UNMETERED LOAD GUIDELINE - DETERMINATION OF DEVICE LOAD AND ANNUAL ENERGY CONSUMPTION FOR UNMETERED DEVICE TYPES

PREPARED BY:	AEMO MARKETS
VERSION:	1.1
EFFECTIVE DATE:	01 December 2017
STATUS:	Final

Approved for distribution and use by:

APPROVED BY:	PETER GEERS
TITLE:	EXECUTIVE GENERAL MANAGER, MARKETS

DATE: 28 / 02 / 2017

VERSION RELEASE HISTORY

Version	Effective Date	Summary of Changes
1.0	3 April 2014	First Issue
1.1	1 December 2017	Updated to incorporate: • National Electricity Amendment (Expanding competition in metering and related services) Rule 2015. No.12; • National Electricity Amendment (Embedded Networks) Rule 2015 No. 15; and • National Electricity Amendment (Meter Replacement Processes) Rule 2016 No. 2.

CONTENTS

1. INTRODUCTION

1.1. Purpose and Scope

This Unmetered Load Guideline (**Guideline**) assists persons who wish to apply to have an Unmetered Device included in the Load Table and outlines the process by which AEMO will consider an application to update the Load Table, as contemplated by section 12.1.4(d) of Metrology Procedure: Part B.

This Guideline supplements Metrology Procedure: Part B. The NER and the *National Electricity Law* prevail over this Guideline to the extent of any inconsistency.

1.2. Definitions and Interpretation

The Retail Electricity Market Procedures – Glossary and Framework:

(a) is incorporated into and forms part of this Guideline; and

(b) should be read with this Guideline.

1.3. Related AEMO Documents

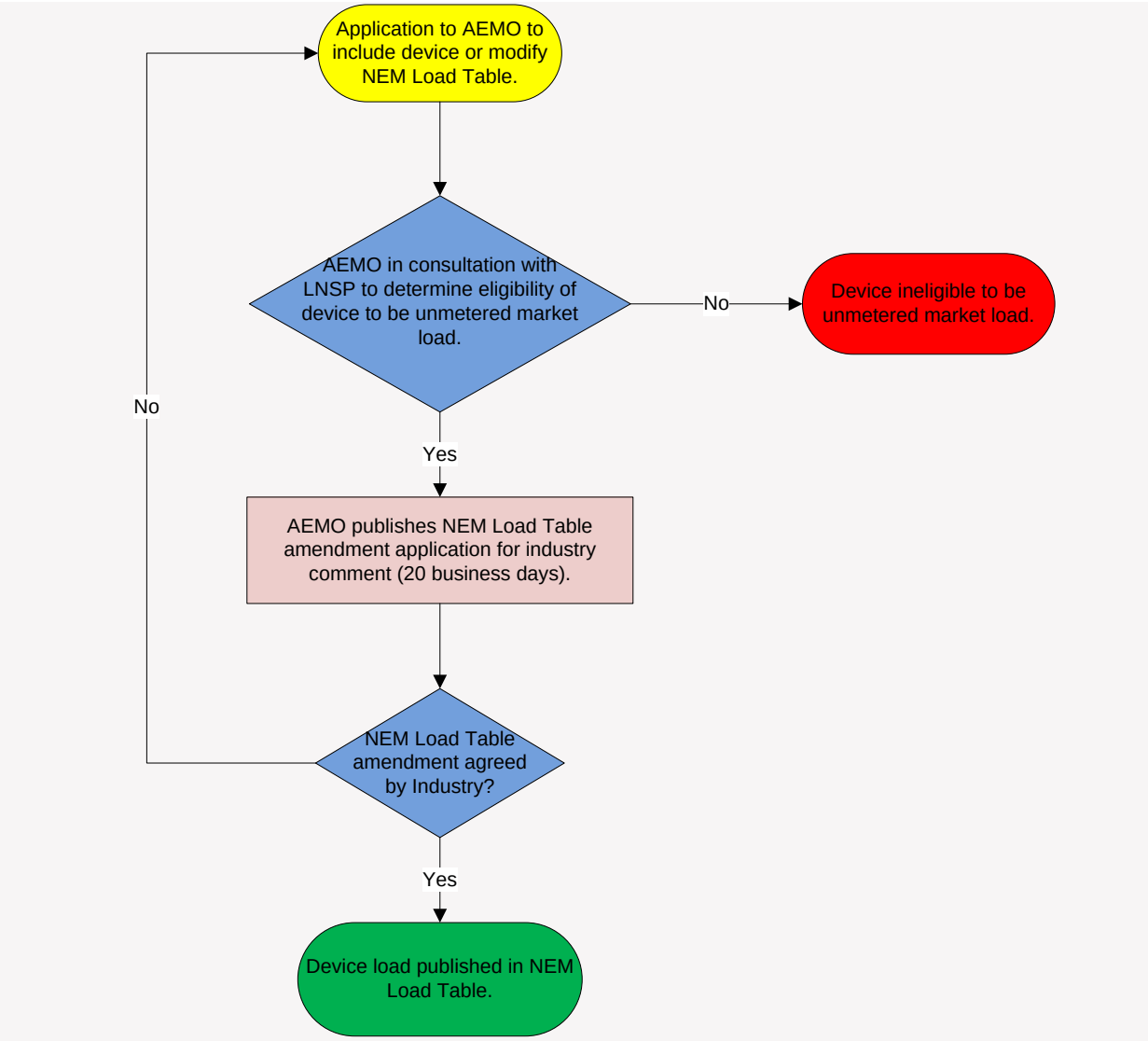
Title	Location
Retail Electricity Market Procedures – Glossary and Framework	http://www.aemo.com.au/Electricity/National-Electricity-Market-NEM/Retail-and-metering/Glossary-and-Framework
Metrology Procedure: Part A	http://www.aemo.com.au/Electricity/National-Electricity-Market-NEM/Retail-and-metering
Metrology Procedure: Part B	http://www.aemo.com.au/Electricity/National-Electricity-Market-NEM/Retail-and-metering

2. APPLICATION PROCESS

2.1. The Process

The process by which AEMO will consider whether to update the Load Table with the inclusion of a new Unmetered Device is depicted in Figure 1.

Figure 1 Application for Updates to Load Table



2.2. The Outcome

The annual *energy* consumption is determined for Unmetered Devices and their associated control equipment, expressed in watt hours, is what appears in the Load Table. This annual *energy* consumption is then converted into a single calculated Unmetered Device wattage using the algorithm detailed in clause 12.3 of Metrology Procedure: Part B.

3. DISCLAIMER

The inclusion of an Unmetered Device in the Load Table:

- merely reflects an agreement to use a value that facilitates the calculation of *energy* consumed by that Unmetered Device when calculating *metering data* for that Unmetered Device; and
- is not an approval from AEMO to use the Unmetered Device and does not absolve the applicant who sought its inclusion from obtaining all necessary approvals related to acceptance of the Unmetered Device's performance and use from relevant authorities, typically LNSPs and road authorities.

4. MATERIAL TO SUPPORT APPLICATION

Any person may submit any Unmetered Device for inclusion in the Load Table by writing to AEMO and providing the information detailed in section 4.1.

4.1. Generally

An application must be accompanied with the following information and tests in respect of the relevant Unmetered Device:

(a) A unique description of the Unmetered Device detailing how it (and any applicable related control equipment) will be marked to ensure unique identification. If the Unmetered Device has multiple electrical configurations, or parameter settings, a description of the marking and the form of the marking that will uniquely identify each configuration or setting.

(b) The nature of the *load* or annual *energy* consumption measurement tests in respect of the Unmetered Device.

(c) The *load* or annual *energy* consumption of the Unmetered Device must be related to its normal and stabilised operating conditions and include the *load* or *energy* consumption of the control equipment.

(d) Evidence that the electricity consumption of a Controlled Unmetered Device is predictable or evidence of its *load* cycle.

(e) Details of the approach used to determine:

  (i) the actual or theoretical operating model from which the operating cycle of the Unmetered Device is derived;

  (ii) the typical operating cycle used upon which the single operating cycle *energy* consumption is based; and

  (iii) the typical number of operating cycles expected in an annual period.

(f) Evidence that demonstrates that the proposed *load* or annual *energy* consumption for a Controlled Unmetered Device is a statistically relevant figure that can be used as the basis for calculating the *energy* consumption of the Unmetered Device.

(g) This test report value for Unmetered Device *load* would be submitted with the proposal to include or modify a controlled unmetered *market load* in the Load Table.

(h) Unmetered Device *load* test results that demonstrate statistical rigour must be based on sample sizes where a 95% assurance (confidence level) that the mean for the Unmetered Device *load* (or annual *energy* consumption) value of the sample is within +/- 2% (precision) of the true mean *load* (or annual *energy* consumption) value for the Unmetered Device population can be established.

(i) Controlled Unmetered Device *load* test results based on a test sample size of a minimum of 10 Unmetered Devices will be acceptable. The Controlled Unmetered Device *load* test sample size could be less than 10 if the applicant can provide reports or other evidence from manufacturers to substantiate the use of smaller sample sizes where the required confidence level and precision can still be achieved.

(j) Formal confirmation supporting the installation and use of the Unmetered Device (such as a letter from a person proposing to use the Unmetered Device or an LNSP).

(k) Evidence that the proposed Unmetered Device load or annual energy consumption was obtained from tests conducted by a NATA accredited laboratory or an overseas equivalent. A test report from a test laboratory that is accredited with an organisation that is a signatory to the ILAC Mutual Recognition Agreement is considered by AEMO to be the equivalent to a test report from a NATA accredited laboratory. Test report results must include the following:

  (i) Test date.

  (ii) Test measurement accuracy.

(iii) A list of relevant *Australian Standards* or International Standards against which the test measurements and test methodology were undertaken.

(iv) A brief description of the Unmetered Device conditioning to provide confidence that the tests reflect its normal and stabilised operating conditions.

(v) Evidence that test sample size represents a statistically relevant sample under a relevant sampling standard.

(vi) Test measurement parameters for street lighting must include:

(A) Test results are to be measured at a supply *voltage* of 250 V.

(B) Lamp conditioning (not LED) – a minimum of 100 hours operation at 250 V to condition lamps. Lamps are allowed to cool down for at least 24 hours before commencement of *load* testing.

(C) Input *voltage* – measured after a continuous 2-hour period of operation.

(D) Running *current* – measured after a continuous 2-hour period of operation.

(E) *Power factor* – measured at the same point in time as the running *current*.

(F) *Load* (watts) – measured after a continuous 2 hours of operation.

(G) LED luminaires must be stabilized in accordance with IES LM-79 before input *voltage*, running *current*, *power factor* and *load* (watts) measurements are taken.

4.2. Determination of a Single Unmetered Device Load Value for Controlled Unmetered Devices

Controlled Unmetered Devices have control equipment that switches the Unmetered Device on and off in accordance with an On/Off Table. This form of control regulates the *load* to a single value that is obtained from test report information. The *load* for each Unmetered Device type must be the wattage for the Unmetered Device and its associated control equipment.

4.3. Determination of Annual Energy Consumption for Uncontrolled Unmetered Devices

As other Unmetered Devices do not have either an Unmetered Device *load* value or an accurately defined switching arrangement, Metrology Procedure: Part B requires that the annual *energy* consumption be determined for these Unmetered Devices.

The following process is used to determine the annual *energy* consumption and is based on the principle that the *energy* profile of an Unmetered Device is predictable over a 12-month cycle:

(a) Determine the *energy* consumption of an Unmetered Device and its control equipment over a single operating cycle.

(b) Determine the number of operating cycles over a 12-month period.

(c) Calculate the product of *energy* consumption per cycle and the number of cycles performed over a year to determine the annual *energy* consumption for the Unmetered Device and its control equipment.

This annual *energy* consumption value should be submitted with the application.

4.4. Load value

End User billing and *settlements* are based on *calculated metering data* for each TI where:

***Energy* consumed = (Unmetered Device wattage) x (Number of Unmetered Device) x (Period *load* is switched on) / 2**

If the Unmetered Device wattage or *energy* consumption can be changed through the application of different electrical configurations, or parameter settings, the *energy* consumed by the Unmetered Device will not be calculated correctly. The impact on *calculated metering data* will, therefore, compromise End User billing and *settlements*.

The Load Table is based on the electrical configurations and setting parameters for an Unmetered Device as specified in the application. If more than one electrical configuration or setting parameter is proposed, AEMO requires a further application setting out the proposed changed electrical configurations or parameter settings.

4.5. Control Equipment

It is a condition of including an Unmetered Device in the Load Table that it will be used exactly as it has been tested, i.e. the *load* test is to measure the combined Unmetered Device and control equipment *load*.

Where control equipment has not been included in the *load* test measurement, a clear statement indicating that Unmetered Device *load* tests were undertaken without control equipment and separate *load* test measurements for the control equipment (conducted by a *NATA* accredited laboratory or an overseas equivalent) must be provided.

4.6. Sampling for LED devices

IES LM-79 is a methodology for the electrical and photometric measurement of solid-state lighting products (i.e. **LED products**). The Annex to IES LM-79 explains how the measurement of LED products differs from the measurement of traditional lamps and luminaires and that traditional test methods and the measurement of one sample is insufficient for LED products. Therefore, appropriate sampling and averaging of results is required for LED products.

Based on the background information provided in IES LM-79, AEMO requires the submission of *load* test results that demonstrate statistical rigour for LED street lighting. *Load* test results must be based on sample sizes where a 95% assurance (confidence level) that the mean *load* value of the sample is within +/- 2% (precision) of the true mean *load* value for the Unmetered Device population can be established.

AEMO will accept *load* test results from a *NATA* accredited laboratory (or an overseas equivalent) based on test results from a minimum of 10 Unmetered Devices. The *load* test sample size could be less than 10 if an applicant can provide reports or other evidence, such as from manufacturers, to substantiate the use of smaller sample sizes where the required confidence level and precision can still be achieved.

Where an applicant provides evidence to substantiate a smaller sample size, the number of Unmetered Devices to be tested will be “n”, from the sample size calculation detailed below, rounded up to the next whole number.

$$n = \frac{z^2 \times cv^2}{e^2}$$

Where

n Sample size.

z Standard normal distribution value at a specific confidence level (i.e. 1.96 for 95% confidence level).

e Desired level of precision (i.e. 0.02 or 2%).

cv Coefficient of variance, defined as the standard deviation of the readings divided by the mean. If no readings are available, the cv can be estimated initially as 0.5.

Sample size calculation source – International Performance Measurement and Verification Protocol compiled by the Efficiency Valuation Organisation.