

# Meter Asset Management Plan



## EXECUTIVE SUMMARY

This document describes the Metering asset methodology for Ergon Energy's Electricity Metering Asset Class.

This document has been developed to guide the decisions, processes and systems that are used to maximise the technical and operational performance whereby adding value of Ergon Energy's meter equipment over the asset lifecycle and ensures regulatory compliance.

This Metering Asset Management Plan [MAMP] will be maintained and published by the Principal Engineer Metering and will be published on Ergon Energy's process zone and subject to an annual cyclic review. The review will coincide with any future submission of Regulatory Information Notice (RIN) data.

The General Manager Network Monitoring & Processing is assigned the Responsible Person [RP] role under the National Electricity Market [NEM] rules, and the Executive General Manager Asset Management is the Local Network Service Provider [LNSP].

This MAMP has been aligned with Ergon Energy's vision of the future to have metering capabilities whereby we will be recognised by our customers as a responsive and competent Meter Provider of choice, this also ensures that metering assets are fit for purpose and provide a good rate of return, and complies with all metering National and Jurisdictional laws, codes and rules. Ergon Energy is committed to maintaining accreditation as a Type 1 to 6 Meter Provider (MPB).

Some of the main areas described in this document include improving asset information, meter asset life-cycle control, budget and cost tracking, meter fleet compliance, installation quality, and type 5 meter data improvements.

The main areas described in this document include:

- Improving asset information;
- Meter asset life-cycle control;
- Budget and cost tracking;
- Meter fleet compliance;
- Installation quality; and
- Type 5 meter data improvements.

Ergon Energy's MAMP is based on the principles and timeframes laid down in schedule 7.3 of Chapter 7 – National Electricity Rules [NER].

This includes:

- Testing of all Type 1-4 Metering based on a 2.5 yearly inspections (HV), 5 yearly meter accuracy and 10 year CT/VT test; and
- Applying AS1284 Part 13 – In-situ testing for direct connect metering families.

All new metering equipment complies with the "National Electricity Rules - Chapter 7", "Electricity Industry Code (Qld), Chapter 9 – Metering", Type 1-7 Metrology procedures and the National Measurements Institute. Standard designs and construction methods are employed when installing metering equipment and these are specified in the Queensland Electricity Connection and Metering Manual (QECMM). Non-standard designs must be approved by the Principal Engineer Metering.

## Table of Contents

EXECUTIVE SUMMARY .....	2
1. PURPOSE .....	1
2. RESPONSE .....	1
3. INSTALLATION HISTORY .....	1
3.1 METERS CURRENTLY BEING INSTALLED BY ERGON ENERGY .....	1
3.2 REVISED AGE PROFILES (AT JUNE 2012) .....	2
4. ERGON ENERGY'S METERING CAPABILITY .....	4
5. MAMP REVIEW PERIOD .....	5
6. METER MANAGEMENT PLAN & STRATEGY .....	5
6.1. HV METERING EQUIPMENT .....	5
6.2. HV VOLTAGE TRANSFORMERS .....	5
6.3. HV CURRENT TRANSFORMERS .....	5
6.4. TYPE 1 – 3 ENERGY METERS .....	6
6.5. LV METERING EQUIPMENT .....	6
6.6. TYPE 4 – 6 ENERGY METERS .....	8
6.7. RIPPLE CONTROL & TIME SWITCHES .....	8
6.8. STRATEGIES FOR FAMILY FAILURES .....	9
7. IN-SITU TESTING PLAN & METER MANAGEMENT STRATEGY .....	9
7.1. ELECTROMECHANICAL & ELECTRONIC METERS .....	10
7.2. RIPPLE RECIEVER TESTING .....	12
7.3. 'AS FOUND' SAMPLE TESTING OF METERS .....	12
7.4. CARD OPERATED METERS .....	12
7.5. METER NEW AND REPLACEMENT STRATEGY .....	13
8. TEST EQUIPMENT MANAGEMENT .....	13
8.1. CALIBRATION INTERVALS FOR TEST EQUIPMENT .....	14
8.2. EQUIPMENT CALIBRATED AT CORRECT INTERVALS .....	14
8.3. TRACEABILITY OF TEST EQUIPMENT .....	14
8.4. MEASUREMENT UNCERTAINTY OF TEST EQUIPMENT .....	14
APPENDIX A – ERGON ENERGY ORGANISATION STRUCTURE FROM MAMP PERSPECTIVE .....	15
APPENDIX B - METERING RESOURCES .....	16
APPENDIX C – METER LABS TEST CAPABILITY .....	19
APPENDIX D – TEST EQUIPMENT CURRENTLY IN USE .....	20
APPENDIX E – REFERENCES .....	22

Table 1 Quantities and type of meters that are installed in the Network as at June 2012 .....	1
Table 2 Metering Operational Competency .....	4
Table 3 Test volumes as at June 2012 .....	7
Table 4 Basic Criteria for Selecting Sub-populations for Sample Testing .....	10
Table 5 In-Situ Testing Program Plan .....	11

Figure 1 : The age profile of single phase electromechanical meters .....	2
Figure 2 : The age profile of Three Phase Meters .....	3
Figure 3 : The age profile of Ripple Control Relays .....	3
Figure 4 : Low Voltage CT quantities by family type as at June 2012 .....	7
Figure 5 : Ripple Receiver Test results .....	12
Figure 6 : The ISO 9001 accreditation process currently in place .....	13

EXECUTIVE SUMMARY .....	2
1. PURPOSE .....	1
2. RESPONSE .....	1
3. Installation History .....	1
3.1 METERS CURRENTLY BEING INSTALLED BY ERGON ENERGY .....	1
3.2 REVISED AGE PROFILES (AT JUNE 2012) .....	2
4. ERGON energy'S METERING CAPABILITY .....	4
5. MAMP REVIEW PERIOD .....	5
6. Meter Management PLAN & Strategy .....	5
6.1. HV METERING EQUIPMENT .....	5
6.2. HV VOLTAGE TRANSFORMERS .....	5
6.2.1. TYPE OF TEST .....	5
6.2.2. PERIOD AND TEST VOLUMES PER YEAR .....	5
6.3. HV CURRENT TRANSFORMERS .....	5
6.3.1. TYPE OF TEST .....	5
6.3.2. PERIOD AND TEST VOLUMES PER YEAR .....	6
6.4. TYPE 1 – 3 ENERGY METERS .....	6
6.4.1. TYPE OF TEST .....	6
6.4.2. PERIOD AND TEST VOLUMES PER YEAR .....	6
6.5. LV METERING EQUIPMENT .....	6
6.5.1. CURRENT TRANSFORMERS (LOW VOLTAGE) – LV CT .....	6
6.5.2. TYPE OF TEST .....	7
6.5.3. PERIOD AND TEST VOLUMES PER YEAR .....	7
6.6. TYPE 4 – 6 ENERGY METERS .....	8
6.6.1. CURRENT TRANSFORMER CAPABLE METERS .....	8
6.6.2. DIRECT CONNECT METERS .....	8
6.6.3. TYPE OF TEST .....	8
6.6.4. PERIODS BETWEEN TESTS .....	8
6.7. RIPPLE CONTROL & TIME SWITCHES .....	8
6.7.1. TYPE OF TEST .....	8

6.8. STRATEGIES FOR FAMILY FAILURES.....	9
6.8.1. STRATEGY FOR METER FAMILY FAILURES.....	9
6.8.2. ACTIONS FOR METER FAMILY ASSET REPLACEMENT .....	9
7. IN-SITU TESTING PLAN & METER MANAGEMENT STRATEGY.....	9
7.1. ELECTROMECHANICAL & ELECTRONIC METERS.....	10
7.2. RIPPLE RECIEVER TESTING.....	12
7.3. 'AS FOUND' SAMPLE TESTING OF METERS .....	12
7.4. CARD OPERATED METERS .....	12
7.5. METER NEW and REPLACEMENT STRATEGY.....	13
8. TEST EQUIPMENT MANAGEMENT .....	13
8.1. CALIBRATION INTERVALS FOR TEST EQUIPMENT .....	14
8.2. EQUIPMENT CALIBRATED AT CORRECT INTERVALS.....	14
8.3. TRACEABILITY OF TEST EQUIPMENT .....	14
8.4. MEASUREMENT UNCERTAINTY OF TEST EQUIPMENT .....	14
Appendix A – Ergon Energy Organisation Structure From MAMP Perspective	15
Appendix B - Metering RESOURCES .....	16
General Manager Network Monitoring & Processing.....	16
Principal Engineer Metering.....	16
Manager Meter Provision.....	16
Manager Meter Strategy .....	16
Manager Meter Data.....	17
General Manager Customer Delivery.....	17
State Metering Manager .....	17
Manager Commercial Enterprises.....	18
Appendix C – Meter Labs TEST CAPABILITY .....	19
Appendix D – Test Equipment CURRENTLY IN Use .....	20
Appendix E – REFERENCES.....	22

## 1. PURPOSE

This document describes the Metering Asset Management methodology for Ergon Energy Electricity Metering Asset Class.

This document has been developed to:

1. Guide the decisions, processes and systems that are used to maximise the technical and operational performance and value of Ergon Energy's meter equipment over the asset lifecycle.
2. Ensure compliance with the requirements of the regulatory bodies that have jurisdiction over electricity meters installed within Ergon Energy's distribution network including:
  - Queensland Competition Authority [QCA] / Australian Energy Regulator [AER]
  - Australian Energy Market Operator [AEMO]
  - National Measurement Institute [NMI]

## 2. RESPONSE

Any response, comments, or feedback relating to this document may be directed to the Responsible Person for Ergon Energy.

## 3. INSTALLATION HISTORY

The meters currently being installed by Ergon Energy in its Network are electronic meters as per the Metrology Procedure Part A and these meters are capable of capturing interval data.

### 3.1 METERS CURRENTLY BEING INSTALLED BY ERGON ENERGY

- Single phase direct connected – EM1000, EM1200 (L+G), MK7 (EDMI)
- Multi-phase direct connected – MK10, MK10A
- LV CT connected meter- MK10E
- HV CT connected – MK3, MK10E

**Table 1 Quantities and type of meters that are installed in the Network as at June 2012.**

Asset Class	No of Units
Single phase electromechanical	1,070,538
Single phase electronic (1 and 2 element)	116,156
Card Operated Meters (1 and 2 element)	4,372
Three phase electromechanical	13,120
Three phase electronic	30,795
LV CT Electronic meters (Tier 1+2) <sup>1</sup>	8,528
HV Customer Electronic Meters	116
HV Wholesale Electronic meters (most sites have check meters) <sup>2</sup>	93
<b>Total Meters</b>	<b>1,243,718</b>
Time Switches Est. <sup>3</sup>	10,604
Ripple Control Receivers	414,610
LV Current Transformers	25,584

<sup>1</sup> Quantity varies due to Market transfers and changes to nominated MP – Tier 1 + 2 in DNSP area

<sup>2</sup> Ergon Energy LNSP Ownership – 19 Sites Meter VT/CT (RP/MP responsibility), 51 – CT and VT only, 6 VT only.

<sup>3</sup> Estimated numbers remaining in the network

## 3.2 REVISED AGE PROFILES (AT JUNE 2012)

Age profiles are shown for the following categories.

- Figure 1- Single phase electromechanical and electronic meters
- Figure 2 -Three phase electromechanical and electronic
- Figure 3 - Receivers

Single Phase Meter Age Profile

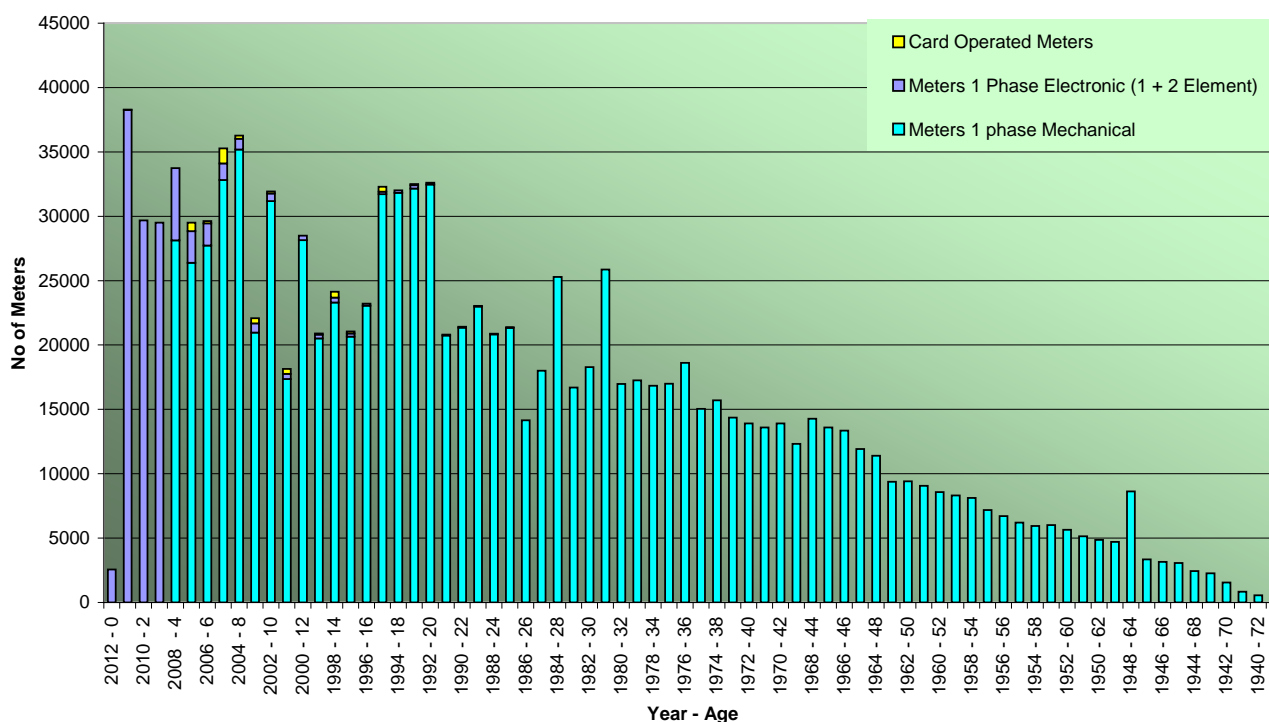


Figure 1 : The age profile of single phase electromechanical meters

Three Phase Meter Age Profile

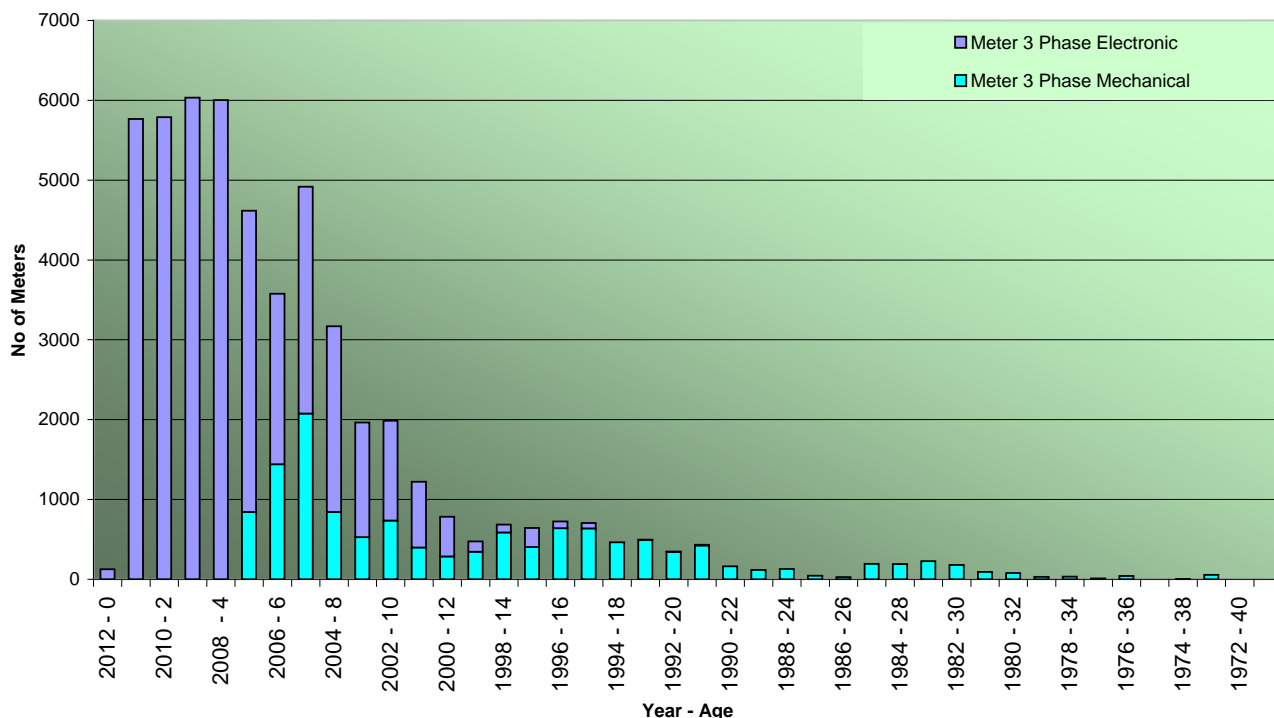


Figure 2 : The age profile of Three Phase Meters

Ripple Receiver Age Profile

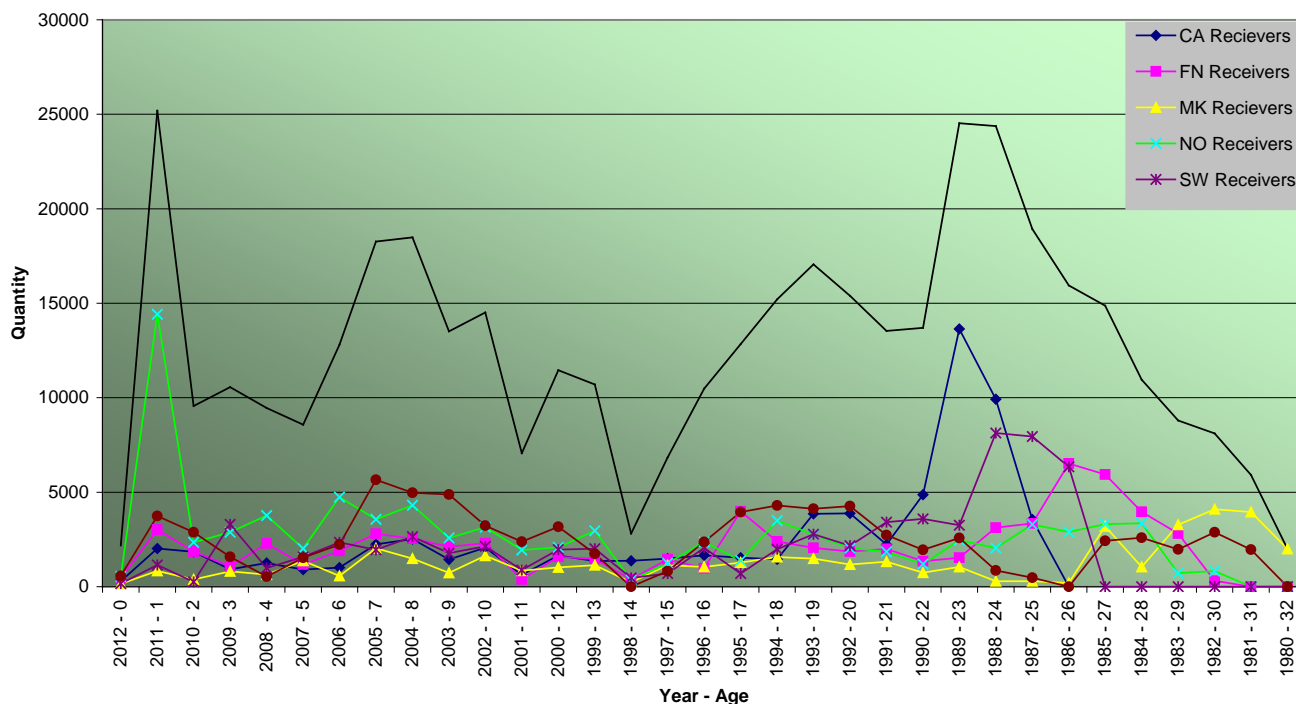


Figure 3 : The age profile of Ripple Control Relays



Electronic meters that have been removed from service due to tariff upgrades, or other project related work may be returned to service if they are deemed suitable and compliant with the National Measurement Institutes verification process. Currently Ergon Energy is only refurbishing the following meter families:

- EM1000 – Single Phase meters
- EM1200 – Two element single phase meters
- MK7A – Two element single phase meters
- MK7C – Single phase meters
- MK10A,Q4 – Three phase direct connect meters
- MK3, Mk10E – Three phase CT meters

## 4. ERGON ENERGY'S METERING CAPABILITY

Ergon Energy's Distribution Network Service Provider [DNSP] is currently accredited as Meter Provider B [MPB] in the Metering Provider classification which entitles its Metering Group to do the following as outlined in Table 2. Ergon Energy DNSP is also the Responsible Person (RP) for all 1<sup>st</sup> Tier and 2<sup>nd</sup> Tier small customer<sup>4</sup> metering in the Ergon Energy Distribution Network area.

**Table 2 Metering Operational Competency**

Category	Competency
1C	Class 0.2 CTs with < 0.1% uncertainty.
1V	Class 0.2 VTs with < 0.1% uncertainty.
1M	Class 0.2 Wh meters with < 0.1/cosφ% uncertainty and class 0.5 varh meters with <0.3/sinφ uncertainty
1A	Class 0.2 CTs, VTs, Wh meters; class 0.5 varh meters; the total installation to 0.5%. Wh with < 0.2% uncertainty at unity power factor; 1.0% for varh with <0.4% uncertainty at zero power factor.
2C	Class 0.5 CTs with < 0.2% uncertainty.
2V	Class 0.5 VTs with < 0.2% uncertainty.
2M	Class 0.5 Wh meters with < 0.2/cosφ uncertainty and class 1.0 varh meters with <0.4/sinφ uncertainty.
2A	Class 0.5 CTs, VTs, Wh meters; class 1.0 varh meters; the total installation to 1.0%. Wh with <0.4% uncertainty at unity power factor; 2.0% for varh with <0.5% uncertainty at zero power factor.
3M	Class 1.0 Wh meters with < 0.3/cosφ% uncertainty and class 2.0 varh meters with <0.5/sinφ% uncertainty
3A	Class 0.5 CTs, VTs, class 1.0 Wh meters; class 2.0 varh meters; the total installation to 1.5%. Wh with <0.5% uncertainty at unity power factor; 3.0% for varh with <0.6% uncertainty at zero power factor.
4M	Class 1.0 Wh meters and class 1.5 Wh Meters with <0.3/cosφ% uncertainty.
L	Approved Communication Interface Installer
5B	Class 1.0 and class 1.5 whole current or CT connected Wh meters with <0.3/cosφ% uncertainty
6B	Class 1.5 whole current or CT connected Wh meters with 0.3</cosφ% uncertainty

<sup>4</sup> A small customer having energy usage of less than 100 MWh pa

# Meter Asset Management Plan

---

## 5. MAMP REVIEW PERIOD

The MAMP is a dynamic living document, and is reviewed annually by the Principal Engineer Metering in consultation with Ergon Energy's Network Monitoring & Processing group on behalf of the RP. This review will be co-ordinated with the Regulatory Information Notice (RIN) data submission. Where significant changes are reflected in the MAMP a copy will be submitted to AEMO for re-approval.

## 6. METER MANAGEMENT PLAN & STRATEGY

### 6.1. HV METERING EQUIPMENT

Routine tests are programmed for all sites where Ergon Energy MPB is designated as the responsible participant.

Ergon Energy MPB on request from other RP's or other relevant market participants may carry out routine tests on the metering assets on a fee for service basis under its relevant accreditation capability. These sites will not be covered by this document.

### 6.2. HV VOLTAGE TRANSFORMERS

Ergon Energy's strategies for high voltage instrument transformer testing are in accordance with Schedule 7.3 of the NER i.e. Tests are to be completed on a routine test period of 10 years (Subject to reasonable endeavours to negotiate and arrange outages with customers to gain access to the metering VTs).

#### 6.2.1. TYPE OF TEST

Voltage transformers will be primary injection tested as per Schedule 7.3 of the NER.

#### 6.2.2. PERIOD AND TEST VOLUMES PER YEAR

All high voltage and wholesale meter installation maintenance is scheduled from the meter asset register (Ellipse) via Maintenance Schedule Task (MST) activities based on the following time frames:

- 2.5 Yearly Inspection
- 10 yearly VT accuracy test

Currently Ergon Energy is testing approximately 30<sup>5</sup> sites per year so that all the high voltage transformers, Ergon Energy are responsible for complies with NER chapter 7.3.

### 6.3. HV CURRENT TRANSFORMERS

Ergon Energy's strategy for high voltage current transformer testings shall be in accordance with Schedule 7.3 of the NER i.e. Tests will be completed on a routine test period of 10 years (Subject to reasonable endeavours to negotiate and arrange outages with customers to gain access to the metering CT's.)

#### 6.3.1. TYPE OF TEST

The current transformers will be tested by either of the following methods whichever is deemed the easiest and safest method to test. This will be influenced by access to the primary conductors.

- Primary injection testing as per Schedule 7.3 of the NER.
- Secondary injection testing using an Omicron CT analyser.

---

<sup>5</sup> This will be reviewed annually to align with all sites falling in compliance with its test plans

# Meter Asset Management Plan

## 6.3.2. PERIOD AND TEST VOLUMES PER YEAR

All high voltage and wholesale meter installation maintenance will be scheduled from the meter asset register (Ellipse) via Maintenance Schedule Task (MST) activities based on the following time frames:

- 2.5 Year Inspection
- 10 yearly CT accuracy test.

Currently Ergon Energy is testing 30 sites per year<sup>6</sup> so that all the all the high voltage current transformers, Ergon Energy is responsible complies with NER chapter 7.3.

## 6.4. TYPE 1 – 3 ENERGY METERS

Ergon Energy's strategy for maintaining meters driven by instrument transformers will be in accordance with Schedule 7.3 of the NER.

### 6.4.1. TYPE OF TEST

All meters used for Type 1-3 installations are electronic four quadrant meters which are direct injection tested as per Schedule 7.3 of the NER.

### 6.4.2. PERIOD AND TEST VOLUMES PER YEAR

All high voltage and wholesale meter installations that Ergon Energy is responsible for will be scheduled from the meter asset register (Ellipse) via maintenance schedule task (MST) activities based on the following time frames:

- 2.5 Yearly Inspection
- 5 Yearly meter accuracy

Currently Ergon Energy is testing approximately 30 sites per year<sup>7</sup> so that all meters are tested in accordance with this MAMP and complies with Schedule 7.3 of the NER.

## 6.5. LV METERING EQUIPMENT

### 6.5.1. CURRENT TRANSFORMERS (LOW VOLTAGE) – LV CT

Ergon Energy's strategy for LV CTs is to schedule tests on all CTs it is responsible for every 10 years using the following test methodology:

- In-situ testing of CTs performed using an Omicron CT Analyser;
- Test any removed CTs with an Omicron CT analyser to supplement test results for family types;
- Schedule approximately 10 per cent of the CT population to be tested annually which aligns for the whole fleet of LV CTs to be tested in a 10 year cycle;
- CTs tested in a 10 year cycle;
- CTs admittance to be tested at site during the installation and commissioning of installation; and
- CT burden checks.

**Note:** Ergon Energy is participating in the Current Transformer Testing Working Group (CTTWG) with other Responsible Person's and Meter Providers where these assets are the focus of the AER (Compliance Bulletin #6 issued December 2011). The results of testing over the next 12 months may allow the acceptance of an alternate sampling based CT test plan instead of the current time based maintenance requirement. Ergon Energy will continue with time based CT maintenance testing. Should Ergon Energy seek to use an alternate sampling based CT test plan AEMO's approval will be requested as an amendment to this MAMP.

<sup>6</sup> This will be reviewed annually to align with all sites falling in compliance with its test plans

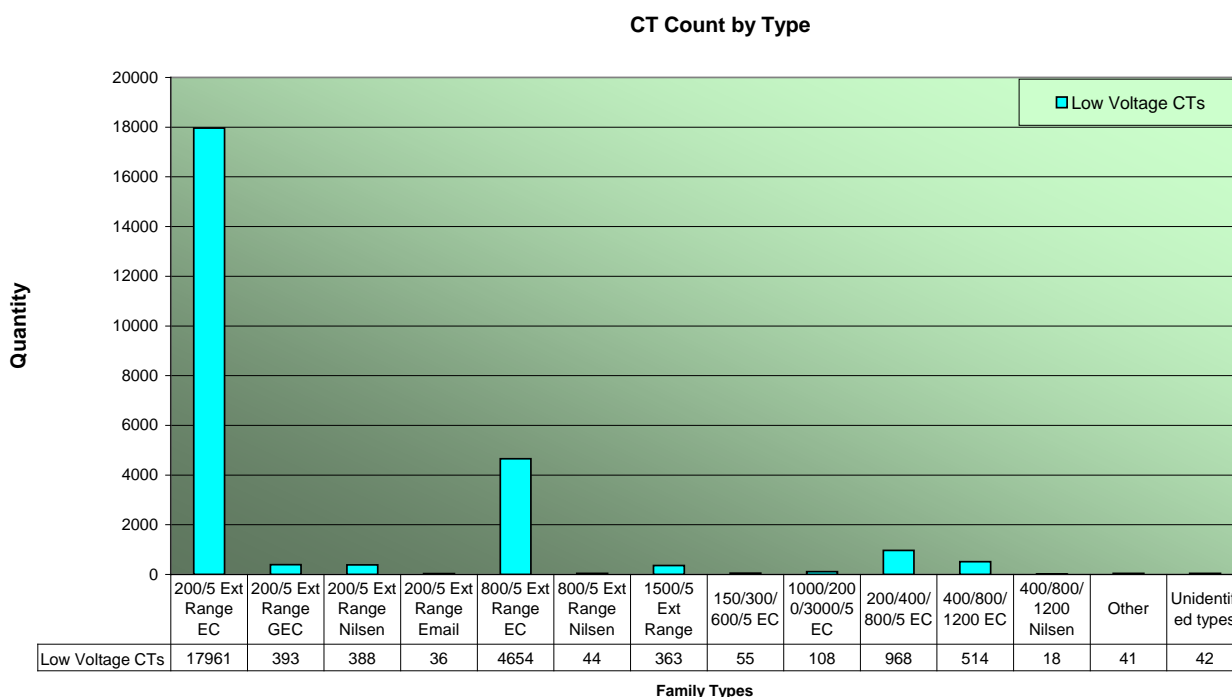
<sup>7</sup> This will be reviewed annually to align with all sites falling in compliance with its test plans

# Meter Asset Management Plan

## 6.5.2. TYPE OF TEST

Secondary injection testing will be utilised for testing all LV CTs and the CTs will be tested in the following manner:

- In field testing;
- In-house testing in the Ergon Energy laboratory<sup>8</sup>.



**Figure 4 : Low Voltage CT quantities by family type as at June 2012**

## 6.5.3. PERIOD AND TEST VOLUMES PER YEAR

The formal testing of LV CTs commenced late in 2008 after the submission of the initial Ergon Energy MAMP. The initial plan included a 2 year 'ramp up' period while test equipment and procedures were established. The CT testing work plan quantities can be impacted significantly due to transfers of sites between Meter Providers. A CT Meter Upgrade plan over the past 10 years has resulted in the elimination of many old CT types; with over 80% of all in-service LV CTs being 200/5 Ext range types (See Figure 4). The formal plan is to continue testing all CTs once every 10 years. Table 3 shows the number of CTs tested till June 2012.

**Table 3 Test volumes as at June 2012**

Total Installation on the lodgement of the initial MAMP (8455 Installation)	Number of sites to be Tested on the lodgement of initial MAMP	Number of sites Completed
First Year (2008-09)	423	210
Second (2009-10)	423	520
Third Year (2010-11)	846	969
Fourth Year (2011-12)	929	851
Fifth Year (2012-13)		857

<sup>8</sup> For CTs that are being removed from the network and deemed suitable for refurbishment or form part of a sample set

# Meter Asset Management Plan

## 6.6. TYPE 4 – 6 ENERGY METERS

### 6.6.1. CURRENT TRANSFORMER CAPABLE METERS

Ergon Energy's strategy for maintaining meters driven by current transformers is in accordance with Schedule 7.3 of the NER.

### 6.6.2. DIRECT CONNECT METERS

Ergon Energy's test strategy for direct connected metering is to use sampling plans based on "Australian Standard AS1284.13 – Electricity Metering In-service Compliance Testing" and Clause 2.7 of the National Metrology Procedures. Ergon Energy will utilise sample testing by attributes as specified in AS1284.13.

Sample testing is based initially on total estimated family populations by meter types across Ergon Energy. This includes initial verification testing of new patterns or types of meters (including a variant to existing pattern or type) as they are added to the meter fleet.

If sample testing fails on a total family of meters, the family will be stratified into sub-populations as determined in Section 7.3 of this document "Strategy for Family Failures" and additional sample tests will be performed in accordance with "Australian Standard AS1284.13 – Electricity Metering In-service Compliance Testing".

Nominated meter types returned from service for recertification and refurbishment may also be used for 'as found' testing and form part of an initial meter verification testing. This will also be used to proactively assess for sudden changes and defects in meter types.

Considerable effort will be directed to populating direct connected meter family asset records in Ergon Energy's Meter Asset Register (Ellipse). Ergon Energy will be researching and updating various legacy meter family asset data.

### 6.6.3. TYPE OF TEST

LV CT installed meters will be direct injection tested as per the Schedule 7.3 of the NER.

All direct connected meters will be direct injection tested under a sample testing regime as outlined in "Australian Standard AS1284.13 – Electricity Metering In-service Compliance Testing".

### 6.6.4. PERIODS BETWEEN TESTS

All LV CT meter installations that Ergon Energy is responsible for will be scheduled from the Meter Asset Register (Ellipse) via maintenance schedule task (MST) activities based on the following time frames:

- 5 Yearly meter accuracy test

For all other direct connected meters in-situ testing will be carried out in accordance with the criteria as outlined in below in Chapter 8 of this document.

## 6.7. RIPPLE CONTROL & TIME SWITCHES

### 6.7.1. TYPE OF TEST

#### 6.7.1.1. TIME SWITCHES

Ergon Energy will no longer purchases any time switches and as time switches fail in the Network they will be replaced with ripple control receivers or the time switch capabilities available in the new electronic meters will be utilised for "Time of Use (TOU) Tariffs" and Load switching applications (where required).

# Meter Asset Management Plan

---

## 6.7.1.2. RIPPLE CONTROL RECEIVERS

Ripple control receivers will be replaced as they fail in service. Use of receivers to control TOU registers in meters has been discontinued since 2000 and electronic meters used for this application. Ripple receivers were installed from the mid 1980's to early 1990's in large quantities as part of a government plan for uniform state wide tariffs. All ripple receivers are electronic devices with 42% > 20 years old, (see Figure 3) and approaching life expectancy. A family of 12,500 Ripple Receivers (Schlumberger Type E1 & E2) purchased between 1981 to 1985 has been identified with a failing electronic component that renders them as non-operational and unable to respond to switching to realise the demand control benefits. These are being scheduled for replacement.

Ripple receivers are difficult to field test and it is considered that as found laboratory testing of removed family samples is needed to ascertain failure rates (refer to Chapter 8.2 of this document)

## 6.8. STRATEGIES FOR FAMILY FAILURES

### 6.8.1. STRATEGY FOR METER FAMILY FAILURES

The following actions will apply on the identification of a family of metering equipment failures.

- Meter families will be stratified into sub-populations by region, age, design, rating etc should sample testing of a family type fail, and additional tests performed to meet the revised sample sizes;
- Meter families will be classified as compliant with a nominated compliance period or non-compliant. Meter families classified as non-compliant will need to be targeted as part of the aged asset meter replacement program; and
- For very small family populations (<500), change-out of the whole population will be recommended due to the ongoing costs to perform in-situ tests.

### 6.8.2. ACTIONS FOR METER FAMILY ASSET REPLACEMENT

Non-compliant assets will be included as part of the aged asset replacement program for replacement as soon as is practical.

## 7. IN-SITU TESTING PLAN & METER MANAGEMENT STRATEGY

A full round of In-situ meter testing has been completed across all regions of Ergon Energy targeting large electromechanical meter families.

- Replacement of all 14,000 non-compliant Sangamo HMT family of meters has been completed;
- Analysis of the test results for the EMMCO BAZ meters installed in the South West Region (SW) has identified these as non-compliant. A meter reading survey has been conducted to identify where these meters are located and a meter replacement program for approximately 14,500 meters is in progress for this family of meters. It is expected that further testing of EMMCO BAZ Meters will result in full family replacement programs being implemented;
- Electromechanical Meters with magnetic bearings introduced from 1963 appear to have a robust design and are still performing well; and
- Electronic meters appear to be retaining compliance as far as accuracy performance, however corrective maintenance will increase as failure of meters due to blank displays and battery errors after power outages occur on electronic meters approaching 20 years old.

# Meter Asset Management Plan

## 7.1. ELECTROMECHANICAL & ELECTRONIC METERS

As described in Section 6.8 meter families may be stratified into subpopulations where the family is large and the testing analysis may indicate a subpopulation that is still be in a usable condition. Ergon Energy will stratify a meter family into sub-populations where it is found to be non-compliant to limit unnecessary capital expenditure on aged meter asset replacements. The stratification options will be different for different meter types. The following methods are some of the options used to stratify a family. Methods 2, 5 and 6 provide some reasons for sub-population to be considered on a regional basis.

**Table 4 Basic Criteria for Selecting Sub-populations for Sample Testing**

Method	Stratification Options
1. Age	Meters may have the same design for 20 years and this may skew the whole meter family results as the older meters may need to be replaced but the newer meters may have passed. eg: EMMCO BAZ.
2. Location	<p>Ergon Energy covers a very large geographical area that can include extreme climates in some areas.</p> <p>Meter accuracy may be affected by the extreme climates in some areas but may not be affected in other areas covered by Ergon Energy e.g.</p> <ul style="list-style-type: none"> <li>Western Queensland is very hot and dry where ambient temperatures can be over 40 degrees Celsius and the meter may be in a meter box that has a temperature of over 60 degrees.</li> <li>North Queensland is subject to tropical storms and can have extremely high humidity ratings. Ingress of moisture can be a problem in the region.</li> </ul>
3. Load Rating	<p>The basic and max load currents of meters have changed over the years and this may have an effect on the operation of the meter due to the loads in houses exceeding the high load level. The manufacturer also changed the revs/kWhr of meters and the latter meters do not have to work as hard. E.g.:</p> <ul style="list-style-type: none"> <li>EMMCO BAZ meters changed their load ratings from 5 Amp to 5/20 Amp to 25/50 Amp to 10/40 Amp to 10/60 Amp.</li> <li>EMMCO BAZ meters change Revs/kWhr from 800 – 1600 – 400</li> </ul>
4. Change of Design	<p>Manufacturers change design for the same meter. The design may have had significant change in the operation and accuracy of the meter. The change would need to be clearly identifiable in our asset register. The meter type may not have been changed. eg:</p> <ul style="list-style-type: none"> <li>Pivot vs Jewel bearing meters, pointer vs cyclometer register, 5 vs 6 dials.</li> <li>Presently all new meters installed by Ergon Energy are electronic meters</li> </ul>
5. Different Years of purchase	Ergon Energy has purchased the same type of meters in different years which segregates the same meter type in different groups
6. Laboratory that verified meter	<p>Ergon Energy was the amalgamation of 6 different supply authorities all had different laboratory and practices. Also meters may have been tested by different manufacturing laboratories. e.g.:</p> <ul style="list-style-type: none"> <li>Wide Bay, NORQEB, FNQEB may have adjusted the meters to 1% fast</li> <li>Email had a laboratory in NSW, QLD and Victoria.</li> </ul>

# Meter Asset Management Plan

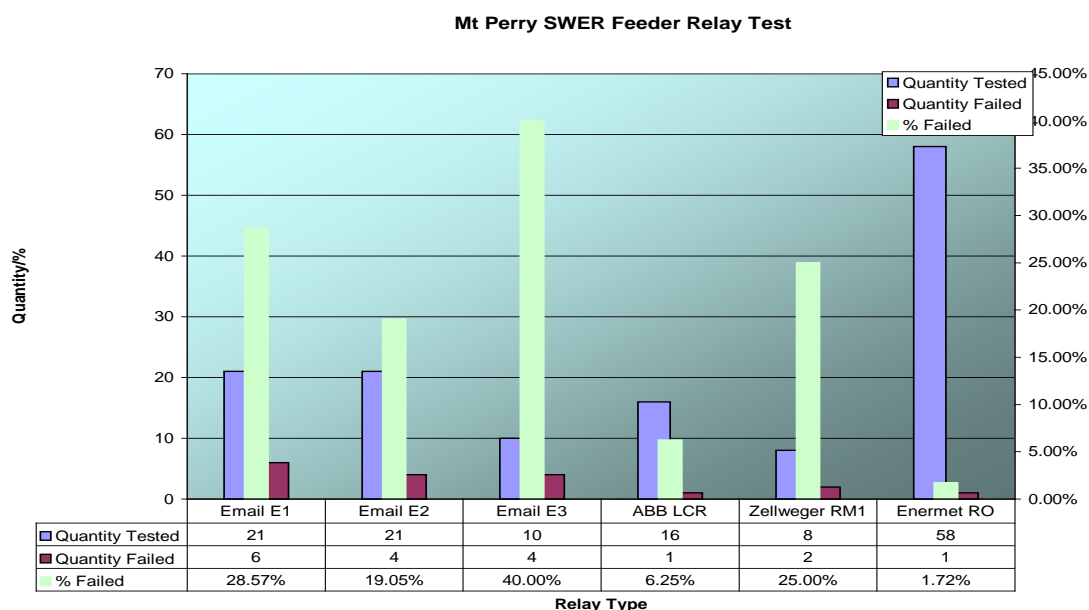
**Table 5 In-Situ Testing Program Plan**

Year of Test	Region	Model	Sub Group	Compliance	Management Program
2007-08	All	Sangamo HMT		Non-compliant	Replaced
2007-08	All	EMMCO MC3		Non-Compliant	Replaced
2007-08	All	EMMCO AZ		Non-compliant	Replaced
2007-08	WB	EMMCO BAZ	BAZ-WB	5 Years	In-situ Test 2014
2007-08	CQ	EMMCO BAZ	BAZ-CQ	5 Years	In-situ Test 2014
2007-08	MK	EMMCO BAZ	BAZ - MK	5 Years	In-situ Test 2014
2007-08	SW	EMMCO BAZ	BAZ -SW	Non-Compliant	Program underway to replace the meters
2007-08	NQ, FN	EMMCO BAZ	BAZ-NQFN	5 Years	In-situ Test 2014
2007-08	All	Email M1	M1 10/60	5 Years	In-situ Test 2014
2007-08	All	Email M1	M1 15/100	7 Years	In-situ Test 2015
2007-08	All	Email M2	M2	7 Years	In-situ Test 2015
2007-08	All	Email M3	M3 10/80	7 Years	In-situ Test 2015
2007-08	All	Email M3	M3 15/100	7 Years	In-situ Test 2015
2007-08	All	Iskra E895G2		7 Years	In-situ Test 2015
2007-08	WB,CQ,SW	WF2	WF2-WBCQSW	5 Years	In-situ Test 2014
2007-08	MK	WF2	WF2-MK	5 Years	In-situ Test 2014
2007-08	NQ, FN	WF2	WF2-NQFN	5 Years	In-situ Test 2014
2007-08	WB,CQ,MK	WF3	WF3-WBCQMK	5 Years	In-situ Test 2014
2007-08	SW	WF3	WF3-SW	5 Years	In-situ Test 2014
2007-08	NQ FN	WF3	WF3-NQFN	5 Years	In-situ Test 2014
2007-08	All	L&G CM170		7 Years	In-situ Test 2015
2007-08	MK	Nilsen EMS 2100	(only region with this meter)	7 Years	In-situ Test 2015
2007-08	All	Email EM1210		7 Years	In-situ Test 2015
2007-08	All	Email A11		7 Years	In-situ Test 2015
2007-08	All	Ampy P1		7 Years	In-situ Test 2015
2007-08	SW	Ferranti TM2C	(only region with this meter)	5 Years	In-situ Test 2014
2007-08	All	Email SDM		7 Years	In-situ Test 2015
2007-08	All	Email WC Q4		7 Years	In-situ Test 2015



# Meter Asset Management Plan

## 7.2. RIPPLE RECIEVER TESTING



**Figure 5 : Ripple Receiver Test results**

A number of projects have been undertaken to ensure or improve the response of load control, an 'as found' test on 134 relays removed from a SWER<sup>9</sup> feeder has been utilised to perform operational tests in a laboratory. Whilst only a small sample, involving 6 relay types, the failure rates were more pronounced in the oldest ripple receivers types deployed.

As part of Ergon Energy's demand strategy a project was initiated in North Queensland region to replace 22,500 ripple receivers which separated visible (Air Conditioning and other loads) and invisible loads (hot water) onto separate switching channels to improve maximum demand response.

Another project has been initiated which will replace the oldest (Type E1 and E2) ripple relays in the Wide Bay (WB) region. A ripple receiver installation survey has been conducted and identified approx 10,500 sites where these relay types are located. This work will be combined with other meter testing/replacement programs to maximise the value of performing a site visit.

## 7.3. 'AS FOUND' SAMPLE TESTING OF METERS

Arrangements have been made with our meter scrapping service provider to refurbish nominated meter types (electronic meters less than 10 years old) removed from installations. As found Laboratory testing will initially be applied to the Email E1000 variants for Initial verification, and to determine if they are performing satisfactorily in the field.

## 7.4. CARD OPERATED METERS

The current fleet of AMPY Automation (UK) Prepayment Card Operated Meters (COM) is no longer available for purchase as the manufacturer has ceased production of this meter type from June 2011. Ergon Energy has a fleet of 4500 COMs in single and dual element configurations that are used in 32 remote Aboriginal and Torres Strait Island communities. Approximately 50% of COMs have been replaced between 2005 and 2007. These meters have a relatively short operating life due to (1) high temperatures and relatively high humidity that impacts the battery life, and (2) the ingress of material into the card reader. A quantity of 1590 COM meters have been purchased for

<sup>9</sup> Single Wire Earth Return

# Meter Asset Management Plan

new and replacement use in installations to allow a new prepayment replacement solution to be investigated and deployed over the next 18-24 months.

## 7.5. METER NEW and REPLACEMENT STRATEGY

Ergon Energy's strategy for new and replacement metering is to use 3 phase meters on all multiphase installations and 2 element single phase meters where a primary and secondary tariff is required. This will reduce the overall meter asset quantities on existing installations. All meters will be installed with import/export displays to cater for the large penetration of PV systems. Over the next two years facilities will be introduced to allow field programming of electronic meters including the use of the internal ripple receivers in two element meters. This is targeted at reducing multiple stock codes to suit tariff applications and reduce meter change outs and rework were electronic meters are already installed.

## 8. TEST EQUIPMENT MANAGEMENT

ISO 9001 compliance will be utilised for all metering test equipment calibration and management. Ergon Energy Metering ISO 9001 accreditation has been upgraded from ISO 9001:2002 to ISO 9001:2008. Ergon Energy's current Certification Number 14229 covers the period 27 July 2011 to 30 June 2014. The above is encapsulated in the metering management system continual improvement cycle (shown below).

Ergon Energy Network Monitoring and Processing  
Metering Management System

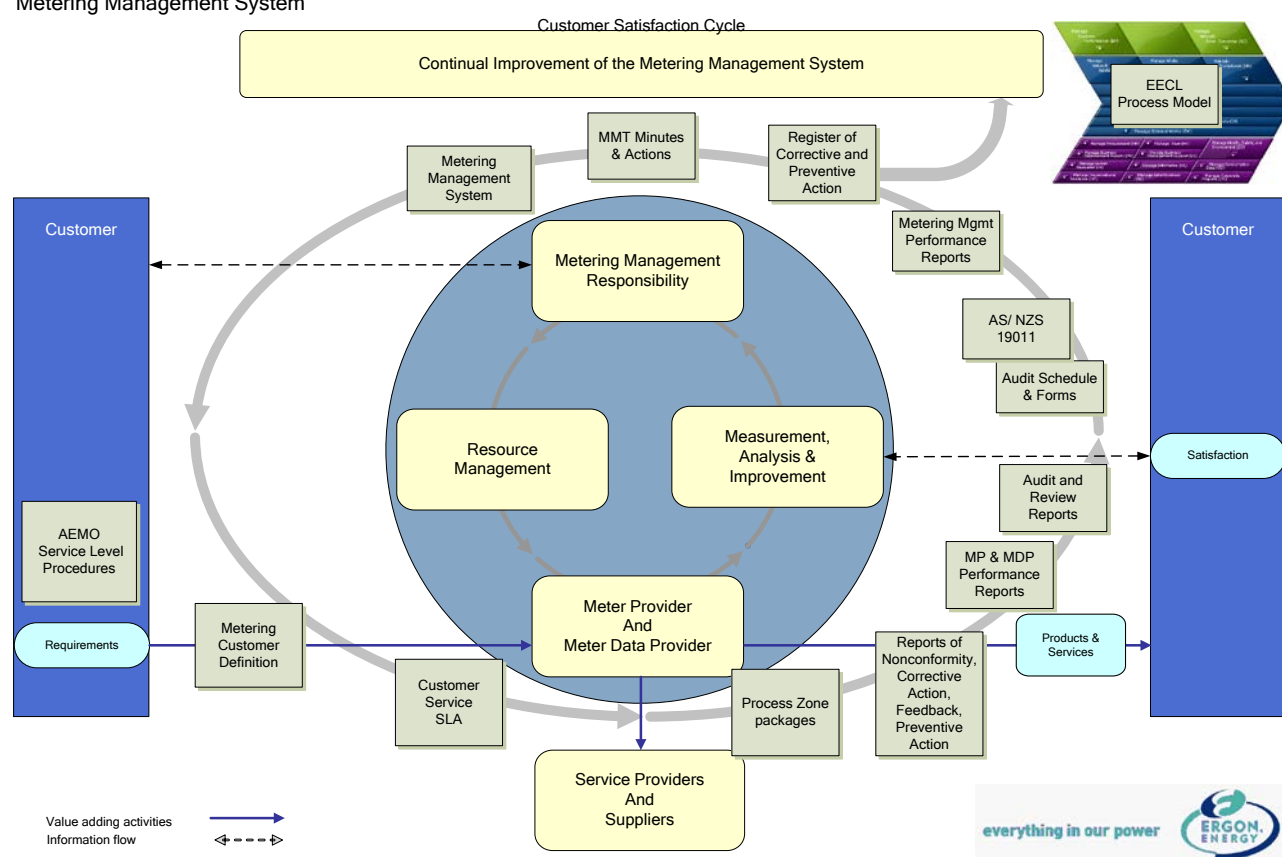


Figure 6 : The ISO 9001 accreditation process currently in place

# Meter Asset Management Plan

---

## 8.1. CALIBRATION INTERVALS FOR TEST EQUIPMENT

Refer to Appendix D – Test Equipment CURRENTLY IN Use for details of metering test equipment that has been approved to be used and the intervals within which it should be calibrated in line with NMI<sup>10</sup> “The Measurement of Electrical Quantities and ISO/IEC 17025 Field Application Document-Supplementary Requirements for Accreditation.”

## 8.2. EQUIPMENT CALIBRATED AT CORRECT INTERVALS

Ergon Energy's Meter Laboratory will monitor and keep a test plan in place so that all metering test equipment is calibrated at its correct test interval. Equipment requiring routine test periods is recorded in the asset system (ellipse) and assigned a maintenance task to ensure periodic testing.

## 8.3. TRACEABILITY OF TEST EQUIPMENT

All test equipment utilised in the field or in the laboratory have standard numbering system allocated to help in identifying the equipment and how often it is tested. All equipment calibrated shall have its test certificate traceable to a NATA lab.

## 8.4. MEASUREMENT UNCERTAINTY OF TEST EQUIPMENT

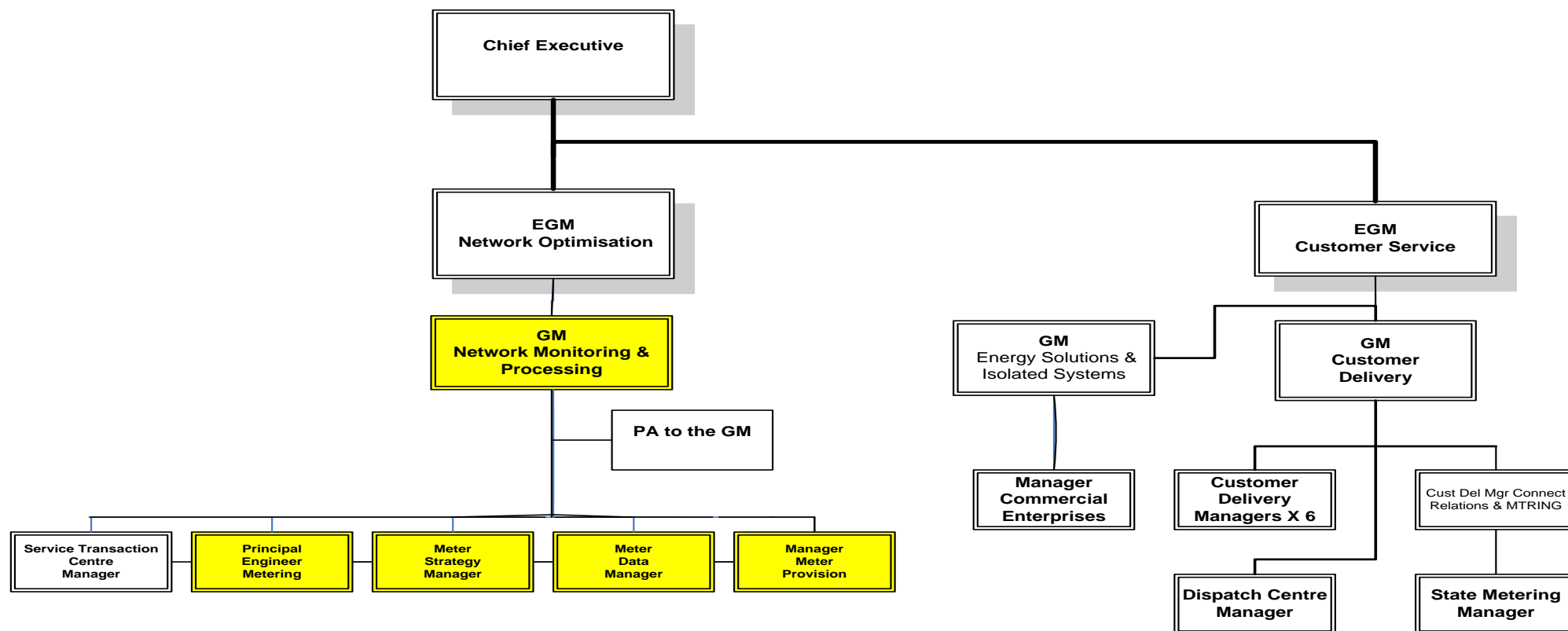
An “estimate of testing uncertainties’ will be calculated in accordance with the ISO “Guide to the Expression of Uncertainty for Measurement” and the calculated uncertainty will be kept electronically and be readily available for any audit process.

---

<sup>10</sup> National Measurement Institute

# Meter Asset Management Plan

## APPENDIX A – ERGON ENERGY ORGANISATION STRUCTURE FROM MAMP PERSPECTIVE



# Meter Asset Management Plan

## APPENDIX B - METERING RESOURCES<sup>11</sup>

### Network Monitoring & Processing Management Team

#### General Manager Network Monitoring & Processing

- Develop and implement a whole of business meter strategy that maintains profitable and sustainable commercial practices for the provision of metering services and which contributes to Ergon Energy's ability to meet future demands.
- Maintain an industry understanding of the National Electricity Market (NEM) to ensure the business is aware of market and industry changes that may affect metering operations, and ensuring that resource arrangements deliver the required service, efficiency and compliance outcomes.
- Ensure compliance with state and national codes, rules and regulations as they relate to the electricity markets for the provision of meter data, meter provision activities and the maintenance of relevant accreditations.
- Assigned role of 'Responsible Person' in the Local Network on behalf of Ergon Energy, taking responsibility to ensure 'Meter Provider' and 'Metering Data' compliance with National Electricity Market rules and meeting specific obligations as stipulated by AEMO.
- Provide leadership, direction, advice and development opportunities for the Network Monitoring & Processing Group to ensure they have the skills and motivation to achieve business objectives and to create a strong safety and quality culture that encourages innovative thinking, teamwork and flexibility.
- Complies with all relevant Legislation, and Ergon Energy policies, procedures and practices as varied from time to time.

#### Principal Engineer Metering

- Accountability for development and review of the Meter Asset Management Plan (MAMP).
- Budget and develop meter asset maintenance plan to meet the MAMP for implementation by the Manager Meter Provision.
- Maintain and develop meter installation standards (Queensland Electricity Connection and Metering Manual) and technical specifications for purchasing and external contracting works.
- Ensure processes and the meter register supports the meter asset life cycle.
- Overall responsibility for meter register operation and data maintenance ownership

#### Manager Meter Provision

- Accountability for overseeing delivery outcomes of MPB 1-6 to satisfy AEMO responsibilities
- Management of contracts and SLA's to ensure delivery outcomes.
- Performance manage AEMO MPB Service Level Requirements
- Maintain MPB processes and quality documentation – shared accountability with Principal Engineer Metering

#### Manager Meter Strategy

- Develop whole of business meter strategy
- Overseeing National & State metering developments
- Strategic alignment of aspects pertaining to metering
- Supporting business case development for new technologies, trials.
- Commercial management of metering business unit activities

<sup>11</sup> Refer to Appendix A – Ergon Energy Organisation Structure From MAMP Perspective for a graphical layout of the organisational structure currently in place

# Meter Asset Management Plan

- Oversee & management of whole of business metering related systems including; monitoring of the IT SPARQ SLR contract
- Maintain appropriate compliance and AEMO relationships including; QA management oversight & business interfaces
- Single point emphasis around system & process changes relating to metering and future systems needs to support strategy
- Maintain and review SLA's with internal business groups providing services to meet KPI's and service quality.

## Manager Meter Data

- Accountability for data collection & processing to satisfy AEMO responsibilities
- Management & provision of WOB meter data as required
- Performance manage AEMO MDP Service Level Requirements
- Maintain MDP processes and quality documentation

## INTERNAL BUSINESS GROUPS SUPPORTING METERING<sup>12</sup>

### General Manager Customer Delivery

Under the Customer Delivery Group the six regional based Customer Delivery Managers provide services for Type 4-7 installations. Under the Customer Delivery Managers are fully trained Electricity Connection Officers (ECO's) & and Advanced Connection Officers (ACO's) who are regularly audited in their work process by the Meter Provision Group. A brief overview of the ECO & ACO roles and capabilities include:

- Meter installation & maintenance for Type 4 – 6 metering
- All Type 7 installations and maintenance
- Customer metering complaints
- In field meter testing for Type 4 – 6 installations

### State Metering Manager

Based under the Customer Delivery Manager, Connections, Relations and Metering, the Customer Delivery Metering Group is responsible for providing services for Type 1-4 metering installation and maintenance. The meter test lab is also managed by the Customer Delivery Metering Group. The following is a brief overview of their roles and capabilities:

- Meter Installation Type 1-4
- Lab Meter Testing
- Field Meter and LV CT Testing
- Remote commissioning of Type 1-4 installations
- Equipment calibration<sup>13</sup>
- Metering services to external MPs
- In house- meter testing and calibration
- Metering project support
- New meter asset evaluation
- Meter programming
- Overall Error Calculation
- Uncertainty Calculation
- NATA<sup>14</sup> test compliance

<sup>12</sup> Only Business groups involved in Field Metering Support are listed

<sup>13</sup> All test result produced are traceable to a NATA accredited lab

<sup>14</sup> National Association of Testing Authorities, Australia

# Meter Asset Management Plan

---

## Manager Commercial Enterprises

Based under the GM Energy Solutions and Isolated Systems the Commercial Enterprises group provides all high voltage testing and maintenance for the Network Monitoring and Processing Group. The capabilities of this group are:

- Type 1-3 high voltage equipment testing
- High voltage infield testing
- High voltage metering unit, voltage transformers, current transformer refurbishment
- Accuracy Testing<sup>15</sup>

## Other External Resources

- Ergon Energy has appointed a “Meter Contractor Panel” that can be utilised for any ad-hoc field metering works for Type 4-6 metering installations. The Meter Contractor Panel is engaged under a formal tender process to provide resources with appropriate experience and capabilities to perform meter services such as meter in-situ testing and change out programs that cannot be resourced internally. The list of service providers are reviewed every three years and a list of all available service providers maintained by the Meter Provision group. All Meter Contractor Panel resources engaged to perform metering services work for Ergon Energy, work under Ergon Energy's MP accreditation and are required to have the same training and competencies as internal staff. Induction and training records are held within Ergon Energy's HR system. In addition, all field staff including contractors performing work under Ergon Energy's MP accreditation is audited as part of our ISO audit program.
- Ergon Energy utilises NATA certified or NATA traceable labs for some of its sample testing and other primary standard testing.

---

<sup>15</sup> All test result produced are traceable to a NATA accredited lab

# Meter Asset Management Plan

## APPENDIX C – METER LABS TEST CAPABILITY

Functionality	Brief Description
Two Meter Test Bench (10 Meter Bench & 20 Meter Test Bench)	Bench Testing of electricity meters (single and three phases). Ability to provide certified test certificate for the equipment under test.
Meter Programming	Create meter tariff programs and testing of the meter programs.
Current Transformer Testing & Refurbishment	Manage the in-house LV current transformer testing. Fault diagnostic and capability to provide certified test certificate.  Repair LV CTs by replacing secondary terminal screws & refurbishment of broken secondary terminal cover
Testing of Field Watt-hour Standards	Use of RD31 (class 0.02) standard for in-house test equipment calibration.
Meter Test Equipment Management	Keep complete records of all metering test equipment. Manage the calibration testing of the test equipment as per National Measurement Institute requirement.
Meter Testing	Carry out calibration tests in-house and have the ability to provide certified meter test results
Hardware Testing	Support Meter Asset and Meter Provision in the testing of new equipment to be introduced by Network Monitoring & Processing Management.
Software Management	Keep Detailed records of all Metering software used by Network Monitoring & Processing Management and manage the access rights within Ergon Energy.
Remote Commissioning	Provide support to field staff to remotely interrogate the meter.  Provide support to the Meter Data Provider in fault diagnostic and repair for remotely polled meters.
Data Warehousing	Keep detailed records of all testing to align with Chapter 7 of the National Electricity Rules
Process Documentation	Keep up to date process documentation for all the work as outlined above.



# Meter Asset Management Plan

## APPENDIX D – TEST EQUIPMENT CURRENTLY IN USE

Work type	Test Equipment	No of Units	Class	Tested at	Ergon Energy Test Schedule
Reference Standards	Radian RD-31-333	2	0.020%	NATA certified Lab	12 Months
Reference Standards	Radian RM11	3	0.025%	In- House at Rockhampton	12 Months
Field Working Standard	Radian RD-30-233	1	0.040%	In- House at Rockhampton	12 Months
Field Working Standard	Radian RM-10	6	0.050%	In- House at Rockhampton	12 months
Laboratory Working Standard	MTE-S 20.20	1	0.050%	In- House at Rockhampton	12 Months
Laboratory Working Standard	MTE-S 10.10	1	0.050%	In- House at Rockhampton	12 Months
Laboratory Working Standard	MTE-PTS3.3/C	1	0.050%	In- House at Rockhampton	12 Months
HV Primary Injection Test Set	Tettex (Townsville)	1	0.050%	NATA certified Lab	36 Months
HV Primary Injection Test Set	Multiamp (Brisbane)	1	0.100%	NATA certified Lab	36 Months
Measuring Instrument for Voltage transformer	Voltage Comparator	2	0.020%	NATA certified Lab	36 Months
Current Transformer Bridge	Current Comparator	1	0.020%	NATA certified Lab	36 Months
Load Burden for HV Testing	Electronic Standard Voltage Burden	4	0.020%	NATA certified Lab	36 Months
Load Burden for HV Testing	Electronic Standard Current Burden	1	0.020%	NATA certified Lab	36 Months
LV & HV CT Frequency Injection Test set	Omicron CT Analyser	13	0.020%	In- House at Rockhampton	12 months
CT/DC Meter Test sets with Phantom load	MTE PTS2.1	14	0.020%	In- House at Rockhampton	6 Months
CT/DC Meter Test sets with Phantom load	MTE PTS2.3	13	0.100%	In- House at Rockhampton	12 Months
CT/DC meter Test sets customer load	MTE PWS2.3	21	0.100%	In- House at Rockhampton	36 Months
Tong testers	Ampstick	18	0.500%	Ergon Energy Test Section	12 Months
Admittance Testers	Red Phase	24		In- House at Rockhampton	
Field Working Standard	Hansen 3.3 - 33KV Standard VT	1	3 VA AL	NATA certified Lab	
Field Working Standard	Haefley 11-275 KV Standard VT	1	0.100%	NATA certified Lab	
Field Working Standard	CGE 66KV Standard VT	1	0.200%	NATA certified Lab	
Field Working	CGE 110KV	1	0.100%	NATA certified	

# Meter Asset Management Plan

Work type	Test Equipment	No of Units	Class	Tested at	Ergon Energy Test Schedule
Standard	Standard VT			Lab	
Field Working Standard	CGE 110KV Standard VT	1	0.100%	NATA certified Lab	
Field Working Standard	CGE 132KV Standard VT	1	0.100%	NATA certified Lab	
Field Working Standard	CGE 275KV Standard VT	1	3 VA - CI AL	NATA certified Lab	
Field Working Standard	Hobson 1 Amp Standard CT	1	3VA – CI AL 40VA- CI AM	NATA certified Lab	
Field Working Standard	Hobson 5 Amp Standard CT	1	3VA – CI AL 40VA- CI AM	NATA certified Lab	
Field Working Standard	Hansen 5.5-22 KV Standard VT	1	100VA - CI 0.05%	NATA certified Lab	
Field Working Standard	10/5/2005 Standard CT	1	10VA - CI 0.05%	NATA certified Lab	
Field Working Standard	200 -20/5 Standard CT	1	10VA - CI 0.05%	NATA certified Lab	
Field Working Standard	3000 -250/5 Standard CT	1	10VA - CI 0.05%	NATA certified Lab	
Reference Standard	200/5 EC S220/5 Standard CT	1	5VA-CI	NATA certified Lab	10 Years
Reference Standard	800/5 EC T800/5 Standard CT	1	0.5 15VA-CI	NATA certified Lab	10 Years
Reference Standard	1500/5 EC W1500/5 Standard CT	1	0.5 15VA-CI	NATA certified Lab	10 Years

# Meter Asset Management Plan

## APPENDIX E – REFERENCES

Document	Information Provided
Queensland Industry Code	Details requirements for operation in the Queensland Electricity Market For metering and GSLs (Metering Chapter 9)
National Electricity Rules	Details the performance of metering in the National Market. Chapter 7.
National Metrology Procedures Part A for meter Types 5 & 6	Details the performance of metering in the National Market.
Australian Standards:	AS:1284 metering series, AS 3000 Wiring rules AS 60044 -1 -2003 Instrument Transformers - Current Transformers AS 60044 -2 -2003 Instrument Transformers - Voltage Transformers AS 1199 1988 Sampling procedures and tables for inspection by attributes. AS 1199-1990 Guide to sampling procedures and tables for inspection by attributes. AS 2490 1987 Sampling procedures and charts for inspection by variables for percent non-conforming.
QECMM	Queensland Electricity Connection and Metering Manual provide service providers with the information required for connecting customers and metering equipment to Ergon Energy's distribution network. A copy of the latest manual is available from Ergon Energy's website at <a href="http://www.ergon.com.au">www.ergon.com.au</a>
Metering Procedures, Specifications and Work Instructions	Details the guidelines for performing metering tasks
National Measurements Institute.	Statistical sampling plan of previously verified electricity meters. National Measurements Act 1960 (NatMeasure1960.pdf) <a href="http://www.measurement.gov.au">www.measurement.gov.au</a>
Metering Asset Management Plan (MAMP) Information Paper	AEMO Document No ME_MP1943 V0005
Business and Information Blueprinting Program	Customer and Metering Stream (Options Analysis Deliverable 15th November 2011 – Version 2.7)
NATA	National Association of Testing Authority, Australia
AEMO	Australian Energy Market Operator