Meter Asset Management Plan

Version 2.5

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for

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Document Version Control

Version	Date	Details
1.0	Nov 2003	Initial version.
2.0	2/11/2006	Updated to comply with the requirements for Meter asset management plans under the National Electricity Rules.
2.1	22/12/06	Updated following review by NEMMCO – refer sections. Unmetered supply section added.
2.2	29/01/08	Reviewed and updated to align with audit findings and current metering related data.
2.3	29/05/08	To define meter testing by variables including satisfying the statistical normality requirement as required in AS 1284.13.
2.4	27/07/12	To define roles, responsibilities and new structure pertaining to Network Services restructure of 2011 and to address LV CT testing on a sampling basis in view of AEMO guidelines as per CTTWG recommendations.
2.5	27/05/14	Minor formatting, update of Current Transformer details and update of new and replacement meter tables.

1. Metering Asset Management Plan

1.1 Executive Summary

The Meter Asset Management Plan (MAMP) is required to comply with the National Electricity Rules and related Procedures under the Rules; and the ACT Electricity Metering Code.

The MAMP covers all Type 5, 6 and 7 metering installations that are the responsibility of *ActewAGL* Distribution as a Local Network Service Provider. This includes both 1st and 2nd tier Connection Points.

ActewAGL Distribution has approximately 187,000 meters at Type 5 and 6 connection points. Based on the National Electricity Rules (NER), this MAMP covers the:

a) Test plan for meters and low voltage current transformers (LV CTs);

b) Meter replacement program on the basis of meter age, and in-service compliance testing;

c) Inspection of metering installations; and

d) Load Inventory Audits of Unmetered Supply (Type 7)

The current review reflects the organizational structure changes and addresses testing of LV CTs on a sampling basis

Appropriate resources and funding budgets are validated and approved annually to operate the plan.

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Tables and Figures

1.2 Preface

The MAMP has been prepared to meet AEMO's requirements for *ActewAGL* to operate as an accredited Type 5B and Type 6B metering provider. The document has been written in accordance with AEMO's guidelines on Metering Asset Management Plan (MAMP) to cover testing, inspection and replacement programs of metering assets installed on *ActewAGL* Distribution network.

Following the Independent Competition and Regulatory Commission's *Final Decision, Review of Metrology Procedures* in December 2005, ActewAGL commenced the installation of Type 5 (interval) meters in March 2007. The Final Decision required ActewAGL Distribution to install interval meters on a new, replacement and customer requested basis.

Types 5 meters have a higher capital and recurrent costs than Type 6 meters. The higher costs are associated with their purchase price, maintenance requirements, life expectancy and metering costs. The interval meter installation program requires additional expenditure by ActewAGL to support the ongoing replacement program. ActewAGL factors these costs in the annual Network Pricing Reports prior to and during the installation program.

If the introduction of Smart Meters was to be mandated in the ACT, then significant investment will be required to update computer systems and business processes to manage the increased interval meter numbers and associated meter data volumes. Together, meter testing, replacement and interval meter installation programs will ensure the continuing reliability of electricity metering within the context of the national introduction of "smart" metering. The COAG/MCE[1] findings for the introduction of smart meters based on their cost benefit analysis model was deemed to be negative for the ACT, therefore resulting in no mandate to introduce smart metering in the ACT.

This Meter Asset Management Plan (MAMP) is prepared for use by *ActewAGL* Distribution. The expenditure necessary for the implementation of the plan is included in the approved annual budgets of *ActewAGL* Distribution.

This document (version 2.0) signed on 02 November 2006 by the then General Manager Networks, required further clarifications by AEMO (previously known as NEMMCO). Version 2.1 was produced in response, and resubmitted to AEMO for its approval that was obtained in Jan 2007.

As the MAMP is a living document, a review of information contained in the MAMP was undertaken in December 2007 to determine relevance and accuracy, resulting in the creation of Version 2.2.

Version 2.3 was produced to address the requirement of statistical "normality" criteria as described in AS/NZ 1284 Part 13 to test meters by Variables which was not covered in earlier versions.

Current version 2.4 reflects the ActewAGL Distribution Divisions' restructures, responsibilities, and other updates including LVCT testing on a sampling basis. Also projected testings and replacement targets have been reviewed.

This document is prepared to meet AEMO's requirements for ActewAGL Distribution to operate as a Type 5B & 6B metering provider.

[1] COAG/MCE revisited the subject of smart metering in June 2012, and noted that there have been significant developments in the rollout of smart metering and interval metering, and that a significant number of pilots and trials of smart meter related technologies, products and services are underway in Australia. However, apart from Victoria, where a mandated rollout is under way, no other jurisdiction is expected to mandate a smart meter rollout in the next few years, although commercial and consumer-led deployments are possible

1.3 Scope

As defined in the Rules Chapter 7 and the National Metrology Procedure, Part A; the Meter Asset Management Plan applies to the types of Metering Installations associated with *ActewAGL* Distribution network Tier 1 and Tier 2 connection points:

- Type 5 Metering Installations: Meters and LV Current Transformers (where applicable)
- Type 6 Metering Installations: Meters and LV Current Transformers (where applicable)
- Type 7: Unmetered supplies

ActewAGL Distribution as Local Network Service Provider (LNSP) is the Rules delegated Responsible Person (RP) for Type 5 and Type 6 Metering Installations for both Tier 1 and Tier 2 sites.

This document also outlines testing and inspection methodology to enable *ActewAGL* achieving and maintaining AEMO accreditation to be a Metering Provider in the National Electricity Market for Type 5B and Type 6B metering installations.

1.4 Abbreviations and Definitions

ACT	Australian Capital Territory
ActewAGL	ActewAGL Distribution
AEMC	Australian Energy Market Commission
AEMO	Australian Energy Market Operator (renamed from NEMMCO)
AER	Australian Energy Regulator
ANMI	Australian National Measurement Institute
AS	Australian Standard
COAG	Council of Australian Governments
CT	Current Transformer
CTTWG	Current Transformer Testing Working Group
DM5	Document Management system used by *ActewAGL*
Ecowise	Ecowise Services (Australia) Pty. Ltd.
ICRC	Independent Competition and Regulatory Commission
LNSP	Local Network Service Provider
LV	Low Voltage
MAMP	Meter Asset Management Plan
MAM	Meter Asset Management
MAT	Meter Asset Testing
MCE	Ministerial Council on Energy
MRIM	Manually Read Interval Meter
NATA	National Association of Testing Authorities
NEM	National Electricity Market
NEMMCO	National Electricity Market Management Company Limited
NMI	National Market Identifier

1.5 References

National Electricity Rules, Chapter 7 – Metering (AEMC)

National Electricity Market - Metrology Procedure; Part A and Part B (AEMO)

ACT Electricity Metering Code 2003

ICRC Final Decision Review of Metrology Procedure December 2005

National Measurement Act 1960

National Supply Act 1995

National Supply (General) Regulation 2002

Metering Asset Management plan - Information Paper (AEMO)

Alternative Testing Minimum Requirements – LVCT Metering Installations (AEMO)

ActewAGL Service and Installation Rules

AS 1284.1: General Purpose induction watt-hour meter

AS/NZS 1284.13: Electricity metering: In-service compliance testing

AS62052.11- 2005: Electricity Metering Equipment (AC) – General Requirements, tests and test conditions

AS62053.11-2005: Electricity Metering Equipment (AC) – Particular Requirements, Part 11: Electromechanical Meters for active energy (Classes 0.5, 1 and 2)

AS62053.21-2005: Electricity Metering Equipment (AC) – Particular Requirements, Part 21: Static meters for active energy (Classes 1 and 2)

AS62053.22-2005: Electricity Metering Equipment (AC) – Particular Requirements, Part 22: Static meters for active energy (Classes 0.2S and 0.5S)

AS1675-1986: Current Transformers – Measurement and Protection

AS60044.1-2007: Instrument Transformers Part 1: Current Transformer

Document DM#547074: *Meters.xls (ActewAGL)*

DM5 G10/4157/1: Metering Type 5/6 – manual, processes, audits, programs and software

Procedure DM5# 299732: In-service Meter Compliance Testing and Bulk Replacement (ActewAGL)

Work Instruction *DM5# 335441: CT Testing for CT Meter Installation (ActewAGL)*

Form *DM5# 335449: CT Testing Result sheet (ActewAGL)*

Form *DM5# 335428: CT Meter Visual Inspection Results (ActewAGL)*

Registry file No. G08/0126/4 (ActewAGL)

Ecowise instruction *M115 Safety Instructions Meter Testing*

1.6 Summary of Metering Installations

Ending December 2011, ActewAGL has a population of active meters totalling 187,452 approximately, comprising 185,000 Type 6 meters and 2,000 Manually Read Interval Meter (MRIM) Type 5 meters. Included in the total are 1,723 transformers connected metering installations and 41,000 Type 5 meters that are currently being read as Type 6 meters.

A summary of the installed population of meters and LVCTs ended December 2011 and a short term forecast is provided in the following Table.

Table 1-1: Summary of Metering Assets and Forecast

Year	Type 5	Type 6	Total Meters	Proportion of Type 5 meters	LVCTs
Installed base 2011	43,000	144,452	187,452	22.9%	5,169
2012	50,000	140,452	190,452	26.2%	6,369
2013	57,000	136,452	193,452	29.5 %	7,569
2014	64,000	132,452	196,452	32.6%	8,769
2015	71,000	128,452	199,452	35.6%	9,969

Installed meters are of models / designs commonly used are:

- Landis & Gyr - Ampy/Email Q3, Q4, EM5100, EM5300, A11, EM3332, EM3030, BAZ, SD variants
- WF - WF, WF2
- EDMI - Mk 10, Mk 7A, Mk 7C
- Nilsen - EMS2100, EMS2600
- Secure/PRI - Sprint 200, ICM 400, ICM 500B

Note: Full details of installed meters are maintained in a spreadsheet titled *ActewAGL Meters.xls* DM#547074, which is used to track the meter test and replacement programs. This spreadsheet is based on *ActewAGL*'s Meter Asset Management (MAM) system. The spreadsheet is updated with meter installation, removals and test details as these occur; with the meter totals updated each time the MAMP is revised.

1.7 Resources with Organisational Structure

ActewAGL Distribution utilises its own metering staff to carry out testing of all direct connected Type 6 meters.

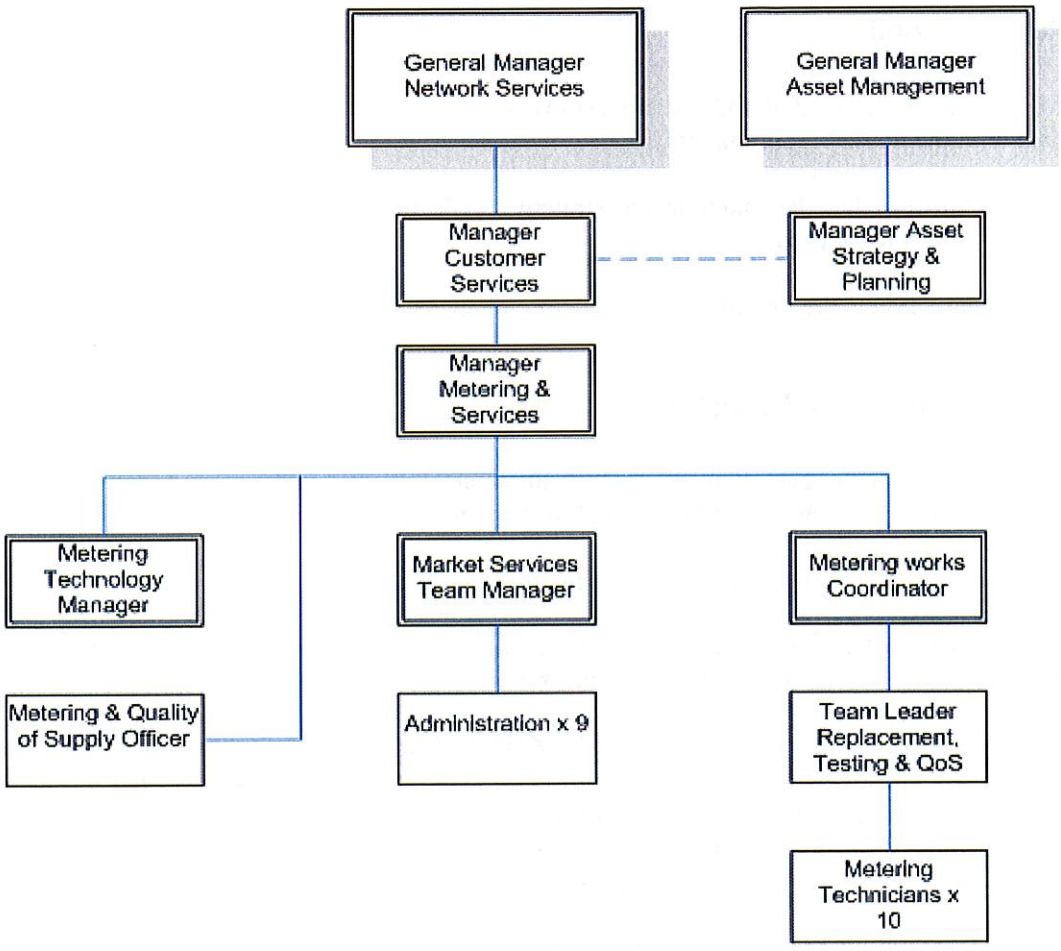
ActewAGL Network Services business has 10 suitably qualified Electrical Technicians capable of testing and replacement of meters as required. Under usual business operating conditions, these staff have the capability of testing 2,000 meters in the field on an annual basis. If required, *ActewAGL* Distribution is able to divert resources to increase the number of meters tested annually to meet projected forecasts.

Having no meter laboratory of its own, *ActewAGL* Distribution relies on the meter manufacturers' quality systems.

ActewAGL technicians install all direct connected interval meters that are intended for the purpose of being read as Type 6 accumulation Time of Use. ActewAGL utilises Ecowise[2], a local electrical contractor, to conduct testing and replacement of all Type 5 MRIM meters.

1.8 ActewAGL Organisational Chart – Metering Responsibilities

(As of *January 2012. Structure to be updated in scheduled major doc review ~ Dec 2014)*



[2] Ecowise was originally a part of ACTEW Corporation (an earlier version of today's *ActewAGL*) and thereby is quite familiar with *ActewAGL*'s technologies and processes. Ecowise has a recognised Quality System and work instructions dealing with metering functions.

1.9 Financial and Company Policy

ActewAGL Distribution annual Capex and Opex budgets have the provision of the necessary funds for the company's asset management.

ActewAGL Distribution Network Services' budgets for implementation of MAMP that includes Program of Works (PoW) for testing, replacement and inspection of metering installations are validated annually through Project approvals by the General Manager Network Services and General Manager Asset Management in liaison with the company's financial delegate, Commercial Manager.

1.10 Review Period

The MAMP is to be reviewed and updated at least every two (2) years or as required to ensure that it is up-to-date with the market requirements.

If the review identifies that the maintenance strategy needs to be amended, the MAMP will be resubmitted to AEMO for approval.

The current review reflects the organizational structure changes and addresses testing of LV CTs on a sampling basis.

1.11 Testing Process and Capability

The purpose of the Meter Test Plan is to test the metrological functions and determine the measurement accuracy performance of meters and instrument transformers.

All *ActewAGL* meter and CT tests are carried out in-situ.

ActewAGL has sufficient staff resources to support a Type 6 meter test program of 1,500 meters per annum. In addition, the ActewAGL contractor currently tests 20 Type 5 MRIM meters per annum.

ActewAGL carries out in-service testing to AS/NZ 1284 Part 13 using calibrated portable test equipment. Meters are tested in-situ, which requires the disconnection of the load and electricity supply to the customer for a short time up to 30 minutes for three phase meters and less time for single phase meters. It is not preferred that meters be removed from service and sent to the manufacturer for testing unless the portable testing equipment becomes unavailable.

The test methodology used by ActewAGL is detailed in the document *DM5# 299732; In-service Meter Compliance Testing and Bulk Replacement*. ActewAGL follows AS/NZ 1284 Part 13 "In service compliance testing" Figure 2. Meter population samples are based on "Variables" numbers and then checked for Normality using the statistical software package "mini tab". If the Normality criteria are met then the results will stand, if not, then further tests are carried out to satisfy "Attribute" numbers. After satisfying attribute numbers the sample is tested for Normality again for future testing of this population.

For full details of the meter test program refer to spreadsheet *ActewAGL Meters.xls* DM#547074.

LVCTs are tested for Ratio Error and Phase-angle Error as per Rules requirement in accordance to their Standard of manufacture.

1.12 Test Plan

ActewAGL commenced testing Current Transformers (CT's) during the 2007 - 2008 financial year.

The planned testing program summarised below ensures that the backlog of testing is addressed by 30 June 2013, with all meters being tested on schedule thereafter.

Table 1-2: Meter testing program (Summary from *Meter .xls DM5# 547074*)

By 30 June:	2012	2013	2014	2015	2016	2017	2018	2019	2020	Total
Type 6 direct connected tests.	120	1,500	800	900	1,200	1,000	500	400	400	**6,820**
CT and Whole Current connected Type 5 tests.	54	20	20	20	20	20	20	20	20	**214**
ActewAGL Current Transformer tests.	48	170	170	170	170	170	170	170	170	**1,408**

The test equipment used by ActewAGL and Ecowise is suitable for the intended purpose of meter testing. For the testing of polyphase meters a polyphase meter test set will be used.

All direct connected and low voltage CT connected meters will be sample tested as per AS/NZ 1284 Part 13. Population sizes are made up of the meter manufacturer and the year purchased, with the sample size in accordance with AS/NZ 1284 Part 13 Table 2. Meter samples will be randomly selected using ActewAGL's Meter Asset Testing (MAT) software which has a random select functionality from the identified family of meters. Although the Rules requirement is that populations be based on the year of manufacture, ActewAGL does not record this information. ActewAGL records show only the year of purchase, not the year of manufacture; and the year of manufacture is *not* normally shown on the meter. Experience has shown the year of purchase and the year of manufacture are normally the same year.

The meter sample populations are not divided into sub-populations based on environmental or installation conditions. The ACT has a dry, non-corrosive environment. There are no significant environmental or installation variations that warrant separation of meters into separate populations based on their location.

If a sample fails for any reason, then the officer[3] responsible for electricity meter maintenance shall either:

- Re-define the populations and redo the entire compliance verification procedure on the alternate populations. The final analysis is completed using the data from the second sample.

or

- Deem the population to have failed and instigate the replacement of the entire population with new meters.

Meters that fail an accuracy test will be removed from service immediately and will be disposed of accordingly.

[3] This officer is a qualified senior technical officer with electrical engineering qualifications.

As required by Rules 7.6.1(e), the responsible person must not refuse a request received under paragraph (d) and must no later than five (5) business days prior to testing, advise:

1. the party making the request; and
2. where the Local Network Service Provider (LNSP) is the responsible person, and the financially responsible market participant,

   of:

   a. the location and time of tests; and

   b. the method of testing undertaken.

1.13 Inspection Plan

National Electricity Rules Table S7.3.3 requires Type 5 and 6 metering installations to be inspected when the meter is tested. Rules S7.3.2 (f) states that a typical inspection may include: check the seals, compare the pulse counts, compare the direct readings of meters, and verify meter parameters and physical connections, current transformer ratios by comparison. All ActewAGL test and inspection procedures address these requirements.

As CT meter testing is carried out using AS/NZ 1284 Part 13, all CT's installations that are not inspected as part of routine testing will be inspected as set out in the National Electricity Rules, Tables S7.3.2 and S7.3.3 presently this is every five years. Inspection of all CT sites was undertaken in 2008 and is next due to be re-inspected in 2013.

1.14 Replacement Meter Plan

ActewAGL has budgeted for the replacement of 3,650 meters per annum.

The following meters are targeted for replacement.

- Meters that have exceeded their life expectancy of 40 years and older (as of 31 December 2011, ActewAGL has on its network 16,781 meters that are in this category).
- With the exception of any meters used in pilot trials or installed for evaluation purposes any direct or low voltage CT connected Type 6 meter populations with less than 8 meters will be replaced rather than tested. All meters with jewelled bearings have been identified for disposal. (*Email-BAZ* all variants, *Email-SD*, *Email-SDP*, *W&F-WF2* and *Feranti-TM2C*).

All removed meters will be returned to the meter workshop where they will be disposed. Meters are not tested or refurbished once removed from service.

The meter replacement program summarised in the table below is covered by ActewAGL's approved and planned budgets. Refer Meter .xls DM5# 547074.

For Type 5 installations, testing of small meter populations is financially viable due to the capital cost of the meter.

Table 1-3: Replacement Meter Volumes & Capital Cost

By 30 June:		2015	2016	2017	2018	2019	2020	Total
Type 5	Qty	50	50	50	50	50	50	300
	$,000	$61	$61	$61	$61	$61	$61	$366
Type 6	Qty	3,600	3,600	3,600	3,600	3,600	3,600	21,600
	$,000	$1,264	$1,264	$1,264	$1,264	$1,264	$1,264	$7,584
Total	Qty	3,650	3,650	3,650	3,650	3,650	3,650	21,900
	$,000	$1,325	$1,325	$1,325	$1,325	$1,325	$1,325	$7,950

Note: 2012/13 $s. Figures do not include additional replacements due to failures found while testing.

1.15 New Meter Installation Plan

The table below summarises the planned new metering installations.

Table 1-4: New Meter Installations Volumes & Capital Cost

By 30 June:		2015	2016	2017	2018	2019	2020	Total
Type 5	Qty	150	150	150	150	150	150	900
	$,000	$525	$525	$525	$525	$525	$525	$3,150
Type 6	Qty	8,000	8,000	8,000	8,000	8,000	8,000	48,000
	$,000	$3,208	$3,208	$3,208	$3,208	$3,208	$3,208	$19,248
Total	Qty	8,150	8,150	8,150	8,150	8,150	8,150	48,900
	$,000	$3,733	$3,733	$3,733	$3,733	$3,733	$3,733	$22,398

Note: 2012/13 $s.

1.16 Current transformers (low voltage)

CT details and location are held in the MAM. The table below lists the totals for each Type and date of purchase. There are 1,723 ActewAGL sites with low voltage current transformers of which we are the responsible person for. The forecast number of new low voltage current transformer sites is approximately 400 per annum.

Instrument transformer details, such as Type, will be updated as part of the meter inspection and testing process.

The purchase date for CT's was never recorded in any of ActewAGL's systems prior to 2003, therefore no accurate CT records are available, however from ActewAGL's 2008 inspection of all CT installations, all identified information was entered into MAM such as CT type, manufacturer, ratio and serial number. MAM only allows for the back dating of 120 calendar days of information such as purchase date therefore resulting in an exponential increase of purchased meters for 2008.

However as a direct outcome from AEMO's Current Transformer Testing Working Group (CTTWG), ActewAGL is anticipating to sample test 10% of families of CT's that are 10 years of age or older and test results forwarded to AEMO. However for the interim, ActewAGL will continue with its 100% testing program until all aspects of the CTTWG strategy have been finalised.

Table 1-5: Current Transformers (May 2014)

Manufacturer	Type	DateOfPurchase	Count of SerialNo
Warburton & Frankie	MT	1967	3
Warburton & Frankie	LR	1980	10
Warburton & Frankie	LR	1988	6
Warburton & Frankie	TypeB	1989	3
Warburton & Frankie	TypeB	1990	9
Nilsen	MT	1993	7
Warburton & Frankie	LR	1994	3
Warburton & Frankie	MT	1994	6
Nilsen	MT	1994	1
Warburton & Frankie	LR	1999	12
Stemar	MT	1999	1
Stemar	MT	2000	2
Warburton & Frankie	MT	2003	3
Warburton & Frankie	LR	2004	49
Warburton & Frankie	Type C	2004	12
Warburton & Frankie	TypeB	2004	65
Warburton & Frankie	LR	2005	427
Warburton & Frankie	MT	2005	47
Warburton & Frankie	Type C	2005	12
Warburton & Frankie	TypeB	2005	184
Warburton & Frankie	LR	2006	725
Warburton & Frankie	MT	2006	64
Warburton & Frankie	Type C	2006	65
Warburton & Frankie	TypeB	2006	304
Warburton & Frankie	LR	2007	461
Warburton & Frankie	MT	2007	44
Nilsen	MT	2007	5
Warburton & Frankie	Type C	2007	33
Warburton & Frankie	TypeB	2007	276
Warburton & Frankie	LR	2008	980
ANI	LR	2008	14
Stemar	MT	2008	20
Nilsen	MT	2008	57
Warburton & Frankie	Type C	2008	5
Warburton & Frankie	TypeB	2008	528
Warburton & Frankie	ER	2009	17
Warburton & Frankie	LR	2009	892
Nilsen	MT	2009	23
Stemar	MT	2009	6
Warburton & Frankie	MT	2009	111
Warburton & Frankie	Type C	2009	31
Warburton & Frankie	TypeB	2009	281
Warburton & Frankie	ER	2010	13

Manufacturer	Type	DateOfPurchase	Count of SerialNo
Warburton & Frankie	LR	2010	205
Warburton & Frankie	MT	2010	6
Warburton & Frankie	Type C	2010	3
Warburton & Frankie	TypeB	2010	121
Warburton & Frankie	ER	2011	373
Warburton & Frankie	MT	2011	9
Warburton & Frankie	TypeB	2011	137
Warburton & Frankie	ER	2012	48
Warburton & Frankie	LR	2012	286
ANI	LR	2012	2
Energy Controls	S	2012	3
Warburton & Frankie	TypeB	2012	50
Warburton & Frankie	ER	2013	18
Warburton & Frankie	LR	2013	218
Warburton & Frankie	MT	2013	30
Energy Controls	S	2013	16
Warburton & Frankie	Type C	2013	3
Warburton & Frankie	TypeB	2013	131
Warburton & Frankie	LR	2014	22
Energy Controls	S	2014	3
Warburton & Frankie	TypeB	2014	18

1.17 Testing Methodology

1.17.1 Direct Connected Metering Installations

Item	Details
Asset information	The details of all ActewAGL metering installations are maintained in Meter Asset Management system. Summary details of the direct connected meters are stored in the spreadsheet *ActewAGL Meters.xls* DM#547074.
Period between inspections	When meter is tested as per S7.3.2 & S7.3.3.
Type of test	Per *Procedure DM5# 299732, In-service Meter Compliance Testing and Bulk Replacement.*
Period between tests	The period between tests will be as required by AS/NZ 1284 Part 13.
Test volumes per year	Refer, Table 1-2: Meter testing program (Summary from Meter .xls DM5# 547074). This table summarises the full details of the meter testing and replacement program stored in the spreadsheet *ActewAGL Meters.xls* DM#523614. This spreadsheet is used to manage the meter testing program.
Compliance process	Per the requirements of the National Electricity Rules.
Applicable standards	AS1284:1, AS62052.11, AS62053.21, AS1284:13.
Test equipment used and traceability of test equipment	The test equipment used by ActewAGL comprises of two (2) 3 phase test set, MTEPTS 2.3 and MTE PTS 2.3C, and one (1) single phase test sets from EDMI. All test equipment will be calibrated by an NATA accredited laboratory, have the appropriate calibration labels and all calibration certificates will be stored in a central location. Test certificates filed on a registry file, No. G08/0126/4.
Testing uncertainty requirements	The maximum allowable level of testing uncertainty for Type 5/6 active meters is 0.3/cosØ% whether tested in the field or a laboratory Refer Rules Table S7.3.1
Test resources	Refer section.1.7
Management of large family compliance failure	Refer section 1.21

1.17.2 Current Transformer Connected Meters

Item	Details
Asset information	The details of all ActewAGL metering installations are maintained in Meter Asset Management system. Summary details of the CT connected meters are stored in the spreadsheet *ActewAGL Meters.xls* DM#547074.
Period between inspections	The maximum period between inspections is 5 years as per S7.3.2 & S7.3.3.
Type of test	Per *Procedure DM5# 299732, In-service Meter Compliance Testing and Bulk Replacement.*
Period between tests	The period between tests will be as required by AS/NZ 1284 Part 13.
Test volumes per year	Refer, Table 1-2: Meter testing program (Summary from ***Meter .xls DM5# 547074***)page 13. This table summarises the full details of the meter testing and replacement program stored in the spreadsheet *ActewAGL Meters.xls* DM#523614. This spreadsheet is used to manage the meter testing program.
Compliance process	Per the requirements of the National Electricity Rules.
Applicable standards	AS1284:1, AS62052.11, AS62053.21, AS62053.22, AS1284:13.
Test equipment used and traceability of test equipment	The test equipment used is a PTS2.3C test set. All test equipment will be calibrated by a NATA accredited laboratory, have the appropriate calibration labels and all calibration certificates will be stored in a central location. Test certificates are kept with our contractor and routine audit verify currency and compliance.
Testing uncertainty requirements	The maximum allowable level of testing uncertainty for Type 5/6 active meters is 0.3/cosØ% whether tested in the field or a laboratory Refer Rules Table S7.3.1
Test resources	Refer section 1.7.
Management of large family compliance failure	Refer section 1.21.

1.17.3 Current Transformers (Low Voltage)

ActewAGL has developed a testing program for the testing of current transformers. The table below details the available information for the facilitation of the testing program's and its ongoing development.

Item	Details
Asset information	There are 1,723 sites with low voltage current transformers. Refer, Table 1-5: Current Transformers page17.
Period between inspections	When meter is tested and the maximum period between inspections is 5 years as per S7.3.2 & S7.3.3.
Type of test	*Current transformer tests are secondary injection tests. Refer Rules S7.3.2.(a). and DM5# 335441 CT Testing for CT Meter Installations* ActewAGL may develop a proposal for consideration by AEMO to use an alternate test method for low voltage current transformers.
Period between tests	The maximum period between tests is 10 years. Burden tests will be performed when meters are tested, when the CT's are Tested or when changes are made. All CTs associated with the meter will be tested. Refer Rules Table S7.3.2.
Test volumes per year	Refer, Table 1-2: Meter testing program (Summary from ***Meter .xls DM5# 547074***) page13. ActewAGL commenced its CT testing program in April 2008 and involves testing all current transformers. However as a direct outcome from AEMO's Current Transformer Testing Working Group (CTTWG), CT's testing will sample test 10% of families of CT's that are 10 years of age or older and test results forwarded to AEMO[4].
Compliance process	As per the requirements of the National Electricity Rules.
Applicable standards	AS60044.1.
Test equipment used and traceability of test equipment	All test equipment (Omicron CT Analyser) will be calibrated by accredited laboratories, have the appropriate calibration labels and all calibration certificates will be stored in a central location. Test certificates filed on a registry file, No. G08/0126/4
Testing uncertainty requirements	The maximum allowable level of testing uncertainty for Type 5/6 Current Transformers is 0.1% for laboratory testing and 0.2% for field testing. Refer Rules Table S7.3.1.
Test resources	Customer Services Branch.
Management of LV CT compliance failure	Refer section. 1.21

[4] Subject to adoption of AEMO's CT Alternative testing plan

1.18 Management of Testing Equipment

ActewAGL has three (3) single-phase test sets for testing of meters ensuring that in the event equipment is away being calibrated / repaired, its meter-testing program will not be impeded. The organization has two (2) three phase test sets which can also be utilized for the testing of single phase meters if the need arises.

ActewAGL has one (1) Omicron CT Analyser used for testing of CT's.

All meter test equipment used by ActewAGL is calibrated by a NATA accredited laboratory, at 12 month intervals.

Test set uncertainties:

- 3 x DSTU – WC ±0.2%
- MTE PTS 2.3 ±0.1%
- MTE PTS 2.3C ±0.1%
- Omicron CT Analyser ±0.1%

The NATA accredited meter testing service provider notifies ActewAGL that the meter test equipment is due for calibration and sends ActewAGL a formal quotation. Additionally all metering test equipment is recorded in ActewAGL's test and tag data base named ProTrac and periodically this database is interrogated by the Metering and Quality of Supply Officer to ensure that all metering test equipment is within its certified calibration due date. ProTrac is updated as equipment is calibrated and NATA calibration reports are received. Programmed audits via ActewAGL's Always Safe systems will ensure that all test equipment used for meter testing is calibrated and within its certification due date.

The Omicron CT Analyser is calibrated by Omicron Australia and ProTrac is used as described above for the management of this piece of test equipment's calibration certificate.

Every metering test set has a calibration label fitted with details of the testing laboratory where it was tested, calibration date, due date and report number. Calibration reports are electronically scanned and stored on a network drive, "Energynetwks on Jeeves/Metering test equipment Calibration Reports" and the original hard copy of the report is filed to a registry file No. G08/0126/4.

Ecowise use a calibrated test set for testing all Type 5 MRIM meters and CT connected Type 6 meters. The calibration test certificate is checked for compliance during regular audits carried out by ActewAGL officers as part of our programd audit schedule and contractor management requirements and are stored within DM5 File G10/4157/1. In addition to monitoring Ecowise utilising the audit process, ActewAGL holds regular meetings with Ecowise to discus and issues either party has, to keep Ecowise updated with changes relating to the Rules, AEMO updates Metering codes amendments, Audits etc and developments within ActewAGL. Minutes of these meetings are filed in DM5, G10/2941/1.

1.19 Unmetered Supplies

Unmetered supplies will be managed and sample tested as detailed in AEMO's Metrology Procedure Part A.

The listing of unmetered NMIs to be sample tested is at Table 1-6: Summary of Unmetered Loads.

Table 1-6: Summary of Unmetered Loads

		Sample size		
NMI	Devices	Reduced	Normal	Tightened
Controlled unmetered loads				
7001156020	104	8	20	32
7001156021	3,924	80	200	315
7001156022	88,892	200	500	800
7001156023	1,337	50	125	200
7001156026	7	2	2	3
7001160459	16	3	5	8
7001160460	27	5	8	13
7001167705	10	2	3	5
7001171731	164	13	32	50
7001176613	72	5	8	13
Uncontrolled unmetered loads				
7001155996	8	2	2	3
7001156001	172	13	32	50
7001156003	7	2	2	3
7001156004	0	0	0	0
7001156005	0	0	0	0
7001156006	7	2	2	3
7001156007	2	1	1	2
7001156008	33	5	8	13
7001156009	1	1	1	1
7001156010	22	3	5	8

7001156011	5	2	2	3
7001156012	1	1	1	1
7001156013	236	13	32	50
7001156014	15	2	3	5
7001156015	50	5	8	13
7001156016	2	2	2	3
7001156017	7	2	2	3
7001156018	35	5	8	13
7001156028	1	1	1	1
7001156686	124	8	20	32
7001156941	1,014	32	80	125
7001156942	23	3	5	8
7001156962	180	13	32	50
7001156963	5	2	2	3
7001158442	26	5	8	13
7001173296	7	2	2	3
7001173521	1	1	1	1
7001175099	14	2	3	5

1.20 Other Matters

1.20.1 Outages and Malfunctions

Where ActewAGL becomes aware of an outage or malfunction of a second tier metering installation, ActewAGL will advise the Metering Data Provider and Responsible Person as soon as practicable. Notifications for first tier metering installations would be handled internally.

If an outage or malfunction occurs to a metering installation, repairs will be made as soon as practicable.

If the repairs are made within 10 business days of detection, ActewAGL will make any necessary substitutions to the metering data.

If the repairs cannot be made within 10 business days of detection, ActewAGL will apply to AEMO for an exemption (per AEMO's Exemption Request Procedure) and will provide AEMO with a plan for the rectification of the metering installation.

Non-critical failures would be programmed for repair. Critical failures, which affect the accuracy or safety of the installation, would be rectified as soon as practicable. AEMO's Exemption Request Procedure would be used as necessary.

Where a meter is replaced, relevant Participants are notified via an MSATS notification.

1.20.2 Test Results

All test results are available to the relevant Participants upon request.

Test results for requested meter tests are provided to the relevant party in all cases.

1.20.3 New Meter Types / Designs

When a new meter is introduced into the meter fleet the Metering Technology Manager/Specifying Officer will be responsible for providing the following:-

- Ensuring the relevant training is delivered to personnel.
- Drawings and drilling templates are produced and entered in to the electronic drawing systems.
- An inventory stock code number is assigned and minimum /maximum quantities are set at logistics.
- That all databases are modified to cater for the meter.
- That the meter is added to the meter-testing program for routine testing.
- Control and storage of meter programming equipment, software and manuals. Electronic copies of manuals and software are stored in DM5, File Ref 523525 (electronic folder G10/4157/1) and electronic copies of manuals are also stored on the Energy Networks common drive Energynetwk on 'Jeeves'.

1.21 Large Family Failure

With respect to the resourcing for the replacement of a large family group of meters that fail compliance testing, ActewAGL would consider a family group of more than 2,000 meters a "large" family. ActewAGL has 74,737 meters in this category, comprised of 25 meter groups.

Should a large family fail, the situation would be addressed using the approved budget and resources for the meter replacement program. Although additional resources may be sought to rectify the situation sooner, this cannot be guaranteed. The primary method of addressing a large family failure would be by the re-prioritisation of the meter replacement program using existing approved resources.

The timeframe for the rectification of a large family failure is therefore determined by the size of the family and (approved) resources available.

A similar approach would be used if a family of instrument transformers failed. However as precise and accurate information pertaining to CT's does not exist prior to 2003, an analytical approach would be taken to best determine the exact year that the family of CT's originate from, such as by serial number and age of site/original meter installation date (refer Section 1.17.3 and

Table 1-5: Current Transformers).

A mix of internal and contract resources would be available to address this situation.

Figure 1-7: Current Installed Meter Population (at 31 December 2011)