APPENDIX 56

Metering Asset Management Plan

June 2014

Energex
Metering Asset Management Plan
2014/15

Version 7

positive energy

EXECUTIVE SUMMARY

This Metering Asset Management Plan (MAMP), which is an updated version of the 2013/14 MAMP approved by AEMO, has been prepared in line with Energex's vision to become a customer centric organisation by providing accurate energy consumption information for all its customers effectively through our in depth understanding of the performance of our metering assets. One of the goals of this MAMP is to maximise our metering asset economic life without compromising the accuracy of the asset.

This MAMP covers the asset management of all metering equipment at metering installations for which Energex is the nominated Responsible Person and/or Metering Provider under either of its MPB accreditations as follows and is based on monitoring populations of common equipment irrespective of the installation type in which it is installed:

- **Type 6 metering installations**
  Energex Limited
  MSATS Participant ID = EGXLTDMP
- **Type 1 - 4 metering installations**
  Energex Limited trading as Metering Dynamics
  MSATS Participant ID = ENERGXMP

For type 1 – 4 installations where Energex is not the Responsible Person (RP), the work will be conducted in accordance with this MAMP to the extent contracted by the RP and/or in accordance with the asset management strategy/plan provided by the RP.

This MAMP provides an alternative non time based maintenance and inspection strategy for meters and low voltage current transformers as specified in Table S7.3.2 and S7.3.3 of the *Rules* and hence is submitted for the approval of Australian Energy Market Operator (*AEMO)* in accordance with clause S7.3.1 of the *Rules.* The alternative strategy is based on:

- For meters - AS 1284.13 Electricity Metering Part 13 In service compliance testing.
- For low voltage current transformers – AEMO document Alternative Testing Minimum Requirements: Low Voltage Current Transformer Metering Installations.

Energex as LNSP provides LV and HV metering instrument transformers to customers and recovers the purchase and maintenance costs through network charges. Energex will arrange for the testing and inspection of these metering instrument transformers as part of their Network Asset Management Plan.

There is an established process of investigating faults, conducting site inspections and regularly auditing different aspects of metering installations and processes, in addition to the sample testing of our meters. This MAMP also covers the procedure to be used where sample testing of an equipment population indicates a population failure.

The Energex metering program of work is included at section 12 of this plan.

As asset process owners we confirm that there are sufficient funds allocated for metering equipment; inspection, testing and replacement where necessary, as detailed in this MAMP and we submit this in accordance with the Rules for your approval.

Name	Position Title	Signature
Endorsements		
Peter Chan	Group Manager Metering	
Kim Boyd	Group Manager Network Maintenance and Performance	
Approval		
Peter Price	Executive General Manager Asset Management	

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ENQUIRIES REGARDING THIS MAMP

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VERSION CHANGES

This MAMP shall be reviewed on an annual basis and updated if necessary.

Date	Version No.	Details
December 2005	Version 1	Initial issue.
June 2006	Version 2	Address issues raised by NEMMCO
June 2010	Version 3	Expanded to include asset management of metering equipment for type 6 installations.
December 2011	Version 4	Annual review and update of MAMP
May 2012	Version 5	Annual review and update of MAMP to specifically cover the AEMO requirements of low voltage current transformer metering installations
August 2012	Version 5.1	AEMO comments of 30/07/12 included. Note amendments for both V5 and V5.1 are shown shaded.
September 2012	Version 5.2	AEMO comments of 12/09/12 included. Note amendments for V5, V5.1 and V5.2 are shown shaded.
June 2013	Version 6	Annual review and update of MAMP 2013/14
June 2014	Version 7	Annual review and update of MAMP 2014/15. Type 1-4 strategy and asset details removed.

The Company

Energex manages sophisticated energy distribution networks and delivers world-class energy products, services and expertise to one of Australia's fastest growing communities.

Based in South East Queensland, Energex has an 85 year history of growth and leadership. Today Energex distributes electricity to more than 1.4 million residential, industrial and commercial customers. It has also developed a strong reputation for its network asset management capabilities including specialised engineering services, metering applications and energy solutions.

At the core of the business are high performing distribution assets worth more than $12 billion, the expertise of more than 3,000 employees and a drive to provide customers with energy solutions that are economically, socially and environmentally acceptable. This is underpinned by technological innovation and advanced management systems which drive efficiency, quality and safety. Many of these are nationally or internationally certified or benchmarked to international standards. Energex also places sustainability high on its corporate agenda through progressive environmental and social practices.

By continually adapting the way it does business to keep pace with the rapidly evolving marketplace, Energex has remained at the forefront of the industry.

The Network

Energex's electricity distribution network spans more than 25,000 square kilometers throughout South East Queensland including the dynamic growth regions of Brisbane, Ipswich, Gold Coast and Sunshine Coast.

In the past 10 years the population has dramatically increased in these areas. This has led to a growth in the customer numbers and a consequent rise in overall energy demand. As a result the electricity network's capacity has more than doubled in this time.

Energex will continue to invest prudently in building and maintaining these networks, so as to reduce the cost of energy to our customers.

Metering Dynamics

Metering Dynamics is one of the most successful metering businesses in the Australian market, delivering innovative multi-utility metering solutions to maximise energy efficiency and reduce costs.

A specialist group of Energex, Metering Dynamics offers a range of innovative energy measurement and data management products throughout Australia.

Metering Dynamics' success is based on world class expertise and products developed over more than 85 years of operating an electricity network utilising state of the art metering systems.

Servicing customers in the, residential, small business, major industrial, manufacturing and utility markets, Metering Dynamics' tailor-made products lead the industry in innovation and technical expertise.

Metering Provider Category B (MPB)

Metering Dynamics' primary function is to manage the business of providing and maintaining metering systems for the national contestable market that meet the requirements of the Rules and National metrology procedures, Acts and Regulations of the Electricity Industry and the Conditions of Supply of local network providers.

Metering Dynamics operates with a core of highly competent technical personnel who remotely supervise and monitor the installation and testing of metering equipment by contract personnel in the field.

Outside South East Queensland, Metering Dynamics has working arrangements with other Metering Providers and with selected electrical contracting organisations. All work is:

- Issued by Metering Dynamics through its works management system MPIS (Meter Provider Information System)
- Conducted in accordance with Metering Dynamics procedures and guidelines
- Controlled by Metering Dynamics through the remote commissioning process
- Fully recorded with records returned to and retained by Metering Dynamics through a paperless system of electronic site and test reports
- Contractors audited through a monitoring system based on the volume and historic performance of contractors' operational personnel.

Customer benefits

The ability to accurately monitor energy usage and maximise energy efficiencies allows the customer to achieve:

- Greater cost effectiveness
- Data security
- System integrity
- Traceability of energy usage and
- Compliance with reporting regulations.

Certifications and Accreditations

Metering Dynamics recognises the need for quality and customer satisfaction and has developed and implemented procedures to gain certification and accreditation against internationally recognised standards including:

- Quality certification of management systems to AS/NZS ISO 9001
- Laboratory accreditation with the National Association of Testing Authorities, Australia (NATA) to AS ISO/IEC 17025 for the testing and calibration of metering equipment and systems in the laboratory and in the field
- Inspection accreditation with NATA to ISO/IEC 17020 (2012) for the inspection of metering installations for compliance to the Rules
- AEMO accreditation for Metering Provider (MPB) and Metering Data Provider (MDP) services for all metering system classifications excluding type 5 metering installations within the Australian National Electricity Market
- Vocational Education Training and Employment Commission (VETEC) registered training organisation for metering courses conducted by Esitrain, a department within Procurement, People and Services Division.

Products and Services

Metering Dynamics establishes and manages infrastructure that collects, data warehouses and distributes energy/utilities information and solutions for Market Participants, Market Operators, Retailers, Networks, Customers and other parties.

Metering Dynamics offers a comprehensive range of innovative energy measurement and data management products throughout Australia covering the following.

Consulting

- Development of metering policies and procedures complying with the relevant standards, codes and regulations
- Design, cost estimation and documentation of metering systems using modern metering, measurement and communication technologies
- Evaluation, specification, procurement and testing of the most appropriate and cost effective metering equipment
- Remote data retrieval systems for multi-utility connections (electricity, gas, water).

Asset Management

- Installation, commissioning, maintenance, condition monitoring and repairs of metering systems
- Testing, calibration and programming of metering equipment and systems on location or at our NATA accredited laboratory
- Auditing of metering systems by expert staff with international auditing experience
- VETEC accredited training on metering system design, installation, testing and commissioning, meter queries, meter reading, meter operation and meter programming
- Technical investigations of metering system performance
- Electricity theft investigation and security assessment (measurement security).

Project Management

- Turnkey project management for metering systems.
- Smart meter pilots and trials

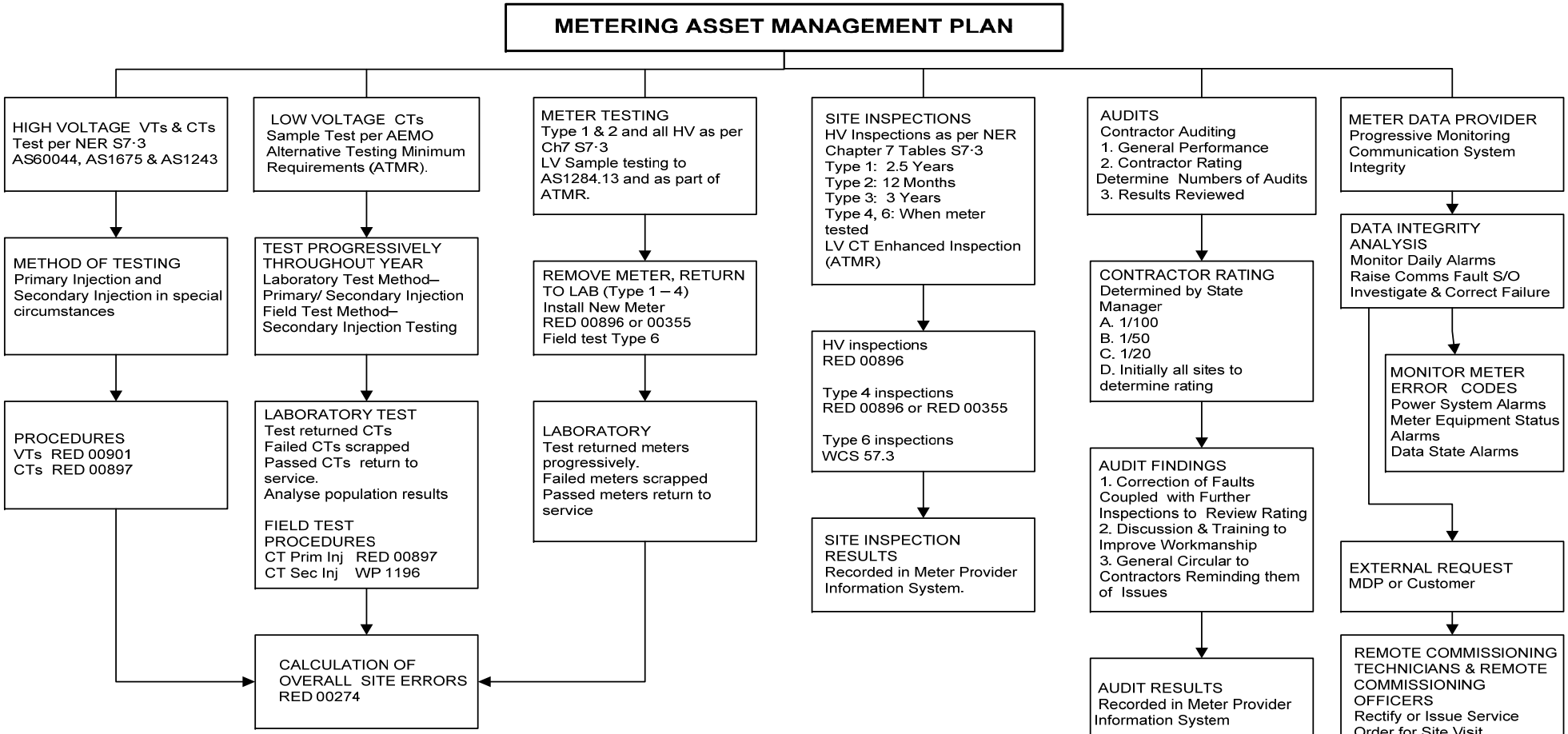
Metering Data Provider

- Data management systems for remote meter reading using Public Switched Telephone Network (PSTN), radio, satellite and digital (GSM) networks
- Provision of Australian Electricity Market MDP services
- Provision of data retrieval, validation, delivery and billing services
- Provision of data monitoring for energy auditing including tariff analysis reports
- Provision of quality of supply information.

Other Products

- Automated remote meter reading systems for individual meters and multi-meter local area networks (electricity, gas and water)
- Development and sale of specialised metering test equipment and software
- Power quality monitoring (voltage sag/swell, harmonics and waveform capture)
- LV power factor correction systems
- Energy monitoring & reporting systems
- Demand management systems
- High Voltage testing to 132kV on location
- Current Transformer testing to 10,000 Amperes on location
- Secondary injection of current transformers in the field
- Calibration of temperature and electrical quantities.

Figure 1 Asset Management Plan Overview



ATMR - AEMO Alternative Testing Minimum Requirements document

1 PURPOSE

The purpose of this document is to describe how Energex Limited manages its metering equipment assets and demonstrates that installed metering equipment and systems continue to meet regulatory and Rule requirements with respect to:

- Initial measurement accuracy and installed functionality
- Correct measurement of all site loads
- Ongoing measurement accuracy and functionality
- Site security and
- Integrity of data delivery.

This MAMP deviates in part from the time based inspection outlined in chapter 7 of the Rules and is based on:

- Pro-active monitoring and analysis aimed at the identification and investigation of potential problems and initiating rapid corrective action where required; and
- Statistical sampling of metering equipment and sites to confirm their integrity and the effectiveness of the overall asset management plan; and
- Selective application of time based inspection and testing in accordance with the schedules of chapter 7 of the Rules where appropriate.

This MAMP describes how the various organisational units within Energex combine to provide and manage all the relevant metering provider and responsible person functions.

This MAMP shall be reviewed on an annual basis and updated if necessary.

2 SCOPE

This MAMP covers the asset management of all metering equipment at metering installations for which Energex is the nominated Metering Provider under either of its MPB accreditations as follows:

- **Type 1 - 4 installations**
  Energex Limited trading as Metering Dynamics
  MSATS Participant ID ENERGXMP
- **Type 6 installations**
  Energex Limited
  MSATS Participant ID EGXLTDMP

From the commencement of full retail competition (FRC) within Queensland on 1 July 2007, Energex did not have any type 5 metering installations and is not planning to introduce type 5 metering installations in the immediate future. If and when type 5 metering installations are introduced, this MAMP and Energex Limited's MPB accreditation will be extended to cover the metering assets at these types of installations.

This MAMP only covers metering installation types 1 to 4 and type 6 at both 1st and 2nd tier sites. This MAMP applies to type 1 to 4 installations where Metering Dynamics has been contracted by relevant retailer RPs to provide these services in accordance with the asset management strategies/plans provided by the RPs.

The MAMP is based on monitoring populations of common equipment irrespective of the installation type in which it is installed. Because there is overlapping commonality of some metering equipment used in both types 4 and type 6 metering installations, this MAMP does not entirely separate the asset management by type of metering installation.

At the commencement of FRC in Queensland on 1 July 2007 and the extension of the Rules and Metrology Procedure to cover both tier 1 and tier 2 installations on 1 July 2008, the "grandfathering" provisions of the Queensland Electricity Industry Code (EIC) and the Rules effectively deemed that all existing type 6 metering installations complied with the Rules at the time of FRC commencement. This MAMP addresses the ongoing compliance of type 6 metering equipment and metering installations.

Where Metering Dynamics or Energex is not the asset owner and a metering installation or the associated metering equipment is found to be non-compliant, Metering Dynamics will advise the site or asset owner and offer its services to correct the deficiencies where applicable.

3 SUMMARY OF INSTALLATIONS AND METERING EQUIPMENT

3.1 Installations

Energex Limited trading as Metering Dynamics commenced as a MPB in the NEM in 1997 servicing mainly South East Queensland. Metering Dynamics has grown steadily since the beginning of market operations to cover NEM installations over six states/territories with non-market metering installations in a further 2 states/territories. The commencement of FRC in Queensland saw the inclusion of 2 million meters installed at approximately 1.3 million type 6 metering installations.

A summary of NEM meters installed by type, state/territory and voltage is given in Table 1.

Table 1
Number of NEM Meters Installed as at June 2014

State	Voltage	Type 5	Type 6	Total
		< 0.75	< 0.75	
		GWh	GWh	
QLD	HV	NA	7	**7**
	LV	NA	2,182,929	**2,182,929**

3.2 Meters

The range of meter types installed is presented in Table 2. More detailed lists of the number of meters by make, model and rating are also available but not included in this document.

Table 2
Number of Meters Installed by Year of Manufacture as at June 2014

Meter Manufacturer	Meter Type		Year of Manufacture			Total
	Single Phase	Poly Phase	BCC/SEAQ	SEQEB	SEQEB/ Energex	Sub Total
			<1977	1977-1992	>1992	
Ampy	429,246	0	0	0	429,246	**429,246**
Aust Sangamo	14,069	0	14,069	0	0	**14,069**
EDMI	4,035	89,945	0	0	93,980	**93,980**
Elster	37	10,236	0	0	10,273	**10,273**
Email	1,096,659	14,680	150,200	562,128	399,011	**1,111,339**
EMMCO	4,568	368	4,936	0	0	**4,936**
EMTEL	0	14	0	14	0	**14**
Enermet	0	5,164	0	0	5,164	**5,164**
English Electric	3	0	3	0	0	**3**
Ferranti	314	0	0	314	0	**314**
Iskra	180,091	7,708	0	11	187,788	**187,799**
Landis & Gyr	246,768	172	157	68,628	178,155	**246,940**
Nilsen	1,623	0	0	180	1,443	**1,623**
Siemens	740	53	0	33	760	**793**
Warburton Franki	74,686	0	55,771	18,915	0	**74,686**
Weston	3	0	3	0	0	**3**
Unknown	1,754	0	966	710	78	**1,754**
Grand Total	**2,054,596**	**128,340**	**226,105**	**650,933**	**1,305,898**	**2,182,936**
Source MARS & Peace databases						

Organisations that originally purchased the equipment and identified on the nameplate, BCC, SEAQ, SEQEB are predecessor organisations of Energex.

3.3 High Voltage Current and Voltage Transformers

Energex as LNSP provides HV metering units (CTs and VTs) to customers, and recovers this cost plus maintenance costs, through network charges (this will change from 1 July 2015 with the proposed reclassification of metering services to an alternative control service). Energex will arrange for the testing and inspection of these instrument transformers as detailed in section 9.3.

Voltage transformers are frequently purchased on a project by project basis and not necessarily on a volume contract basis. Hence there is a wide variety of manufacturers and types of voltage transformers in service which cannot be readily categorised into logical populations of any reasonable size.

Current transformers at high voltage installations are frequently purchased with the switchgear and most of these current transformers cannot be readily categorised into logical populations of any reasonable size.

3.4 Low Voltage Current Transformers

Energex as LNSP provides LV CTs to customer's, and recovers this cost plus maintenance costs, through network charges (this will change from 1 July 2015 with

the proposed reclassification of metering services as an alternative control service). Energex will arrange for the testing and inspection of these instrument transformers as detailed in section 9.4.

A summary of the number of low voltage and high voltage current transformers installed for type 6 metering installations by current transformer type is presented in Table 3.

Table 3
Number of Current Transformers Installed at Type 6 Metering Installations as at June 2014

Number of Type 6 Current Transformers In Service - June 2014 - RP = Energex								
CT Type	**A**	**B**	**C**	**S**	**T**	**W**	**Other**	**Totals**
Ratio	150/5 300/5 600/5	400/5 800/5 1200/5	1000/5 2000/5 3000/5	200/5	800/5	1500/5	Various	
Total HV CT's	0	0	0	0	0	0	20	**20**
Total LV CT's	624	144	42	18,409	2,394	105	30	**21,748**
Totals	**624**	**144**	**42**	**18,409**	**2,394**	**105**	**50**	**21,768**
Source MARS and Peace databases								

"Other" includes CTs where the type is currently not known. Where the enhanced inspection under AEMO document Alternative Testing Minimum Requirements: Low Voltage Current Transformer (LV CT) Metering Installations, identifies the CT type, they will be included in the relevant population.

Where they are not one of the nominated CT types, they will be tested in accordance with Schedule 7.3.2 of the Rules.

Note that CT accuracy requirements for HV installations are the same as defined for type 3 metering installations.

4 ORGANISATION AND RESOURCES

4.1 Energex Corporate Structure

Energex Limited is a divisional based organisation with each division headed by an Executive General Manager reporting to the Chief Executive Officer. The Divisions with sub-listings of their functions associated directly with electricity energy metering are as follows:

Asset Management Division

- Coordination of RP obligations for the LNSP functions of Energex
- Development and administration of this MAMP
- Provision of integrated engineering systems for the overall management and monitoring of the metering fleet and for the provision of metering services throughout Energex and the delivery of metering data via appropriate communication channels to the metering data warehouse.

- Scheduling, installation and commissioning of type 1 to 4 metering installations and for larger type 6 metering installations
- Specification and contract administration of service contracts for the provision of contract services for the installation, investigation, auditing and testing of metering installations
- Commercial marketing of MPB and MDP services within the wider NEM related to contestable metering services (Metering Dynamics)
- Updating and managing the Queensland Electricity Connections and Metering Manual (QECMM), in consultation with Ergon Energy, outlining the physical and design requirements for metering installations in Queensland

Procurement, People and Services Division

- Specification and contract administration of purchase contracts for metering equipment and contractor services
- Operation of laboratories and services accredited by the NATA to ensure the metrological integrity of all Energex metering equipment and installations
- Skills training of staff and contractors involved in metering operations
- Human resources recruitment and staff development

Service Delivery Division

- Scheduling, installation and commissioning of the smaller type 6 metering installations
- Scheduling and conducting investigations related to billing complaints and metering faults associated with type 6 metering installations
- Establishing and administering operational procedures associated with customer connections to the network
- Administration of contracts for the provision of contract services for the maintenance and testing of smaller type 6 metering installations
- Auditing contractors for quality, safety and performance

Customer and Corporate Relations Division

- Provision of call centre services for the processing and expediting of all telephone queries and complaints including those associated with billing and metering issues
- Provision of MDP services for the collection, processing and delivery of metering data to the market
- NMI allocation and LNSP premise data administration
- Provision and administration of systems for the collection, processing and delivery of metering data to the market
- Administering market interface issues with Retailers and other market participants

Strategy, Regulation and Governance Division

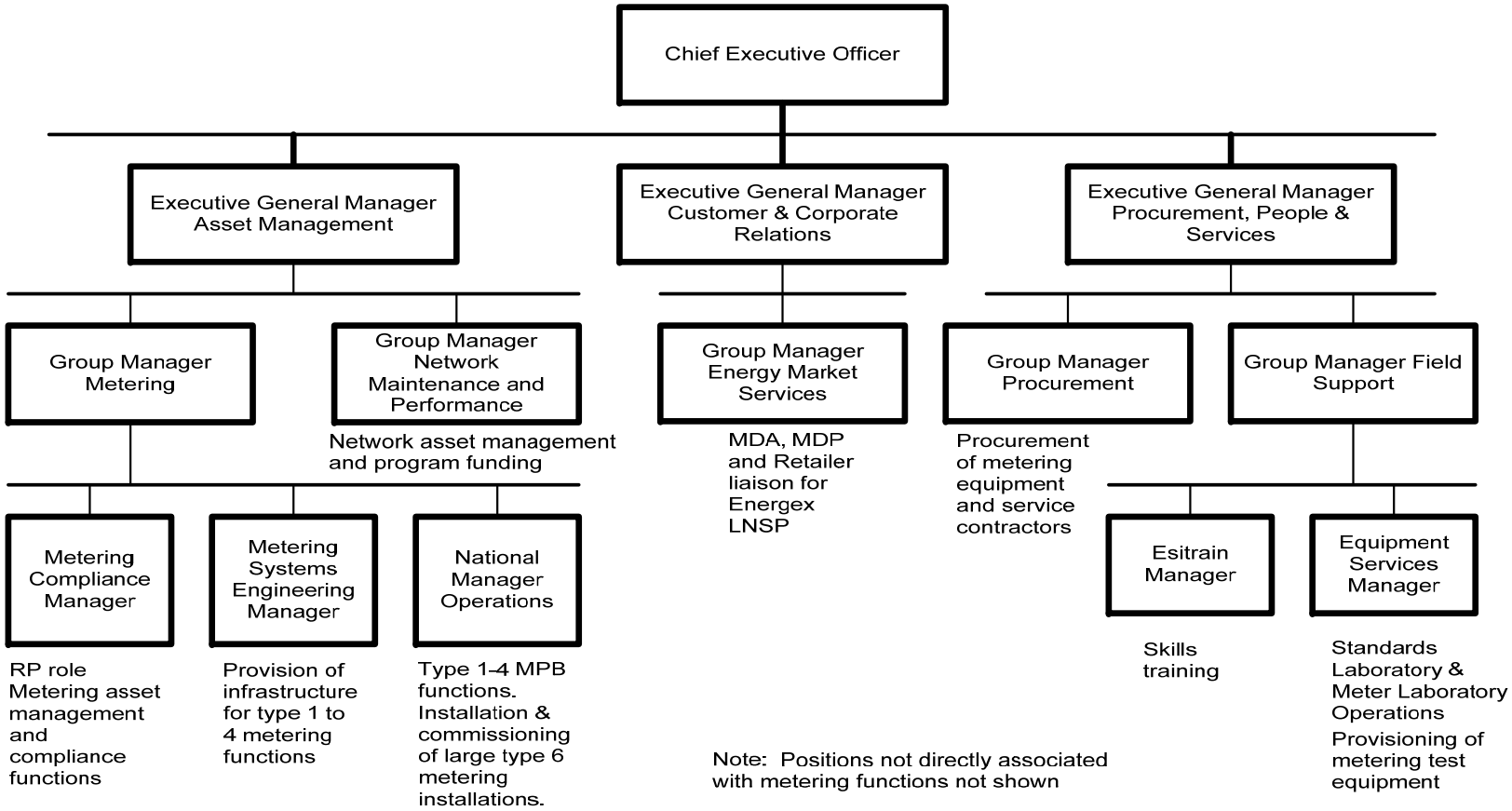
- Responsible for the operation of the Energex Regulatory Compliance Program
- Responsible for the legal and auditing functions

Corporate Finance

- Responsible for the financial and business performance
- Corporate quality, safety and environmental auditing and reporting

4.2 Energex Division Structure

Figure 2 Energex Organisation Structure associated with Metering Functions

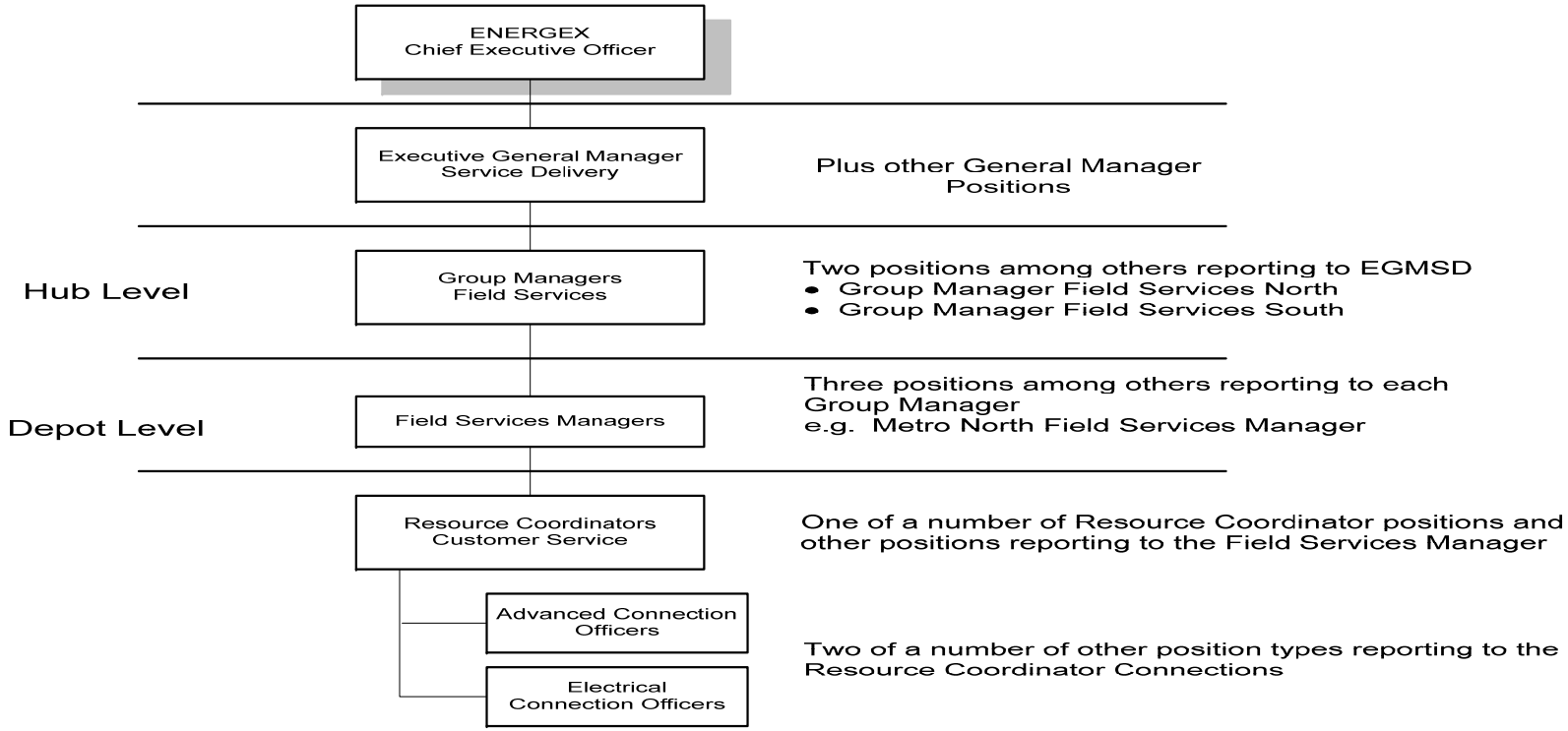


5 RESOURCES FOR TYPE 6 METERING INSTALLATIONS – ENERGEX

5.1 Resources for Type 6 Installations – Service Delivery Division

The installation and commissioning of the majority of type 6 metering installations is coordinated and conducted by Connection Officers working from Energex Depots with management as shown in Figure 3 Management of Resources for Type 6 Metering Installations.

Figure 3 Management of Resources for Type 6 Metering Installations



5.2 Resources for Type 6 Metering Installations

All metering installation and commissioning work for type 6 metering installations is conducted by a total of 91 Energex personnel with varying levels of competence ranging from Customer Service Officers (CSO), Electricity Connection Officers (ECO) to Advanced Connection Officers (ACO). Work is only dispatched to Officers listed as competent to do the work. The geographical distribution of these personnel is presented in Table 4.

Table 4
Geographical Distribution of Energex Electricity Connection Personnel as at June 2014

Energex Region	Number of Personnel
Far North Coast	10
North Coast	12
Metro North	17
Central West	13
Metro South	22
South Coast	10
Western	11
Total	**91**

Source: Energex organisation chart

Maintenance work including additions and alterations, testing and inspections of metering installations, customer complaint and enquiry investigations and the like may be carried out by the above electrical connections personnel or by customer service contractors appointed and administered under formal service contracts as follows;

- Contractor - All Energex regions – 65 trained people available as required.

6 TEST AND INSPECTION CAPABILITIES

6.1 General

Energex has a range of testing support that is NATA accredited in the field of electrical measurement (Accreditation No. 74) as listed on the NATA web site:

Standards Laboratory

Wattmeters with least uncertainties of measurement of -
0.01% up to 1,100 V and 10 A on d.c.;
0.04%/Cos Φ from 60 V to 300 V and 0.1 to 50 A at 40 to 60 Hz;
0.03 crad for measurement of zero power factor error at 40 to 60 Hz

Three phase wattmeters with least uncertainties of -
0.1%/cos Φ from 63.5 V to 415 V and up to 20 A at 50 Hz

Varmeters with least uncertainties of measurement of -

0.2% from 60 V to 300 V and 0.1 to 20A at 50 Hz

Electricity meters – Watthour meters at 40 to 60 Hz with least uncertainties of measurement of –

0.02%/CosΦ from 60 to 300 V and 0.1 to 50 A (single phase);
0.05%/CosΦ from 60 to 300 V and 50 A to 100 A (single phase)

Electricity meters – Varhour meters from 60 to 300 V and 0.1 A to 20 A and at 0, 0.5, 0.866 power factor lagging at 50 Hz with least uncertainty of measurement of 0.08%

Current transformers accuracy tests at 50 Hz on transformers with rated primary currents from 0.5 A to 3,000 A and rated secondary currents of 1 and 5 A with least uncertainty of measurement of:

0.02% for current error
0.02 crad for phase angle error

Meter Laboratory

Electricity meters – Watthour meters at 50 Hz, 60 - 250 V, 0.1 A to 100 A with least uncertainties of measurement of –

0.04%/cosΦ, single phase and three phases

Electricity meters – Varhour meters from 60 to 250 V, 50 Hz, 0.1 A to 50 A with least uncertainties of measurement of –

0.2% from sinΦ = -1 to sinΦ = -0.25

Current transformers - Accuracy tests on metering current transformers rated from 5 to 1 500 A with least uncertainties of measurement of –

0.1% for current error
0.15 crad for phase angle error.

Metering Operations

Electricity meters – Watthour meters at 50 Hz, 60 to 250 V, 0.2 A to 20 A with least uncertainties of measurement of –

0.06%/cosΦ, three phase

Electricity meters – Varhour meters at 50 Hz, 60 to 250 V, 0.5 A to 20 A with least uncertainties of measurement of –

0.5% from zero to 0.5 power factor lag

Current transformers - Accuracy tests at 50 Hz on transformers with rated primary currents of 1 A to 10,000 A and rated secondary currents of 1 A or 5 A with least uncertainties of measurement of –

0.06% for current error
0.06 crad for phase angle error

Voltage transformers - Accuracy tests at 50 Hz on transformers with rated primary voltages from 110/√3 V to 132 kV and rated secondary voltages of 110/√3 V or 110 V with least uncertainties of measurement of –

0.04% for voltage error
0.04 crad for phase angle error

If necessary, Energex may contract testing work to other appropriately NATA accredited organisations.

Energex is accredited by NATA to ISO/IEC 17020 (2012) as an inspection body (accreditation No. 14142) for the commissioning and in-service inspection of electricity meters.

6.2 Test Equipment Measurement Uncertainty and Calibration

To maintain NATA accreditation and ensure data accuracy in the fields of electrical measurement and for site inspections, Energex/Metering Dynamics laboratories maintain test equipment registers and calibration schedules to ensure that:

- Calibration is maintained at frequencies as specified by NATA
- Measurement uncertainties of equipment is maintained to meet the minimum levels of uncertainty specified in the scope of accreditation as outlined in Section 6.1 and in line with Table S7.3.1 of the Rules.

6.3 Energex Resources

6.3.1 Standards Laboratory

The Energex Standards Laboratory has the following personnel and equipment resources relevant to the testing of metering equipment:

- Personnel – Five qualified staff capable of testing metering equipment
- Meter testing – Zera Com 3003 reference power meter, and a Fluke 6105A electrical power standard and 2 x 6106A auxiliary supplies
- Current transformer testing – Tinsley-Arnold test set and Smith Hobson reference CT

6.3.2 Meter Laboratory

The Energex Meter Laboratory has the following personnel and equipment resources relevant to the testing of metering equipment:

- Personnel – Three experienced staff capable of testing metering equipment
- Meter testing – Two Zera multi-station (10) meter test benches incorporating Zera EPZ303-5 reference power meters
- Current transformer testing – One Tettex comparator with electronic burden box with an Elliot Reference CT.

6.3.3 Metering Operations

The Metering Operations team has the following personnel and equipment resources relevant to the testing of metering equipment:

- Personnel – Eight Metering Technicians and two Metering Officers (electrical fitter mechanics) supporting the technicians.
- Meter testing – Two Dobble three phase test sets (source) and eight MTVS test sets
- Current transformer testing – Hansom Standard CT and Tettex comparator and Tettex electronic burden. Ten Redphase 590G secondary injection test sets.
- Voltage transformer testing – Hansom Standard VT and Tettex comparator and Tettex electronic burden.

6.3.4 Metering Dynamics

Metering Dynamics has the following personnel and equipment resources relevant to the testing of metering equipment:

- Personnel – Eleven experienced personnel capable of testing metering equipment and inspecting metering installations with six in Queensland, two in each of New South Wales and Victoria and one in South Australia
- Meter testing – Five MTVS test sets for meter accuracy testing at prevailing customer loads with two in Queensland and one in each of the states of New South Wales, Victoria and South Australia. Also a phantom load box is located in each of the three states of Queensland, New South Wales and Victoria.
- Current and voltage transformer testing – Twenty Red Phase secondary injection test units used as required in the states of Queensland, New South Wales, Victoria and South Australia. The Metering Operations Department's primary injection test equipment for CT and VT testing is also available where required.

7 METERING SYSTEMS

This management strategy covers the complete metering system at an installation. The time based monitoring of installations as outlined in chapter 7 of the Rules is replaced where applicable with a three tiered program embracing the initial establishment of quality, ongoing proactive checks and data analysis aimed at the early detection of system faults and errors and supplemented with a final level of audit surveillance based on sample inspection and testing.

The range of quality assurance activities include:

- Initial establishment monitoring
- Pre-contract evaluation of metering equipment
- Quality monitoring of purchased equipment
- Initial commissioning inspection and testing of metering installations
- Routine monitoring on a sample basis
- Auditing of installation contractors on a sample basis
- Routine monitoring of metering equipment on a sample basis and
- Routine inspections of metering installations on a sample basis.

The intention is to provide a higher level of statistical confidence that metering systems conform to market Rule requirements than could be achieved by strict adherence to the testing and inspection regime outlined in Chapter 7 of the Rules.

Progressive monitoring is aimed at detecting potential problems at an early stage as possible and correcting any confirmed problems. Corrective action is controlled and recorded through the works management system. On an annual basis, the type and causes of faults is analysed for possible trends and proactive preventive action is initiated to further improve metering system integrity and performance.

8 INITIAL ESTABLISHMENT MONITORING

8.1 Metering Equipment Purchasing

8.1.1 Strategy Summary

- Metering equipment purchased under formal tendering and contract processes in accordance with Queensland Government Purchasing policies
- Metering equipment specified to be in accordance with the requirements of the Rules and of relevant Australian standards
- Manufacturer's test results from an accredited laboratory obtained at the time of purchase
- Equipment sample tested on receipt
- Results of sample inspection compared with manufacturer's results

8.1.2 Strategy Details

Metering equipment within Energex is purchased under period contracts with technical administration by Metering Dynamics. Metering Dynamics works in close cooperation with the Laboratory Services Department in the selection and evaluation processes.

The quality assurance activities include:

- Formal specification covering all the relevant requirements of the Rules (Schedule 7.2 and particularly Section S7.2.6) and of relevant Australian Standards
- Specification of pattern approved equipment where relevant
- Pre-contract evaluation, testing and field trialling of all metering equipment components prior to contract acceptance and field deployment
- Formal technical and commercial evaluation process of tender submissions prior to contract
- Provision and review of test reports from manufacturers' at the time of equipment delivery
- Incoming inspection testing of purchased equipment on a sample basis with the level of sampling dependent on whether the supplied test reports are NATA endorsed, on the historical performance of the supplier and on the degree of conformity between manufacturer's and Energex's test results.

Incoming inspection testing is performed by the NATA accredited Meter Laboratory within the Field Support Group.

Batches of purchased metering equipment failing functional checks or accuracy tests are returned to the manufacturer for rectification.

8.2 Installation Commissioning

8.2.1 Strategy Details Type 6 Metering Installations

Service orders for customer services work are generated, scheduled and issued through the Field Force Automation (FFA) system to field staff with “Tough Book” computers in their vehicles. It is the responsibility of Electricity Connection Officers to ensure:

- The locations of metering points are appropriate to the connection point
- The metering equipment is approved for use
- The metering system connections are correct
- The metering system configuration and programs are correct
- The metering system is suitable for the load of the connection point and the environment in which it is installed
- The metering system accuracy is appropriate for the metering installation type
- The metering system is secure
- The metering system is correctly labelled
- Records of the metering installation and the commissioning tests are complete and correctly entered into the FFA system in relevant “completion screen” forms.

The installation, commissioning and testing work is conducted in accordance with the following;

- Electrical Connection Officers Manual (ECO Manual)
- Queensland Electricity Connections and Metering Manual (QECMM)
- Standard Work Procedure WCS 57 Perform Work at a Customer’s Installation
- WCS 57.1 Initial Connection of Electricity Supply to a Customer’s Installation
- WCS 57.2 Retailer Requested Reconnection, Disconnection Activities at a Customer’s Installation
- WCS 57.3 Maintenance of Supply and Examination of Whole Current Metering Equipment at a Customer’s Installation
- WCS 57.4 Install and Maintain Low Voltage Current Transformer Metering Equipment at a Customer’s Installation
- WCS 57.5 In-Service Compliance Testing of Metering Equipment at a Customer’s Installation.

9 ROUTINE MONITORING

9.1 Principles of Sampling

This section outlines the general principles that Energex have adopted in applying statistical sampling to the monitoring of metering equipment, installations and processes.

The objective of the routine sample monitoring is to confirm that all the proactive measures to assure the integrity and accuracy of metering data delivered to the market has been effective. This can be viewed as an audit of the overall process of providing metering data. The areas audited are:

- Contractor performance,

- Installation inspections,
- Metering equipment covering;
  - meters as specified in AS 1284.13 Electricity metering Part 13 In-service compliance testing,
  - LV current transformers in accordance with AEMO document Alternative Testing Minimum Requirements: Low Voltage Current Transformer (LV CT) Metering Installations.

Where measured quantities are involved, variables sampling (s method) will be used provided the data can be verified as being reasonably normally distributed. For non-measured quantities and where data is not found to be normally distributed, attributes sampling will be used.

The sample size requirements for attributes and variables sampling of meters in accordance with AS 1199 Sampling Procedures for Inspection by Attributes, AS 2490 Sampling Procedures and Charts for Inspection by Variables for Percent Nonconforming and AS 1284.13 Electricity metering Part 13 In-service compliance testing are presented in Table 5.

The sample size requirements for attributes and variables sampling of LV current transformers is in accordance with AEMO document, Alternative Testing Minimum Requirements: Low Voltage Current Transformer (LV CT) Metering Installations.

Table 5
Sample Size Verses Population Size for Sample Testing of Meters

Population Size	Variables Sample Size	Attributes Sample Size
2 – 8	3	2
9 – 15	3	3
16 – 25	4	5
26 – 50	5	8
51 – 90	7	13
91 – 150	10	20
151 – 280	15	32
281 – 400	20	50
401 – 500	25	
501 – 1200	35	80
1201 – 3200	50	125
3201 – 10000	75	200
10001 – 35000	100	315
35001 – 150000	150	500
150001 - 500000	200	800

Source: AS 1199, AS 2490, AS1284.13

Metering Dynamics will perform the sample inspection and testing of meters as part of their normal operations with meters randomly selected at the start of the period using our asset management systems.

9.2 Testing of Meters

9.2.1 Strategy Summary

Test meters at type 1 and type 2 and all other HV installations in accordance with the Rules (Schedule 7.3).

- Test meters at LV type 3, 4 and 6 CT connected installations; in accordance with the approved Energex/Metering Dynamics enhanced inspection program of CT connected installations as outlined in AEMO document Alternative Testing Minimum Requirements: LV CT Metering Installations, or, in accordance with retailer RPs approved strategies, or, in accordance with the Rules.
- Sample test meter populations at LV type 3, 4 and 6 direct connected installations with sample sizes in accordance with AS 1284 Electricity metering Part 13: In-service compliance testing.

9.2.2 Strategy Details

Initially, total populations by meter manufacturer and type will be defined. Samples will be randomly selected from these populations in accordance with AS 1284.13. Where a meter population fails on issues affecting accuracy, the population would be subdivided by year of manufacture and further by purchase order or batch if necessary. Additional meters would need to be sampled in order to make up the sample sizes for sub-populations.

For meters at type 6 metering installations, the populations will be selected by manufacturer and type with older populations selected first and with the testing frequency as outlined in AS 1284.13. In-service testing of meters at type 6 metering installations is conducted by contractors in accordance with contract requirements administered by Procurement, People and Services Division's Procurement Group with the information of meters at what installations to be tested provided by the asset management team within Metering Group.

Individual failed meters would be replaced, and an action plan for failed populations/sub populations to be determined, submitted to Energex executive management for approval and submitted to AEMO. Execution of a replacement plan would be on a staged basis. (Refer to Section 11 of this Asset Management Plan)

9.3 Testing of High Voltage Current and Voltage Transformers

9.3.1 Strategy Summary

- Test current and voltage transformers at high voltage installations in accordance with the Rules. (Schedule 7.3).
- Current and voltage transformers at high voltage sites will either belong to the LNSP or the customer. Metering Dynamics will advise the relevant party of the Rule requirement for testing, and request appropriate timing and arrangements for access to the equipment.

- For current and voltage transformers at HV type 1 – 4 metering installations, Metering Dynamics will perform the testing in accordance with the RPs strategy, plans and instructions.
- Where equipment fails to meet test criteria, the relevant parties including AEMO will be advised and an action plan negotiated.

9.3.2 Strategy Details

Metering Dynamics will carry out site inspections on high voltage metering installations at the frequencies specified in Table S7.3.3 of the Rules for those sites where it is the metering provider. Site inspections are carried out in accordance with Energex's internal policy "Inspection of Metering Installations" (RED 00896), which has been independently verified by NATA to ensure compliance with the Rules.

As part of this inspection, the MP Technician will identify which, if any, metering system components are due for testing in accordance with the Rules. (Table S7.3.2). Upon identifying that metering system components require testing, Metering Dynamics will notify the RP advising them of their obligation to ensure the equipment is tested and will provide a quotation for performing the work. Metering Dynamics will raise a general service order in MPIS for the metering installation, detailing the information sent to the RP and periodically remind the RP of the outstanding requirement.

Where a retailer RP elects to use the services of Metering Dynamics, testing will be carried out in accordance with policies "Meter Field Services – In situ C.T. Error Testing" (RED 00897) and "Meter Field Services – In situ V.T. Error Testing" (RED 00901) in accordance with the accuracy requirements given in Tables S7.2.3.1 to S7.2.3.5 and with the maximum levels of test uncertainty given in Table S7.3.1 of the Rules.

Voltage transformers will be tested by primary injection. Current transformers will be tested using primary injection except in circumstances where access for primary injection is not available (e.g. current transformers in transformer bushings) or where it is necessary to limit outage times, in these cases secondary injection testing will be utilised.

9.4 Testing of Low Voltage Current Transformers

9.4.1 Strategy Summary

- Sample test LV CTs at type 3 and 4 metering installations in accordance with AEMO document Alternative Testing Minimum Requirements: Low Voltage Current Transformer Metering Installations.
- Metering Dynamics will perform testing of LV CTs at other metering installations where contracted by RPs in accordance with their approved strategy, plans and instructions (ATMR or Rules).
- Sample test LV CTs at type 6 metering installations in accordance with AEMO document Alternative Testing Minimum Requirements: Low Voltage Current Transformer Metering Installations.

9.4.2 Strategy Details

For type 3 and 4 LV CT connected metering installations where Energex is not the RP, Metering Dynamics will include LV CT testing in accordance with this MAMP where contracted by the relevant Retailer (FRMP) and include such testing in the test program. For these metering installations, the sites and CTs will be selected randomly in accordance with the AEMO document Alternative Testing Minimum Requirements: Low Voltage Current Transformer Metering Installations.

For type 6 LV CT connected metering installations, the sites and CTs will be selected randomly in accordance with the AEMO document but will also include sites where CTs have been removed from service for reasons other than CT failures.

Testing of CTs will be conducted by secondary injection in accordance with WCS 57.7 Compliance Testing of Low Voltage Current Transformer Metering Equipment and WP1196.

CT populations will be based on CT type. Where populations fail, the test results will be analysed to determine whether there is merit in investigating sub populations based on manufacturer, date of manufacture or the like.

Individual failed CTs would be replaced and an action plan for failed populations/sub populations would be determined, submitted to Energex executive management for approval and submitted to AEMO. Execution of a replacement plan would be on a staged basis. (Refer Section 10 of this MAMP)

9.4.3 Overall Site errors LV CT Connected Installations

Following CT secondary injection tests at an installation and the return of the results to Metering Dynamics, a check will be made of the overall site errors taking into account the errors of the meter and the CT.

Where the overall site errors do not meet the requirements of Schedule 7.2 of the Rules, appropriate corrective action will be determined and taken to ensure the installation is made compliant.

9.5 Site Inspection Audits

9.5.1 Strategy Summary

- Metering installations including high voltage installations to be inspected in accordance with the requirements of the Rules (Table S7.3.3) being;
    - Type 1 HV – every 2.5 years
    - Type 2 HV – every 1 year or 2.5 years if check metering installed
    - Type 3 HV – every 3 years (without breaking into sub-levels of consumption)
    - Types 3, 4 & 6 LV CT connected – every 5 years (with type 3 sites inspected as required by relevant CT enhanced inspection programs)
    - Types 4 & 6 LV direct connected - when meter is tested
- Additional LV sites may be inspected on a sample basis, and when other work is conducted at an installation

- Results of audit inspections will be reviewed and appropriate corrective/ improvement actions taken.

9.5.2 Strategy Details

The relevant number of sites to be inspected in any one year will be made up of:
- Sites visited for meter testing purposes
- Sites visited for other normal work reasons and where the opportunity is taken to conduct a site inspection
- Sites inspected as a result of audit inspections of contractors. These sites will generally be newer sites commissioned within the last year or with switchboard alterations in the last year.
- Additional sites selected through MPIS/CIS systems to meet the requirements outlined in section 9.5.1.

The work is issued as an inspection service order in MPIS (types 1 – 4) or FFA (type 6) and the inspection recorded.

The inspection shall ensure that the installation is appropriate to the environmental conditions at the site such as indoor/outdoor location, high humidity and temperature exposure, dusty or dirty surroundings, vibrations and the like. Such conditions shall be noted on the MPIS/FFA work order.

Where an issue affecting the quality of data delivered to the market is identified during inspection, the following actions will result:
- The nature of the issue and the possible causes will be reviewed and a decision made as to whether further targeted sampling based on common characteristics such as equipment type or contractor will be made and an action plan prepared and submitted to AEMO
- Relevant corrections to market data will be forwarded to AEMO
- Relevant parties will be contacted for correction of billing issues (over/under billing)

9.6 Auditing of Energex Personnel - Type 6 Metering Installations

9.6.1 Strategy Summary

All Energex personnel performing electrical connections work are audited in relation to safety, environmental issues and work practices

9.6.2 Strategy Details

All electrical connections personnel are audited in work crews under a three tiered audit structure outlined in Energex Policy RED 00544 Three Tier Audit Framework and RED 00545 Three Tier Audit Manual with the first two tiers as follows:
- T1 Audit (Tier 1). Conducted by the work crew's immediate supervisor (Local Work Group Leader) at least twice per year
- T2 Audit (Tier 2). Work crews are audited once per year by a person at least one management level away from or is independent of the work crew e.g. a Workplace Health and Safety Officer.

Audits for work practices are conducted against WCS 57 series Perform Work at Customer's Installation and results of audits are recorded in e-Safe. Depending on the findings of the audits, corrective actions may include:

- Immediate action to correct faults found
- Discussion and training with work crews or individuals to assist in improving particular aspects of workmanship
- Topic for discussion at tool box talks.

9.7 Auditing of Contractors - Type 6 Metering Installations

9.7.1 Strategy Summary

Customer service contractors are audited in relation to safety, environmental issues and work practices.

9.7.2 Strategy Details

All contract personnel working on customer connection contracts are audited in accordance with Energex Procedure RED 00907 Manage Field Assessments on Service Providers.

Audits for work practices are conducted against WCS 57 series Perform Work at Customer's Installation and results of audits are recorded in e-Safe.

Depending on the findings of the audits, corrective actions may include:

- Immediate action to correct faults found
- Discussion and training with contractors to assist in improving particular aspects of workmanship

10 EQUIPMENT FAILURES AND RULE NON-COMPLIANCES

This section summarises the actions to be taken to rectify equipment failures or Rule non-compliances.

Where failure of individual items of equipment is identified through routine progressive monitoring, site inspections, contractor monitoring audits or site investigation visits, every endeavour will be made to replace the item of equipment at the time of the visit or within the timeframes specified in AEMO service level procedures. These corrective actions are described at relevant places throughout this asset management plan.

Where a failure or Rule non-compliance is deemed critical in that the quality of data delivered to the market is affected or the safety of an installation is jeopardised, all relevant parties shall be advised as quickly as possible. This may include the customer, retailer, RP, LNSP, regulator and/or AEMO.

Where sample testing analysis indicates an equipment population failure, corrective action will be taken as outlined in Section 11 "Equipment Population Failures".

In certain circumstances it may not be possible to replace the equipment in the immediate short term. This may be because of reasons such as:

- Catastrophic failure of equipment in service with possible damage to other parts of the installation
- The lack of availability of replacement equipment e.g. high voltage current and voltage transformers
- The difficulty of gaining access to a site
- The economic viability of customers to sustain a loss of supply

Metering Dynamics will liaise and negotiate with all relevant stakeholders (customers, retailers, RP, networks, contractors, equipment suppliers, AEMO) in an effort to rectify the issues as quickly as possible.

Where the timeframes specified in service level agreements are clearly going to be exceeded, Metering Dynamics will advise the responsible person and, in conjunction with relevant stakeholders, arrange for the submission of an exemption to AEMO and prepare a rectification or fault repair plan in accordance with AEMO's Exemption Procedure. The rectification or fault repair plan would include some or all of the following:

- A description of the issues and their level of criticality
- The impact on the availability and level of accuracy of metering data
- The general process necessary to rectify the issues and replace equipment
- The resources to be used and the parties involved
- The estimated timescale for rectification dependent on such things as the nature and criticality of the equipment failure, the availability of replacement equipment, the length of outage required and the availability of access
- Possible temporary arrangements for alternate metering or meter data estimation until rectification is completed
- The estimated cost of equipment replacement where relevant to Energex or Metering Dynamics. (This may be outside the responsibility of Energex or Metering Dynamics)
- The relevant parties responsible for taking action throughout the rectification process
- The parties responsible financially for the equipment replacement

The rectification or fault repair plan will be submitted to all relevant parties for endorsement and action. This will include submission to AEMO for possible negotiation over proposed details and endorsement.

11 EQUIPMENT POPULATION FAILURES

11.1 Initial Investigation Stage

Where sample testing of equipment populations indicates a population failure, Metering Dynamics will review the sample results and the population details and will develop an investigation plan to determine a breakdown into sub populations generally by year of manufacture and possibly down one further level by delivery batch if appropriate. The investigation plan will identify:

- The additional sample numbers required to cover all sub populations identified
- The method of collecting the test data (In-service testing verses equipment replacement and laboratory testing or combination of both)
- The test methods and test equipment to be used

- The resources to be used (Contractors verses Metering Dynamics/ Metering Operations personnel or a combination of both)
- The timescale for the completion of collecting and analysing sub population test data depending on the size, number and geographical extent of the sub populations and the methods of testing to be adopted

11.2 Replacement of Populations

Where the sample testing of equipment sub populations indicates a sub population failure, Energex will prepare an equipment replacement plan covering:

- The range of equipment to be replaced
- The extent of geographical areas in which the equipment is located
- The general process of equipment replacement including method of arranging customer supply outages if required
- The resources to be used
- The commissioning process
- The estimated cost of the equipment replacement program
- The timescale for the completion of the equipment replacement program depending on the size and geographical spread, availability of replacement equipment, customer access requirements and whether a customer outage is required, the nature of the population failure and the degree of impact on stakeholders including the impact of any failure of data quality delivered to the market.

The equipment replacement plan will be submitted to the relevant levels of financial delegation within Energex for approval as outlined in Section 11.3. The plan will also be submitted to AEMO for possible negotiation over proposed details, timing and endorsement.

Energex will utilise a combination of its own personnel and external contractors necessary to achieve the agreed replacement program timing.

11.3 Financial Delegations

As outlined in Energex policy RED 00256 Delegation of Authority and related financial delegation schedules, the following levels of financial delegation would be relevant to equipment population replacement programs.

Table 6
List of Relevant Financial Delegations

Position	Financial Delegation
Group Manager Metering	$200,000
Group Manager Network Maintenance & Performance	$1,500,000
Executive General Manager Asset Management	$7,500,000
Chief Executive Officer	$15,000,000
Energex Limited Board	$75,000,000
Shareholding Ministers	> $75,000,000

12 METERING PROGRAM OF WORK

The current Energex Regulated Metering Program of Work (POW) is set for five years and includes planned testing and replacement of metering equipment, it does not include customer requested and individual failed and/or replaced meters.

Table 7 shows the current regulated program. Note that the 2015 to 2020 regulatory period program is subject to change and final approval.

Table 7
Energex Regulated Metering Program of Work

NAMP Line	Number of Units Planned	Items	Units					
	OPEX		**2014-15**	**2015-16**	**2016-17**	**2017-18**	**2018-19**	**2019-20**
SC13	LV Meter Sample Testing - direct connected single phase meters	Test	4,486	3,000	3,000	3,000	3,000	3,000
		Failed/Replaced	300	300	300	300	300	300
SC15	LV CT Sample Testing and Periodic Inspection - set of 3 CTs per installation	Inspection	1,300	1,300	1,300	1,300	1,300	1,300
		Failed/Replaced	2	2	2	2	2	2
		Sample Testing	153	185	335	153	185	335
SC16	LV Meter Sample Testing - polyphase, direct connected and CT meters	Test	3,049	1,000	1,000	1,000	1,000	1,000
		Failed/Replaced	150	150	150	150	150	150
	CAPEX							
SC14	LV Meter Replacements -bulk replacement of faulty populations	Single phase	5,000	34,000	39,000	41,000	41,000	40,000
		Polyphase	2,000	1,000	1,000	1,000	1,000	1,000

NAMP Line	Cost for Units Planned $	Items	Cost $					
	OPEX		**2014-15**	**2015-16**	**2016-17**	**2017-18**	**2018-19**	**2019-20**
SC13	LV Meter Sample Testing - direct connected single phase meters	Test	$426,170	$285,000	$285,000	$285,000	$285,000	$285,000
		Failed/Replaced	$28,452	$28,452	$28,452	$28,452	$28,452	$28,452
SC15	LV CT Sample Testing and Periodic Inspection - set of 3 CTs per installation	Inspection	$253,500	$253,500	$253,500	$253,500	$253,500	$253,500
		Failed/Replaced	$1,227	$1,227	$1,227	$1,227	$1,227	$1,227
		Sample Testing	$70,854	$85,674	$155,139	$70,854	$85,674	$155,139
SC16	LV Meter Sample Testing - polyphase, direct connected and CT meters	Test	$395,577	$129,740	$129,740	$129,740	$129,740	$129,740
		Failed/Replaced	$41,051	$41,051	$41,051	$41,051	$41,051	$41,051
	CAPEX							
SC14	LV Meter Replacements -bulk replacement of faulty populations	Single phase	$1,517,500	$6,432,735	$7,839,648	$8,647,419	$8,852,681	$8,535,978
		Polyphase	$766,400	$189,198	$201,017	$210,913	$215,919	$213,399
		TOTALS	**$3,500,731**	**$7,446,576**	**$8,934,773**	**$9,668,155**	**$9,893,243**	**$9,643,485**

13 GLOSSARY

Term	Meaning
AEMO	Australian Energy Market Operator
ATMR	Alternative Testing Minimum Requirements, AEMO document
BMS	Business Management System (replaced by RED)
CT	Current Transformer
eSafe	Information management system used to record, analyse and report on Energex's Safety, Quality, Environment and Health business processes
Esitrain	Energex training and education department
FFA	Field Force Automation
FRC	Full Retail Competition
IEE	Itron Enterprise Edition, meter data management system (replaced MV90)
LNSP	Local Network Service Provider (Distributor)
MAMP	Metering Asset Management Plan
MDP	Metering Data Provider
MPB	Metering Provider category B
MPIS	Meter Provider Information System
MSATS	Market Settlement and Transfer Solutions, a system that is operated by AEMO to fulfil its obligations under the Rules
NATA	National Association of Testing Authorities, Australia
NEM	National Electricity Market
QECMM	Queensland Electricity Connection and Metering Manual
RED	Repository of Energex Documents (replaced BMS)
RP	Responsible Person
Rules	National Electricity Rules
SEQEB	South East Queensland Electricity Board (Energex predecessor)
VETEC	Vocational Education Training and Employment Commission
VT	Voltage Transformer
WCS	Work Category Specification

END