering installation* that has a sample *meter* is second-tier, a second *NMI* must be used to transfer the *accumulated metering data* to which the *CLP* is applied in accordance with clause 13.3.7 of this *metrology procedure*.

(d) The requirements for one *Controlled Load Profile* are:

    i. There shall be at least one *CLP* in each *profile area.*

    ii. A *Local Network Service Provider* may choose to introduce a second *CLP* in its *profile area*.

    iii. If the *Local Network Service Provider* chooses not to introduce a second *CLP*, one (1) *CLP* must be calculated for all *controlled loads* in a *profile area*, which is based on a sample of *controlled load interval meters*.

    iv. For each half hourly *trading interval*, the *CLP* must be calculated by *profile area* as follows:

CLP for a *profile area* for a *trading interval* j

$$= \sum_{n=1}^{N} \text{(sample } meter \text{ load in } trading\ interval\ \text{j)}_n * \text{(wf)}_n$$

where:
N = represents the set of sample *NMIs* in the *profile area*
wf = is the weighting factor associated with the *NMI*s.

(e) The requirements for two *Controlled Load Profiles* are:

    i. If the *Local Network Service Provider* chooses to introduce a second *CLP*, it must provide a written notice advising of the commencement date of the second *CLP* to:

- *AEMO, and*
- All *Retailers.*

    ii.   The commencement date must be at least six (6) months after the date of the notice.

    iii.   From the commencement date, two (2) *CLPs* must be calculated for the *profile area*:

- One for *controlled loads* in the *profile area* based on a sample of *controlled load interval meters* on the *controlled load* 1 *network tariff*; and

- One for *controlled loads* in the *profile area* based on a sample of *controlled load interval meters* on the *controlled load* 2 *network tariff*.

(f)   For each half hourly *trading interval*, the *CLPs* must be calculated by *profile area* as follows:

    i.   *CLP* for loads on the *controlled load* 1 network tariff

$$= \sum_{n=1}^{N} \left(\begin{array}{c} \text{load for sample meter on the controlled} \\ \text{load 1 network tariff in trading interval j} \end{array} \right)_n * (\text{wf})_n$$

where:
N = represents the set of sample *NMI*s on the *controlled load* 1 network tariff, in the *profile area.*
wf = weighting factor associated with the *NMIs.*

    ii.   *CLP* for loads on the *controlled load* 2 network tariff

$$= \sum_{m=1}^{M} \left(\begin{array}{c} \text{load for sample meter on the controlled} \\ \text{load 2 network tariff in trading interval j} \end{array} \right)_m * (\text{wf})_m$$

where:
M = represents the set of sample *NMI*s on the *controlled load* 2 network tariff, in the *profile area*
wf = weighting factor associated with the *NMIs.*

13.3.4   The requirements for the *Profile Preparation Service - Controlled Load* in **Queensland** are:

(a)   In accordance with clause 3.10.2 of the *metrology procedure:* Part A, *Controlled Load Profiles* (**CLPs**) for the *profile area* must be *estimated* by *AEMO* using *interval metering data* from a sample (or samples) of *controlled load interval meters* in accordance with clause 13.3.8 and sub-clauses 13.3.4 (b) and (c).

(b)   The sample *meters*, which will be installed by the *Local Network Service Provider*, must be type 4 *metering installations.*

(c)   Two *NMI*s may need to be allocated to each sample *meter*.

    i.   One *NMI* must be used for the *interval metering data* from the sample *meter* that is used to *estimate* the *CLP* in accordance with this clause 13.3.4; and

    ii.   Where the *metering installation* that has a sample *meter* is second-tier, a second *NMI* must be used to transfer the

accumulated metering data to which the CLP is applied in accordance with clause 13.3.7 of this metrology procedure.

(d)　Two (2) CLPs must be calculated for the profile area:

　　i.　One for controlled loads in the profile area based on a sample of controlled load interval meters on the controlled load 1 network tariff; and

　　ii.　One for controlled loads in the profile area based on a sample of controlled load interval meters on the controlled load 2 network tariff.

(e)　For each half hourly trading interval, the CLPs must be calculated by profile area as follows:

　　i.　CLP for loads on the controlled load 1 network tariff

$$= \sum_{n=1}^{N} \left(\begin{array}{l} \text{load for sample meter on the controlled} \\ \text{load 1 network tariff in trading interval j} \end{array} \right)_{n} * \left(\text{wf} \right)_{n}$$

where:
N = represents the set of sample NMIs on the controlled load 1 network tariff, in the profile area.
wf = weighting factor associated with the NMIs.

　　ii.　CLP for loads on the controlled load 2 network tariff

$$= \sum_{m=1}^{M} \left(\begin{array}{l} \text{load for sample meter on the controlled} \\ \text{load 2 network tariff in trading interval j} \end{array} \right)_{m} * \left(\text{wf} \right)_{m}$$

where:
M = represents the set of sample NMIs on the controlled load 2 network tariff, in the profile area
wf = weighting factor associated with the NMIs.

13.3.5　The requirements for the Profile Preparation Service - Controlled Load in **South Australia** are:

(a)　In accordance with clause 3.10.2 of the metrology procedure: Part A, a single Controlled Load Profile (CLP) for all controlled loads for each profile area must be estimated by AEMO using interval metering data from a sample of controlled load interval meters in accordance with clause 13.3.8 and clauses 13.3.5 (b) and (c).

(b)　The sample meters, which will be installed by the South Australian Local Network Service Provider, must be a type 4 metering installation.

(c)　Two NMIs may need to be allocated to each sample meter.

　　i.　One NMI must be used for the interval metering data from the sample meter that is used to estimate the CLP in accordance with this clause 13.3.5; and

　　ii.　Where the metering installation that has a sample meter is second-tier, then a second NMI must be used to transfer the accumulated metering data to which the CLP is applied in accordance with clause 13.3.7 of this metrology procedure.

(d) For each half hourly *trading interval*, the *Controlled Load Profile* must be calculated by *profile area* as follows:

i. *CLP* for a *profile area* for a *trading interval* j

$$= = \sum_{n=1}^{N} (\text{sample } \textit{meter} \text{ load in } \textit{trading interval } \text{j})_n * (\text{wf})_n$$

where:
N = represents the set of sample *NMIs* in the *profile area*
wf = is the weighting factor associated with the *NMIs*.

13.3.6 *Profile Preparation Service – Controlled Load* does not apply to the jurisdiction of **Victoria**.

13.3.7 For the *Basic Meter Profiler – Controlled Load*, actions are to be undertaken in each jurisdiction as specified in the following sub-clauses:

(a) The requirements for *Basic Meter Profiler – Controlled Load* in **New South Wales** and **Queensland** are:

i. In accordance with clause 3.10.2 of the *metrology procedure:* Part A, *AEMO* must apply the appropriate *CLP*, for the *profile area* to which the *NMI* is connected, to the *accumulated metering data* for all *first-tier* and *second-tier controlled loads*, in order to obtain *trading interval metering data*.

ii. The requirements for one *Controlled Load Profile* are:

(1) For *NMIs* in a *profile area* with one *CLP*, the *CLP* must be applied as follows:

Half hourly *metering data* for *trading interval* j for a *NMI data stream*

$$= \frac{(\text{Accumulation energy data between start date and end date}) * (\text{CLP j})}{\sum_{i=startdate}^{enddate} CLP_i}$$

where:
CLPj = the calculated *Controlled Load Profile energy* for *trading interval* j

$\sum_{i=startdate}^{enddate} CLP_i$ = the sum of *Controlled Load Profile energy*

between the start date and the end date and;

'start date' and 'end date' have the meanings given in clause 13.5 of this Procedure.

iii. The requirements for two *Controlled Load Profiles* are:

(1) In a *profile area* where the *Local Network Service Provider* has chosen to introduce a second *CLP*, the *CLPs* shall be applied as follows:

(a) *Loads* on the *controlled load* 1 network tariff (CLP1) must be applied to the *accumulated metering data* for all first tier and *second-tier controlled loads,* which are on the *controlled load* 1 network tariff:

Half hourly *metering data* for *trading interval* j for a *NMI data stream* on the *controlled load* 1 network tariff

$$= \frac{\left(\text{Accumulation energy data between start date and end date}\right) * \left(\text{CLP1}_j\right)}{\sum\limits_{i=startdate}^{enddate} \text{CLP1}_i}$$

where:

CLP1_j = the calculated *Controlled Load Profile energy* for *trading interval* j

$\sum\limits_{i=startdate}^{enddate} \text{CLP1}_i$ = the sum of Controlled Load Profile *energy* between the start date and the end date and;

'start date' and 'end date' have the meanings given in clause 13.5 of this Procedure.

(b) *Loads* on the *controlled load* 2 network tariff (CLP2) must be applied to the *accumulated metering data* for all *first-tier* and *second-tier controlled loads*, which are on the *controlled load* 2 network tariff:

Half hourly *metering data* for *trading interval* j for a *NMI data stream* on the *controlled load* 2 network tariff

$$= \frac{\left(\text{Accumulation energy data between start date and end date}\right) * \left(\text{CLP2}_j\right)}{\sum\limits_{i=startdate}^{enddate} \text{CLP2}_i}$$

where:

CLP2_j = the calculated *Controlled Load Profile energy* for *trading interval* j

$\sum\limits_{i=startdate}^{enddate} \text{CLP2}_i$ = the sum of *Controlled Load Profile energy* between the start date and the end date and;

'start date' and 'end date' have the meanings given in clause 13.5 of this *metrology procedure*.

iv. The resulting half hourly *metering data* produced by applying the *Controlled Load Profile* is at the *NMI data stream* level. The total of these *data streams* is used in the calculation of the *Net System Load Profile* as explained in clause 13.4.2 of this Procedure.

(b) The requirements for *Basic Meter Profiler – Controlled Load* in **South Australia** are:

i. In accordance with clause 3.10.2 of the *metrology procedure: Part A*, *AEMO* must apply the *CLP*, for the *profile area* to which the *NMI* is connected, to the *accumulated metering data* for all *first-tier* and *second-tier controlled loads*, in order to obtain *trading interval metering data*.

ii. The *accumulated metering data* for *first-tier loads* is represented by a scaling factor that is transferred to *AEMO* in accordance with clause 3.10.8 of the *metrology procedure: Part A*.

iii. The profile must be applied as follows:

Half hourly *metering data* for *trading interval* j for a *NMI data stream*

$$= \frac{(\text{Accumulation energy data between start date and end date}) * (\text{CLP}_j)}{\sum\limits_{i=\text{startdate}}^{\text{enddate}} \text{CLP}_i}$$

where:
CLPj = the calculated *Controlled Load Profile energy* for *trading interval* j

$\sum\limits_{i=\text{startdate}}^{\text{enddate}} CLP_i$ = the sum of *Controlled Load Profile energy*

between the start date and the end date and;

'start date' and 'end date' have the meanings given in clause 13.5 of this *metrology procedure*.

iv. If the *accumulated metering data* is based on an *actual meter reading*:

(1) Start date = 00:00 on the *day* of the previous *meter* reading.

(2) End date = the end of the *trading interval* commencing at 23:30 on the *day* prior to the current *meter* reading date.

v. If the *accumulated metering data* is an estimate:

(1) Start date = 00:00 on the first *day* of the *billing period*, or 00:00 on the previous *meter* reading date (whether actual or *estimate*), or 00:00 on the first *day* that the *load* becomes *second-tier*, whichever is the later.

(2) End date = the end of the *trading interval* commencing at 23:30 on the last *day* of the *billing period,* or the end of the *trading interval* commencing at 23:30 on the *estimate meter* reading date, whichever is the earlier.

vi. The resulting half hourly *metering data* produced by applying the *Controlled Load Profile* is at the *NMI data stream* level. The total of these *data streams* is used in the calculation of the *Net System Load Profile* as explained in clause 13.4.2 of this Procedure.

13.3.8 Sample Meters:

(a) Where *metering* equipment to sample *controlled loads* is installed, the *responsible person* must ensure that:

    i. At least 200 *controlled load* sample *meters* are installed for the purposes of calculating each *controlled load profile* within a *profile area* unless otherwise agreed by *AEMO*; and

    ii. The method it adopts for selecting sample sites is statistically sound.

(b) This sub-clause (b) relating to sample size and selection only applies to the jurisdiction of **South Australia.**

    i. The *Local Network Service Provider* must ensure that at least 200 *controlled load* sample *meters* are installed for the purposes of calculating the *Controlled Load Profile*.

    ii. The method of selecting sample *meter* sites adopted by the *Local Network Service Provider* must be approved by *AEMO*.

    iii. The *Local Network Service Provider* must use reasonable endeavours to ensure that sample *meter* sites:

        (1) Are occupied sites;

        (2) Have historical annual *energy* consumption with a lower range exceeding 1,000kWh and an upper range not exceeding two standard deviations of the mean *controlled load* annual consumption;

        (3) Subject to sub-clause (4), must be randomly selected such that each site which meets the other criteria has an equal chance of being included in the sample; and

        (4) New sample *metering* sites are selected to maintain a sample distribution that is representative of the *controlled load* in accordance with clause 13.3.8(b)(ii).

    iv. In the event that an existing sample *meter* site becomes inappropriate for a sample *meter*, the sample *meter* must be removed or relocated to an appropriate site selected in accordance with clause 13.3.8 (b) (iii).

    v. The *Local Network Service Provider* must ensure that a *meter* which is a sample interval *meter* installed for the purposes of calculating the *Controlled Load Profile* is not removed without the consent of *AEMO*.

(c) The weighting factor assigned to each sample *meter NMI* in the calculation of the *Controlled Load Profile* should be proportional to 1/n, where n is the number of sample *meters* contributing to the calculation of the *Controlled Load Profile* in the respective *Local Network Service Provider area*.

$$\text{Weighting Factor} = \frac{(\text{sf}) * (\text{dlf})}{n}$$

where :

sf = scaling factor (for South Australia = 200)

dlf = *distribution loss factor* applicable to the sample *meter* site

> > n = number of sample *meters* used in the calculation of the *Controlled Load Profile*

(d) This sub-clause (d) relating to Load Scaling Factor only applies to the jurisdiction of **South Australia**.

   i. *AEMO* must approve the calculation of the *load* scaling factor for the *Controlled Load Profile* at a frequency which is at least once every six (6) months.

   ii. For each week, the *Local Network Service Provider* must calculate the *load* scaling factor as follows:

$$\left(\text{WeeklyLoadScalingFactor}\right) = X * \frac{\left(\text{WeeklySampleEnergy}\right) * \left(\text{AnnualCLEnergy}\right)}{\left(\text{AnnualSampleMeterCLEnergy}\right)}$$

where:

> WeeklyLoadScalingFactor (MWh) = a value calculated to be the total *energy* consumed for a one week period by *accumulation metered controlled load end-use customers* that are *first-tier loads*.
>
> X = the *estimated* proportion of *accumulation metered controlled load end-use customers* that are *first tier loads* determined for the six month period beginning 1 July and 1 January respectively.
>
> AnnualCLEnergy (MWh) = the annual *controlled load energy* of all *end-use customers* for the whole calendar year preceding the regulatory year t.
>
> AnnualSampleMeterCLEnergy (MWh) = total annual sample *meter controlled load energy* for the whole calendar preceding regulatory year t.
>
> WeeklySampleEnergy (MWh) = the value representing the actual *energy* consumption recorded by the sample *meters* in a one week period.

   iii. The *Local Network Service Provider* must send the *load* scaling factor to *AEMO* as an active *first-tier load accumulation metered NMI data stream*, with the *actual reading date* as the last day in the settlement week, at a frequency which is at least once per week.

13.4 Net System Load Profile

13.4.1 Clause 13.4 applies to the jurisdictions of Victoria, New South Wales, South Australia, Queensland, the Australian Capital Territory, and Tasmania.

13.4.2 The requirements for the *Profile Preparation Service – Net System Load Profile* are:

(a) In accordance with clause 3.10.3 of the *metrology procedure:* Part A, the form of *profiling* that *AEMO* must use for the *metering installations* to which this *metrology procedure* applies, excluding *metering installations* for *controlled loads* where applicable to a jurisdiction, is the *Net System Load Profile* (*NSLP*).

(b) The *NSLP* must be calculated by *profile area* as follows:

NSLP for a *profile area* for a *trading interval*

$$= \sum_{i=1}^{j} \left(\text{Energy inflows to the profile area at the TNI level}\right)_i * MLF_i$$

$$+ \sum_{m=1}^{n} \left(\text{Energy generated within profile area from embedded generation}\right)_m * MLF_m * DLF_m$$

$$- \sum_{s=1}^{t} \left(\text{Half hourly load in profile area}\right)_s * MLF_s * DLF_s$$

where

MLF = *marginal loss factor* applicable for the *NMI* that is stored in MSATS

DLF = *distribution loss factor* applicable for the *NMI* that is stored in MSATS

   i = Each *TNI* with *energy* inflows to profile area

   m = Each embedded *Generator* with *energy* generated within *profile area*

   s = Half hourly loads in *profile area*, which include:

- *interval metered second-tier loads*;

- *interval metered first-tier loads* in accordance with clause 3.10.7 of the *metrology procedure:* Part A;

- *unmetered first-tier* and *second-tier loads*;

- *interval metered* market loads that are not *first-tier* or *second-tier loads*;

- where applicable to a participating jurisdiction, interval *metering data* for *first-tier* and *second-tier controlled loads*; and

- but exclude *interval metered loads* which are children in an embedded network.

13.4.3 The requirements for the *Basic Meter Profiler – Net System Load Profile* are:

(a) In accordance with clause 3.10.2 of the *metrology procedure:* Part A, *AEMO* must apply the *NSLP*, for the *profile area* to which the *NMI* is connected, to the *metering data* for type 6 *metering installations*, in order to obtain *interval metering data*.

(b)　The profile must be applied as follows:

Half-hourly *metering data* for *trading interval j* for *NMI data stream*

$$= \frac{(\text{Accumulation energy data between start date and end date}) * NSLP_j}{\sum\limits_{i=\text{start date}}^{\text{end date}} NSLP_i}$$

where the *accumulated metering data* is based on an *actual meter reading*, then

start date = 00:00 on the day of the previous *meter* reading, and

end date = the end of the *trading interval* commencing at 23:30 on the day prior to the current *meter* reading date.

and **where** the *accumulated metering data* is an *estimate,* then

start date = 00:00 on the first day of the billing period, or 00:00 on the day of the previous *meter* reading date (whether actual or *estimate*), or 00:00 on the first day that the *load* becomes *second-tier*, whichever is the later, and

end date = the end of the *trading interval* commencing at 23:30 on the last day of the billing period, or the end of the *trading interval* commencing at 23:30 on the *estimate meter* reading date, whichever is the earlier.

(c)　The resulting half hourly *metering data* produced by applying the *NSLP* is at the *NMI data stream* level.

13.5　　Start Dates and End Dates

13.5.1　Pre 1 July 2003

(a)　Subject to clause 13.5.3 of this *metrology procedure*, prior to 1 July 2003:

　　i.　If the *accumulated metering* data is based on an *actual meter reading*:

　　　　(1)　The start date is 00.00 on the day after the previous *meter* reading; and

　　　　(2)　The end date is 23.59 on the current *meter* reading date; and

　　ii.　If the *accumulated metering* data is an *estimate*:

　　　　(1)　The start date is the latest of:
　　　　(A) 00.00 on the first day of the *billing period*;
　　　　(B) 00.00 on the previous *meter* reading date; and
　　　　(C) 00.00 on the first day on which the *load* becomes *second-tier*; and

　　　　(2)　The end date is 23.59 on the last day of the *billing period*.

13.5.2　Post 1 July 2003

(a)　Subject to clause 13.5.3 of this *metrology procedure*, with effect from 1 July 2003:

      i.   If the *accumulated metering data* is based on an *actual meter reading*:

        (1)   The start date is 00.00 on the day of the previous *meter* reading; and

      ii.   The end date is the end of the *trading interval* commencing at 23.30 on the day prior to the current *meter* reading date; and

      iii.   If the *accumulated metering data* is an *estimate*:

        (1)   The start date is the later of:
(A) 00.00 on the first day of the *billing period*;
(B) 00.00 on the previous *meter* reading date (whether actual or *estimate*; and
(C) 00.00 on the first day on which the *load* becomes *second-tier*:

        (2)   The end date is the earlier of:
(A) the end of the *trading interval* commencing at 23.30 on the last day of the *billing period*; and
(B) the end of the *trading interval* commencing at 23.30 on the *estimate meter* reading date.

13.5.3   Transitional:

(a)   In respect of each relevant *metering installation*, the transitional period is the period in respect of which the 'start date' occurs before 1 July 2003 and the 'end date' occurs on or after 1 July 2003.

(b)   For the purposes of the transitional period for each relevant *metering installation*:

      i.   The start date will be as defined in clause 13.5.1 of this *metrology procedure*; and

      ii.   The end date will be as defined in clause 13.5.2 of this *metrology procedure*.

14 UNMETERED LOADS – DETERMINATION OF METERING DATA

14.1 Application of Clause 14

14.1.1 The requirements of clause 14 apply to the jurisdictions of Victoria, New South Wales, Queensland, South Australia, Tasmania and Australian Capital Territory. ~~They do not apply to the Tasmanian jurisdiction.~~

14.2 Requirement to produce *calculated metering data*

14.2.1 Agreed *market loads*

(a) In accordance with clause 3.6 of the *metrology procedure:* Part A, half-hourly *trading interval* data is required to be calculated by *NMI data stream* for those *loads* that have been classified as type 7 *metering installations* in accordance with S7.2 of the *Rules* that, subject to clause 14.2.1 (d), are able under relevant legislation or regulation to be classified as *market loads* as agreed between a *Minister* and *AEMO*.

(b) *AEMO* will publish a list of the *loads* that have been classified, in accordance with clause 14.2.1 (a), as *market loads* and any amendments to these *loads*.

(c) *Loads* that have been classified, in accordance with clause 14.2.1 (a), as *market loads* may be either a "controlled *unmetered load*" (for which the *market load* is controlled) or "other *unmetered load*" (for which the *market load* is not controlled).

(d) If there is a *load table* under clause 14.2.4, an *inventory table* under clause 14.3.3 or clause 14.4.3 and for controlled *unmetered loads* an *on/off table* under clause 14.3.4, then a type 7 *metering installation* may be classified as a *market load* in accordance with clause 14.2.1 (a).

(e) The *responsible person* will be advised within 20 *business days* from the date of lodgement of such a request whether a *load*, in accordance with clause 14.2.1 (c), will be classified as a "controlled *unmetered load*" or "other *unmetered load*" by *AEMO*.

14.2.2 Application to device types

The agreed *market load* that is published by *AEMO* will be generic in nature (for example, street lighting). For each agreed *market load* there may be one or more device types that are listed in the *load table* developed in accordance with clause 14.2.4.

14.2.3 Application of *NMI*

(a) *Metering data* for an *unmetered load* is calculated by *NMI data stream*. A *NMI* is assigned for each unique combination of:

  i. *Financially responsible Market Participant*;

  ii. *End-use customer*;

  iii. *Local Network Service Provider*;

  iv. *Transmission Node Identifier*; and

  v. *Distribution loss factor*.

The *unmetered load NMI* may contain different agreed *market loads* and/or different device types, but they must have the same *financially responsible Market Participant*, *end-use customer*, *Local Network Service Provider*, *TNI* and *distribution loss factor*.

(b) Where permitted by the *Rules* or guidelines issued by *AEMO*, an *unmetered load* may be included in the *NMI* for a related metered *load*, where the number of devices is small, for example watchman lights, the *energy* consumption of those devices is immaterial relative to the total *energy* consumption for that *NMI*, and the *financially responsible Market Participant*, *end-use customer*, *Local Network Service Provider*, *marginal loss factor* (or *TNI*) and *distribution loss factor* are the same.

14.2.4 Load Table

(a) The *load table* must set out:

    i. The device *load* (in watts) for controlled *unmetered loads* for use in calculating *interval metering data* for each device type in accordance with clause 14.3. The *load* per device type must be the wattage of the device and associated control gear; and

    ii. The annual energy consumption for other *unmetered loads* by device type in accordance with clause 14.4.1. The annual *energy* consumption is used to calculate the calculated device wattage (in watts) which is used to calculate the interval *metering data* for each device type as follows:

$$(\text{Calculated device wattage})_i = \frac{(\text{device annual energy consumption})_i}{365*24}$$

Where i = device type i.

(b) *AEMO* must develop the initial load table in accordance with the *Rules consultation procedures*.

(c) The initial *load table* must be published by *AEMO*. Changes to the *load table* must be published by *AEMO*. *AEMO* should remove redundant device types from the published *load table*.

(d) *AEMO* must consider and publish proposals from interested parties to add device types to the *load table*. *AEMO* must determine whether to add the new device type and its corresponding device *load* or annual *energy* consumption to the *load table* taking into account the views of other interested parties.

(e) New device types must be included in the *load table* prior to installation of the device.

(f) *AEMO* must develop and publish relevant explanatory material for the determination of a *load table* device *load* or annual *energy* consumption. The relevant explanatory material must be prepared, revised and published by *AEMO* in accordance with the *Rules consultation procedures*.

(g) Proposals to add a new device type to the *load table* must be accompanied by a relevant unique description of the device and evidence of the device *load* or *energy* consumption whichever the case may be. Wherever possible, the device load should be derived from measurement tests conducted by a NATA accredited laboratory or overseas equivalent.

14.3 Controlled unmetered loads

14.3.1 This clause 14.3 is applicable to all agreed "controlled *unmetered loads*".

14.3.2 *Metering Data* calculation

(a) The *responsible person* must ensure that the *interval metering data* for controlled *unmetered loads*, which have been classified as a type 7 *metering installation*, are calculated in accordance with the following algorithm:

Half-hourly *metering data* for *trading interval j* for *NMI* (in watt hours)

$$= \frac{\sum_{i=1}^{n} (k) * (\text{Device wattage})_i * (\text{Device count for NMI})_i * (\text{Period load is switched on})_j * (\text{Trading interval})}{60}$$

where;
i = device type
j = *trading interval*
k = proportion of device attributable to that *NMI*
Trading interval is period in minutes
Device wattage is determined from the *load table*.
Device count is determined from the *inventory table*.
Period *load* is switched on is determined from the *on/off table*.

14.3.3 Inventory Table

(a) For each *NMI*, a separate *inventory table* is required that identifies each device type which forms part of the *NMI load* and for each device type lists:

    i. The device type;

    ii. The form of on/off control – photoelectric cell control, timer control, ripple control or other control;

    iii. If timer control or ripple control, the on/off times for the controlling device;

    iv. If other control, the on/off times;

    v. If a device is shared with another *NMI*, the proportion of *load* that is agreed by affected *Registered Participants* to be attributable to that *NMI* (k). Each k factor will be less than 1. The sum of the k factors for a shared device across each respective *NMI* shall be equal to 1;

    vi. Number of such devices installed;

vii. Effective start date – the first day on which that record in the *inventory table* is to be included in the calculation of *metering data* for that *NMI*;

viii. Effective end date - the last day on which that record in the *inventory table* is to be included in the calculation of *metering data* for that *NMI*; and

ix. Last change date – the date that record in the *inventory table* was most recently created or modified.

(b) Each device in the *inventory table* is a unique combination of physical hardware, time control classification and shared portion, for example, if a device is shared with another *NMI*, the device(s) must be included in the *inventory table* as a separate device type.

(c) Each *responsible person* must develop the initial *inventory table* for the *NMI*s for which it is responsible. The initial *inventory table* must be agreed by the affected *Registered Participants*, *AEMO* and the relevant *end-use customer*.

(d) Each *responsible person* must use *reasonable endeavours* to update the *inventory table*, for the *NMIs* for which it is responsible, on at least a monthly basis for any additions, deletions and modifications to ensure that the accuracy requirements in clause 3.9.7 of the *metrology procedure* Part A are met. Such additions, deletions or modifications to the *inventory table* may only be made on a retrospective basis where:

i. Agreed by the *responsible person* and the affected *Registered Participants*; or

ii. Where necessary to comply with clause 7.9.5 of the *Rules*.

(e) The *responsible person* must communicate any material changes to the *inventory table* to the affected *Registered Participants*.

(f) The *responsible person* must provide the *inventory table* to relevant *Registered Participants* when requested.

14.3.4 On/Off table

(a) The form of on/off control may be:

i. Photoelectric cell control;

ii. Timer control, or ripple control; or

iii. Other control.

14.3.5 Photoelectric cell control

(a) If the on/off times for a device is controlled by a photoelectric cell, then

i. On time = sunset time + ON delay

ii. Off time = sunrise time + OFF delay.

The ON delay and OFF delay are set out in clause 14.5.

(b)   The *responsible person* must ensure that the appropriate sunset
times and sunrise times are obtained from the Australian Government
Geoscience website (www.ga.gov.au/geodesy/astro/sunrise.jsp),
based on the longitude and latitude of the relevant town as specified
below, and Australian Eastern Time:

Jurisdiction	*LNSP*	Town	Latitude	Longitude
Victoria	CitiPower	Melbourne	37 deg 49 min S	144 deg 58 min E
Victoria	Jemena Electricity Networks	Essendon	37 deg 44 minS	144 deg 54 min E
Victoria	Powercor	Ballarat	37 deg 30 min S	143 deg 47 min E
Victoria	SP AusNET	Morwell	38 deg 13 min S	146 deg 25 min E
Victoria	United Energy	Dandenong	38 deg 01 min S	145 deg 12 min E
NSW	Ausgrid	Sydney	33 deg 52 min S	151 deg 12 min E
NSW	Endeavour Energy	Cecil Park	33 deg 52 min S	150 deg 50 min E
NSW	Essential Energy	Armidale	30 deg 30 min S	151 deg 50 min E
NSW	Essential Energy	Broken Hill	31 deg 57 min S	141 deg 27 min E
NSW	Essential Energy	Dubbo	32 deg 15 min S	148 deg 36 min E
NSW	Essential Energy	Wagga Wagga	35 deg 06 min S	147 deg 22 min E
SA	ETSA Utilities	Adelaide	34 deg 55 min S	138 deg 35 min E
ACT	ActewAGL	Canberra	35 deg 20 min S	149 deg 10 min E
Queensland	Energex	Brisbane	27 deg 28 min S	153 deg 01 min E
Queensland	Ergon Energy	Townsville	19 deg 15 min S	146 deg 48 min E
Queensland	Ergon Energy	Toowoomba	27 deg 33 min S	151 deg 57 min E
Tasmania	Aurora Distribution	Ross	42 deg 1 min S	147 deg 29 min E

(c)   The *responsible person* must ensure that the period that the *load* is
switched on during a *trading interval* is calculated as follows:

Trading interval	Period load is switched on
For the *trading intervals* commencing after sunset and finishing prior to sunrise	Period *load* is switched on = 1
For the *trading intervals* commencing after sunrise and finishing prior to sunset	Period *load* is switched on = 0
For the *trading interval* during which the sunset occurs	$\dfrac{(\text{Period load is switched on}) = (\text{End time of trading interval}) - (\text{Time of sunset})}{30}$
For the *trading interval* during which the sunrise occurs	$\dfrac{(\text{Period load is switched on}) = (\text{Time of sunrise}) - (\text{Start time of trading interval})}{30}$

(d) Should testing on the operation of photoelectric cells by an independent party, agreed to by the *responsible person*, affected *Registered Participants*, *AEMO* and relevant *end-use customer*, indicate that the on/off times for a device controlled by a photoelectric cell are influenced materially and consistently by other variables, then *AEMO* shall revise the *metrology procedure* accordingly.

14.3.6   Timer control

(a) If the on/off times for a device is controlled by a timer or ripple injection system, then

    i.   On time = ON time set on timer or ripple injection system

    ii. Off time = OFF time set on timer or ripple injection system.

(b) The *responsible person* must ensure that the period that the *load* is switched on during a *trading interval* is calculated as follows:

Trading interval	Period load is switched on
For the *trading intervals* commencing after on time and finishing prior to off time	Period *load* is switched on = 1
For the *trading intervals* commencing after off time and finishing prior to on time	Period *load* is switched on = 0
For the *trading interval* during which the on time occurs	$$(\text{Period load is switched on}) = \frac{(\text{End time of trading interval}) - (\text{On time})}{30}$$
For the *trading interval* during which the off time occurs	$$(\text{Period load is switched on}) = \frac{(\text{Off time}) - (\text{Start time of trading interval})}{30}$$

14.3.7   Other control

(a) Where the on/off times for a device are not in accordance with clause 14.3.5 or clause 14.3.6 of this Procedure, then the following alternative forms of control may be used.

    i.   On time = sunset time + ON delay or ON time set on timer or ripple injection system.

    ii. Off time = sunrise time + OFF delay or OFF time set on timer or ripple injection system or a fixed duration after ON time.

(b) Where sunrise or sunset times are used, the time is determined in accordance with clause 14.3.5(b) of this *metrology procedure*.

(c) The *responsible person* must ensure that the period that the *load* is switched on during a *trading interval* is calculated as follows:

Trading interval	Period load is switched on
For the *trading intervals* commencing after on time and	Period *load* is switched on = 1

Trading interval	Period load is switched on
finishing prior to off time	
For the *trading intervals* commencing after off time and finishing prior to on time	Period *load* is switched on = 0
For the *trading interval* during which the on time occurs	$(\text{Period load is switched on}) = \dfrac{(\text{End time of trading interval}) - (\text{On time})}{30}$
For the *trading interval* during which the off time occurs	$(\text{Period load is switched on}) = \dfrac{(\text{Off time}) - (\text{Start time of trading interval})}{30}$

14.4 Other unmetered loads

14.4.1 This clause 14.4 is applicable to all agreed "other *unmetered loads*". Other *unmetered loads*" do not have a constant *load* and therefore the *energy* is calculated based on an annual *energy* consumption determined by *AEMO* in accordance with clause 14.2.4.

14.4.2 Energy calculation

(a) The *responsible person* must ensure that the *interval metering data* for other *unmetered loads*, which have been classified as a type 7 *metering installation*, is calculated in accordance with the following algorithm.

Half-hourly *metering data* for *trading interval j* for *NMI* (in watt hours)

$$= \frac{\sum_{i=1}^{n} (k) * (\text{Device wattage})_i * (\text{Device count for NMI})_i * (\text{Period load is switched on})_j * (\text{Trading interval})}{60}$$

where;
i = device type
j = *trading interval*
k = proportion of device attributable to that *NMI*
Trading interval is period in minutes
Device wattage is determined from the *load table*.
Device count is determined from the *inventory table*.
Period *load* is switched on is determined from the *on/off table*.

14.4.3 Inventory Table

(a) For each *NMI*, a separate *inventory table* is required that identifies each device type which forms part of the *NMI load* and for each device type lists:

   i. The device type;

   ii. The form of on/off control (24 hours per day);

   iii. If a device is shared with another *NMI*, the proportion of *load* that is agreed by affected *Registered Participants* to be

attributable to that *NMI* (k). Each k factor will be less than 1. The sum of the k factors for a shared device across each respective *NMI* must be equal to 1;

    iv.   Number of such devices installed;

    v.   Effective start date – the first day on which that record in the *inventory table* is to be included in the calculation of *metering data* for that *NMI*;

    vi.   Effective end date - the last day on which that record in the *inventory table* is to be included in the calculation of *metering data* for that *NMI*; and

    vii.   Last change date – the date that record in the *inventory table* was most recently created or modified.

(b)   Each device in the *inventory table* is a unique combination of physical hardware, time control classification and shared portion, for example, if a device is shared with another *NMI*, the device(s) shall be included in the *inventory table* as a separate device type.

(c)   Each *responsible person* must develop the initial *inventory table* for the *NMI*s for which it is responsible. The initial *inventory table* must be agreed by the affected *Registered Participants, AEMO* and the relevant *end-use customer*.

(d)   Each *responsible person* must use *reasonable endeavours* to update the *inventory table*, for the *NMIs* for which it is responsible, on at least a monthly basis for any additions, deletions and modifications to ensure that the accuracy requirements in clause 3.9.7 of the *metrology procedure* Part A are met. Such additions, deletions or modifications to the *inventory table* may only be made on a retrospective basis where:

    viii.   Agreed by the *responsible person* and the affected *Registered Participants*; or

    ix.   Where necessary to comply with clause 7.9.5 of the *Rules*.

(e)   The *responsible person* must communicate any material changes to the *inventory table* to the affected *Registered Participants*.

(f)   The *responsible person* must provide the *inventory table* to relevant *Registered Participants* when requested.

14.4.4   On/off Table

(a)   Other *unmetered loads* are assumed to operate 24 hours per day. For each *trading interval*, then:

    Period *load* is switched on = 1.

14.5   ON delay and OFF delay

14.5.1   This clause 14.5 applies only to the jurisdiction of the Australian Capital Territory. For the jurisdictions of Victoria, New South Wales, Queensland, Tasmania and South Australia the ON and OFF delays are zero.

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(a) The *responsible person* must use the ON delay and OFF delay for each day of the year as provided in the following tables, when determining the on time and off time of photoelectric cells in accordance with clause 14.3.5.

January

Day	ON delay (minutes)	OFF delay (minutes)	Day	ON delay (minutes)	OFF delay (minutes)
January 1	20	21	January 16	19	20
January 2	19	20	January 17	19	20
January 3	19	20	January 18	19	20
January 4	19	20	January 19	19	20
January 5	19	20	January 20	19	20
January 6	19	20	January 21	19	20
January 7	19	20	January 22	19	20
January 8	19	20	January 23	19	20
January 9	19	20	January 24	19	20
January 10	19	20	January 25	18	20
January 11	19	20	January 26	18	20
January 12	19	20	January 27	18	20
January 13	19	20	January 28	18	20
January 14	19	20	January 29	18	20
January 15	19	20	January 30	18	20
			January 31	18	20

February

Day	ON delay (minutes)	OFF delay (minutes)	Day	ON delay (minutes)	OFF delay (minutes)
February 1	18	20	February 15	18	20
February 2	18	20	February 16	17	20
February 3	18	20	February 17	17	20
February 4	18	20	February 18	17	20
February 5	18	20	February 19	17	20
February 6	18	20	February 20	17	20
February 7	18	20	February 21	17	20
February 8	18	20	February 22	17	20
February 9	18	20	February 23	17	20
February 10	18	20	February 24	17	20
February 11	18	20	February 25	17	20
February 12	18	20	February 26	17	20
February 13	18	20	February 27	17	20
February 14	18	20	February 28	17	20
			February 29	17	20

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March

Day	ON delay (minutes)	OFF delay (minutes)	Day	ON delay (minutes)	OFF delay (minutes)
March 1	17	20	March 16	16	19
March 2	17	20	March 17	16	19
March 3	17	20	March 18	16	19
March 4	17	19	March 19	16	19
March 5	17	19	March 20	16	19
March 6	17	19	March 21	16	19
March 7	17	19	March 22	16	19
March 8	17	19	March 23	16	19
March 9	17	19	March 24	16	19
March 10	17	19	March 25	16	19
March 11	16	19	March 26	16	19
March 12	16	19	March 27	16	19
March 13	16	19	March 28	16	19
March 14	16	19	March 29	16	19
March 15	16	19	March 30	16	19
			March 31	16	19

April

Day	ON delay (minutes)	OFF delay (minutes)	Day	ON delay (minutes)	OFF delay (minutes)
April 1	16	19	April 16	15	19
April 2	16	19	April 17	15	19
April 3	15	19	April 18	15	19
April 4	15	19	April 19	15	19
April 5	15	19	April 20	15	19
April 6	15	19	April 21	15	19
April 7	15	19	April 22	15	19
April 8	15	19	April 23	15	19
April 9	15	19	April 24	15	19
April 10	15	19	April 25	15	19
April 11	15	19	April 26	14	19
April 12	15	19	April 27	14	19
April 13	15	19	April 28	14	19
April 14	15	19	April 29	14	19
April 15	15	19	April 30	14	19

May

Day	ON delay (minutes)	OFF delay (minutes)	Day	ON delay (minutes)	OFF delay (minutes)
May 1	14	19	May 16	14	18
May 2	14	19	May 17	14	18
May 3	14	19	May 18	14	18
May 4	14	18	May 19	13	18
May 5	14	18	May 20	13	18
May 6	14	18	May 21	13	18
May 7	14	18	May 22	13	18
May 8	14	18	May 23	13	18
May 9	14	18	May 24	13	18
May 10	14	18	May 25	13	18
May 11	14	18	May 26	13	18
May 12	14	18	May 27	13	18
May 13	14	18	May 28	13	18
May 14	14	18	May 29	13	18
May 15	14	18	May 30	13	18
			May 31	13	18

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June

Day	ON delay (minutes)	OFF delay (minutes)	Day	ON delay (minutes)	OFF delay (minutes)
June 1	13	18	June 16	12	18
June 2	13	18	June 17	12	18
June 3	13	18	June 18	12	18
June 4	13	18	June 19	12	18
June 5	13	18	June 20	12	18
June 6	13	18	June 21	12	18
June 7	13	18	June 22	12	18
June 8	13	18	June 23	12	18
June 9	13	18	June 24	12	18
June 10	12	18	June 25	12	18
June 11	12	18	June 26	12	18
June 12	12	18	June 27	12	18
June 13	12	18	June 28	12	18
June 14	12	18	June 29	12	18
June 15	12	18	June 30	12	18

July

Day	ON delay (minutes)	OFF delay (minutes)	Day	ON delay (minutes)	OFF delay (minutes)
July 1	12	18	July 16	12	18
July 2	12	18	July 17	12	18
July 3	12	18	July 18	12	18
July 4	12	18	July 19	12	18
July 5	12	18	July 20	12	18
July 6	12	18	July 21	13	18
July 7	12	18	July 22	13	18
July 8	12	18	July 23	13	18
July 9	12	18	July 24	13	18
July 10	12	18	July 25	13	18
July 11	12	18	July 26	13	18
July 12	12	18	July 27	13	18
July 13	12	18	July 28	13	18
July 14	12	18	July 29	13	18
July 15	12	18	July 30	13	18
			July 31	13	18

August

Day	ON delay (minutes)	OFF delay (minutes)	Day	ON delay (minutes)	OFF delay (minutes)
August 1	13	18	August 16	14	18
August 2	13	18	August 17	14	18
August 3	13	18	August 18	14	18
August 4	13	18	August 19	14	18
August 5	13	18	August 20	14	18
August 6	13	18	August 21	14	18
August 7	13	18	August 22	14	18
August 8	13	18	August 23	14	18
August 9	13	18	August 24	14	18
August 10	13	18	August 25	14	18
August 11	13	18	August 26	14	18
August 12	14	18	August 27	14	19
August 13	14	18	August 28	14	19
August 14	14	18	August 29	14	19
August 15	14	18	August 30	14	19
			August 31	14	19

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September

Day	ON delay (minutes)	OFF delay (minutes)	Day	ON delay (minutes)	OFF delay (minutes)
September 1	14	19	September 16	15	19
September 2	14	19	September 17	15	19
September 3	14	19	September 18	15	19
September 4	15	19	September 19	15	19
September 5	15	19	September 20	15	19
September 6	15	19	September 21	15	19
September 7	15	19	September 22	15	19
September 8	15	19	September 23	15	19
September 9	15	19	September 24	15	19
September 10	15	19	September 25	15	19
September 11	15	19	September 26	15	19
September 12	15	19	September 27	16	19
September 13	15	19	September 28	16	19
September 14	15	19	September 29	16	19
September 15	15	19	September 30	16	19

October

Day	ON delay (minutes)	OFF delay (minutes)	Day	ON delay (minutes)	OFF delay (minutes)
October 1	16	19	October 16	16	19
October 2	16	19	October 17	16	19
October 3	16	19	October 18	16	19
October 4	16	19	October 19	16	19
October 5	16	19	October 20	17	19
October 6	16	19	October 21	17	19
October 7	16	19	October 22	17	19
October 8	16	19	October 23	17	19
October 9	16	19	October 24	17	19
October 10	16	19	October 25	17	19
October 11	16	19	October 26	17	19
October 12	16	19	October 27	17	20
October 13	16	19	October 28	17	20
October 14	16	19	October 29	17	20
October 15	16	19	October 30	17	20
			October 31	17	20

November

Day	ON delay (minutes)	OFF delay (minutes)	Day	ON delay (minutes)	OFF delay (minutes)
November 1	17	20	November 16	18	20
November 2	17	20	November 17	18	20
November 3	17	20	November 18	18	20
November 4	17	20	November 19	18	20
November 5	17	20	November 20	18	20
November 6	17	20	November 21	18	20
November 7	17	20	November 22	18	20
November 8	17	20	November 23	18	20
November 9	17	20	November 24	18	20
November 10	17	20	November 25	18	20
November 11	17	20	November 26	18	20
November 12	18	20	November 27	18	20
November 13	18	20	November 28	18	20
November 14	18	20	November 29	18	20
November 15	18	20	November 30	18	20

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December

Day	ON delay (minutes)	OFF delay (minutes)	Day	ON delay (minutes)	OFF delay (minutes)
December 1	18	20	December 16	19	20
December 2	18	20	December 17	19	20
December 3	18	20	December 18	19	20
December 4	19	20	December 19	19	20
December 5	19	20	December 20	19	20
December 6	19	20	December 21	19	20
December 7	19	20	December 22	19	20
December 8	19	20	December 23	19	20
December 9	19	20	December 24	19	20
December 10	19	20	December 25	19	20
December 11	19	20	December 26	19	20
December 12	19	20	December 27	20	21
December 13	19	20	December 28	20	21
December 14	19	20	December 29	20	21
December 15	19	20	December 30	20	21
			December 31	20	21

15 SUBSTITUTION READS FOR TRANSFER

15.1 Application of Clause 15

15.1.1 The requirements of clause 15.2 and 15.3 apply during a *retailer of last resort* event or where a participating jurisdiction has requested *AEMO* to undertake *end-use customer* transfers requiring *metering data substitutions*.

15.1.2 The requirements of clause 15.2 are applicable to all type 5 *metering installations* requiring the management of *metering data substitutions* and *estimations* for *end-use customer* transfer.

15.1.3 The requirements of clause 15.3 are applicable to all type 6 *metering installations* requiring the management of *metering data substitutions* and *estimations* for *end-use customer* transfer.

15.2 Type 5 Metering Installations

15.2.1 The *Metering Data Provider* must ensure the correct management of the *NMI data stream* status within MSATS for the *connection points* concerned that meets Jurisdictional requirements for *settlements* and *profile* preparation.

15.2.2 The *Metering Data Provider* must ensure that *metering data* is provided to the old *financially responsible Market Participant* up to the transfer date.

15.2.3 The *Metering Data Provider* must ensure that *metering data* is provided to the new *financially responsible Market Participant* from the transfer date which may include provision of a new forward *estimation*.

15.2.4 The *Metering Data Provider* must ensure forward *estimations* are undertaken in accordance with clause 3 of this *metrology procedure*.

15.2.5 The *Metering Data Provider* may *substitute* the *metering data* up to the transfer date in order to facilitate *end-use customer* end billing. Notification to the *Local Network Service Provider, Local Retailer*, the old and new *financially responsible Market Participant* via the *metering data* file that has a format compliant with the Meter Data File Format Specification with the following configuration:

   (a) Utilise a reason code of "00", with an entry in the free text field of "*AEMO* directed *substitution*", and

   (b) Utilise a transaction code of N.

15.2.6 The *Metering Data Provider* must ensure that all *substituted metering data* is replaced by actual *metering data* as per the normal manual *meter* reading processes.

15.3 Type 6 metering installations

15.3.1 The *Metering Data Provider* must ensure the correct management of the *NMI data stream* status within MSATS for the *connection points* concerned that meets Jurisdictional requirements for *settlements* and *profile* preparation.

15.3.2 The *Metering Data Provider* must ensure that *metering data* is provided to the old *financially responsible Market Participant* up to the transfer date.

15.3.3   The *Metering Data Provider* must provide the necessary type 6 *substitution* readings labelled with a 'Final' quality flag.

15.3.4   The *Metering Data Provider* must ensure that *metering data* is provided to the new *financially responsible Market Participant* from the transfer date which may include provision of a new forward *estimation*.

15.3.5   The *Metering Data Provider* must ensure forward *estimations* are undertaken in accordance with clause 4 of this *metrology procedure*.

15.3.6   The *Metering Data Provider* must calculate the Final *substitution* reading value in accordance with clause 4 of this *metrology procedure*.

15.3.7   The Metering Data Provider must notify the *Local Network Service Provider*, *Local Retailer*, the old and new *financially responsible Market Participant* for the *connection point* of the data *substitution* undertaken. Notification is via the *metering data* file that has a format compliant with the Meter Data File Format Specification with the following configuration:

   (a)   Utilise a reason code of "00", with an entry in the free text field of "*AEMO* directed *substitution*"; and

   (b)   Utilise a transaction code of 'N'.

15.3.8   The *Metering Data Provider* must *validate* the final *substituted* readings, recalculate and update the *metering data* values where:

   (a)   The final *substitution* is found to be greater than the *actual metering data* when next obtained; or

   (b)   Following consultation and agreement from the old and new *financially responsible Market Participant*, the *Local Retailer* and the *Local Network Service Provider* for the *connection point* a new agreed value as per clause 4.3.4 (Type 64) must be provided.