

METROLOGY IN THE NEM, THE METROLOGY PROCEDURE, AND A BRIEF OVERVIEW OF POWER OF CHOICE

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AGENDA

1. Scope and assumptions
2. NEM metrology framework
3. The Metrology Procedure
4. WA specific requirements
5. Further NEM regulatory changes
6. POC – metering competition
7. Next steps
8. Questions?

All the analysis in these slides is based on:

- The Metering Competition Rule change (mainly chapter 7) that becomes effective on 1 December 2017;
- The procedures and instruments amended and created as a consequence of this Rule change that become effective on 1 December 2017; and
- The draft WA Rules as at 10 October 2016.

NEM METROLOGY FRAMEWORK



NEM Metrology Framework provisions contained in the following instruments:

- National Measurement Act
 - National Electricity Rules (NER)
 - NEM Metrology Procedure
 - Australian and IEC Standards
 - Service Provider Accreditation Guidelines
 - Service Provider Service Level Procedures

National Measurement Act (and National Measurement Institute)

- Standards for legal metrology, relating to metrological requirements of meter manufacture, including pattern approval and initial verification

Australian Standards (and IEC Standards)

- Standards for the technical design and manufacture of meters, e.g.
 - Accuracy and testing, test points, harmonics, operating ranges
 - Requirements for environmental conditions, e.g. lightning withstand, dust ingress, temperature range
 - Electrical safety aspects eg fire retarding capabilities, safe disconnection of load, surges

NER

- Operational requirements – required accuracy class, metering installation errors, data delivery for settlements
- Requirements for provision, installation and maintenance of meters
- Asset management strategies and in-service testing/inspection
- Metering data services
- Accreditation and management of service providers

- Before participating in the market in respect of a connection point, a **Market Participant** must ensure that the connection point has a metering installation and that the metering installation is registered with AEMO.
- The requirements for accuracy, testing and maintenance of these metering installations, and the related roles and obligations, are contained on Chapter 7 of the **NER**.
- The **NER** also creates a number of Procedures that contain the related technical provisions, e.g.:
 - **Metrology Procedure**
 - **Service Level Procedures** for metering service providers
 - CATS and B2B Procedures

Meters must:

- Meet the requirements of relevant **Australian Standards** and **International Standards** which must be identified in the Metrology Procedure; and
- Have a valid **pattern approval** issued under the authority of the National Measurement Institute.

Instrument transformers must:

- Meet the requirements of relevant **Australian Standards** and **International Standards** which must be identified in the Metrology Procedure; and
- Have a valid pattern approval issued under the authority of the National Measurement Institute or, until relevant pattern approvals exist, a valid **type test certificate**.

ROLES AND OBLIGATIONS FOR METERING



- Market participant (retailer or generator)
 - Ensures that there is a metering installation
- Metering Coordinator
 - Ensures that metering installation is compliant (by engaging Meter Provider (MPB))
 - Ensures that data is delivered to AEMO for market settlement (by engaging Meter Data Provider (MDP))
- Metering Provider
 - Provides, installs and maintains metering installation
- Metering Data Provider
 - Acquires metering data, processes, and delivers to AEMO

Electricity meter standards:

- AS 1284.1: Electricity metering - General purpose induction watt-hour meters;
- AS 62052.11: Electricity metering equipment (AC) – General requirements, tests, test conditions – Metering equipment;
- AS 62053.21: Electricity metering equipment (AC) – Particular requirements – Static meters for active energy (classes 1 and 2); and
- AS 62053.22: Electricity metering equipment (AC) – Particular requirements – Static meters for active energy (classes 0.2S and 0.5S)
- **AS 62035.31 – the new safety standard**

Voltage transformer standards:

- AS 60044.2: Instrument transformers - Inductive voltage transformers;
- AS 60044.3: Instrument transformers - Combined transformers;
- AS 60044.5 (part): Instrument transformers - Capacitor voltage transformers; and
- AS 1243: Voltage Transformers for Measurement and Protection (for 3 phase only)

Current transformers standards:

- AS 60044.1: Instrument transformers - Current transformers; and
- AS 60044.3: Instrument transformers - Combined transformers.

General use:

- AS/NZS ISO 9001: Quality Management Systems – Requirements
- AS/NZS ISO 10013: Guidelines for developing quality management system documentation
- ISO/IEC Guide 98: Guide to the expression of uncertainty in measurement (GUM)
- AS ISO/IEC 17025: General Requirements for the Competence of Calibration and Testing Laboratories

- **NER**
 - Rule change proposal to AEMC
 - Submission must contribute to National Energy Objective (NEO)
 - Rule change process approx. 6 – 9 months after AEMC commencements, including 2 rounds of consultation.
- **Metrology Procedure**
 - Change request to AEMO
 - Must also contribute to NEO
 - Consultation process approx. 6 months, including 2 rounds of consultation.

METROLOGY PROCEDURE



NEM METROLOGY PROCEDURE - RELATED DOCUMENTS



| Procedure Title | Location |
|---|---|
| Retail Electricity Market Procedures – Glossary and Framework | http://aemo.com.au/Electricity/National-Electricity-Market-NEM/Retail-and-metering/Glossary-and-Framework |
| Metrology Procedure: Parts A and B | http://www.aemo.com.au/Electricity/Policies-and-Procedures/Metrology-Procedures-and-Unmetered-Loads |
| Service Level Procedure (MDP) | http://www.aemo.com.au/Electricity/Retail-and-Metering/Metering-Services |
| Service Level Procedure (MP) | http://www.aemo.com.au/Electricity/Retail-and-Metering/Metering-Services |

- Requirements for Metrology Procedure: NER 7.16.3
 - “AEMO must establish, maintain and publish the metrology procedure that will apply to metering installations in accordance with this clause 7.16.3 and this Chapter 7.”
- Information on the devices and processes used to:
 - Measure or calculate the flow of electricity in a power conductor;
 - Convey this data to other devices;
- Requirements for metering provisions and metering data services
- Obligations on MCs, FRMPs, LNSPs, MPs, MDPS
- Procedures for validation, substitution or estimation of metering data (Part B)
- Profiling (Part B)

- The NER (7.16.4) allows for the inclusion of *jurisdictional metrology material* to be included in the Metrology Procedure
- This material alters the application of the metrology procedure for that jurisdiction
- Jurisdictional metrology material may only be submitted to AEMO by the COAG
- NER 7.16.4 provides details on the process.
- Jurisdictional metrology material for WA has been developed by PUO in consultation with RMO&M working group

Key topics:

- Responsibility for meter provision
- Metering installation components
- Minimum Services Specification
- Embedded Networks
- Reversion
- Routine testing and inspection
- Meter churn
- Network devices
- Responsibility for metering data services
- Emergency priority procedures

Responsibility for metering provision

- Obligations on MCs to use suitably accredited MPs for metering provision; and
- MC responsibilities with respect to the metering installation design

Metering installation components

- Requirements under National Measurement Act
- Use of standards
- Optical ports and pulse outputs
- Metering installation parameters (eg x, y, data storage)
- Clocks, intervals, trading intervals
- Alarms

Minimum services specification

- New procedure created in MC rule
- Contains minimum service levels for the new services; and
- Technical requirements to support the services

Reversion

- Jurisdictional material about if/when an interval meter can be replaced by an accumulation meter
- Still in NER, but redundant under MC's new and replacement policy

Routine testing and inspection

- Supporting the NER provisions for routine testing
- Includes requirement for MC's asset management strategy

Meter churn

- New procedure under MC rule change
- Requirements for initiation and performance of meter churn
- Meter churn process

Network devices

- New procedure under MC rule change
- Requirements for devices used for network control purposes, or for redundant metering installations still being used for network control purposes

Responsibility for metering data services

- Obligations on MCs to use suitably accredited MDPs for metering data services; and
- Requirements for metering data collection and storage, access to metering data;
- Verification of metering data during commissioning
- AEMO's obligations

Emergency management procedures

- New procedure under MC rule change
- Criteria for determining emergency conditions,
- Metering installations affected; and
- Prioritisation of services by MC in emergency condition

- Principles for validation, substitution and estimation
- Substitution for metering installation with remote access of metering data
- Substitution and estimation for manually read interval metering data
- Substitution and estimation for manually read accumulation metering data
- Substitution and estimation for calculated metering data
- Data validation requirements
 - Meter reading
 - Registration
- Load profiling
- Unmetered loads – determination of metering data

WA SPECIFIC REQUIREMENTS



WA DRAFT CHAPTER 7 VS NEM CHAPTER 7



| WA Chapter 7 | NEM Chapter 7 |
|---|--|
| No metering at transmission/distribution boundary points – conversion of SCADA data being allowed for transitional period. Introduces the term <i>local metering installation</i> | Metering at all connection points |
| New obligation on AEMO: AEMO must in consultation with the Local Network Service Provider establish a process for the collection, processing, delivery and provision of data in relation to a local metering installation . | |
| Initial MC concept for all types of metering installations | Initial MC concept for type 5 and 6 metering installations |
| MC to comply with NER, Procedures and jurisdictional electricity legislation | MC to comply with NER and Procedures |
| Market based on Western Standard Time | Market based on Eastern Standard Time |
| Embedded Network competition not being supported | Provisions included for Embedded Networks |
| Propose extending IEC provisions to include WA participants | |

WA METERING CODE VS METROLOGY PROCEDURE



| WA METERING CODE | NER / METROLOGY PROCEDURE |
|---|--|
| Network operator responsible for ensuring that a connection point has a metering installation | FRMP responsible for ensuring that a connection point has a metering installation |
| Network operator responsible for compliant operation of metering installation | Responsible Person responsible for compliant operation of metering installation |
| Network operator responsible for compliant operation of metering data services | Responsible Person responsible for compliant operation of metering data services |
| A network operator is not required to maintain any metering equipment owned by a user or user's customer. | RP responsible for metering installation components regardless of ownership |
| Metering testing as per AS1284-13 | Time based and / or sample based |
| Prepayment metering is allowed | Prepayment metering is NOT allowed |
| Type 5 – 35 days storage | Type 5 – 200 days storage |
| No access to data for retail customers or customer authorised representatives | Access to data for retail customers or customer authorised representatives through meter data provision procedures |

- PUO developed a paper on policy decisions related to the jurisdictional material in the Metrology Procedure
- This paper was consulted on with participants and the Retail Market Operations and Metering working group.
- The paper has now been submitted to the WA steering committee for endorsement for submission to COAG.
- COAG can then submit the required amendments to AEMO, as required by NER.

WA JURISDICTIONAL MATERIAL IN METROLOGY PROCEDURE PART A



| Description | WA position from PUO paper |
|---|---|
| 'x' value (maximum value for a type 4A or 5 metering installation) | 160 MWh per year |
| "y" value (maximum value for a type 6 metering installation) | 50 MWh per year |
| Calculation of annual consumption | Based on the billing periods over the most recent 12 month period, or prorated over a 12 month period based on the ADL where 12 month data is not available. |
| Type 5 accumulation boundary (maximum value where type 5 can be read as accumulation meter) | 50 MWh per year |
| Grandfathering | All T5 and 6 installed prior to 1 July 2018 to be compliant by 1 July 2022. |
| Data collection | The MC must ensure that metering data is collected from Type 5 and 6 metering installations and transferred to the metering data services database at least once every 12 months. |

| Description | WA position |
|--|--|
| Metering data forward estimation requirement | Where metering data for a Type 5 metering installation is collected more frequently than required by Metrology Procedure: Part A (i.e. remotely read) estimations need not be provided routinely or as a result of a change to the current published Scheduled Reading Date. Estimations must, however, be provided where necessary to meet the data requirements of the Service Level Procedure: Metering Data Provider Services. |
| Requirement for load profiling | Change the requirements in 13.2.2 (draft clause 11.1.1) to include Western Australia as a jurisdiction with the same requirements as Victoria, the Australian Capital Territory and Tasmania. |

WA VS NEM INSTRUMENTS



| WA | NEM |
|-----------------------------|----------------------------|
| WA Metering Code | National Electricity Rules |
| WA Metrology Procedure | NEM Metrology Procedure |
| WA NMI Allocation Procedure | NMI Allocation Procedure |
| Technical Rules | N/A |
| Access Code | N/A |
| WA Electricity Act | |
| Application Queuing Policy | N/A |

FURTHER NEM REGULATORY CHANGES



- March 2011, the Standing Council on Energy and Resources (now COAG Energy Council (COAG EC)), directed the Australian Energy Markets Commission (AEMC) to undertake a review into implementing Demand Side Participation in the National Electricity Market (NEM).
 - Final report released November 2012
- Overall objective, to ensure that community's demand for energy services is met by the lowest cost combination of demand and supply side options:
 - Provide consumers with the information, education, incentives and technology they need to efficiently manage their electricity use.
 - Provide networks operators, retailers and other parts of the electricity supply chain with incentives to better support consumer choice and use flexible demand to reduce overall industry capital and operating costs.
- Progress of recommendations split between COAG EC, AEMO and AEMC

POC – METERING COMPETITION



- A rule change request has been published by the AEMC to establish metering competition framework, which includes
 - Removing distributors' exclusivity for the management customer metering and related services
 - Allowing a party other than a retailer or distributor to manage the compliance obligations for metering (Metering Coordinator)
 - What meters are to be installed - advanced metering
 - The functionality and services to be supported by advanced metering (Minimum Functionality Specification)
 - The method of communicating and delivering those services (Shared Market Protocol)
- The AEMC's final determination on the rule change was published on 26 November 2015 (effective date Dec 2017)

- Primary objective of the rule changes is to promote competition in metering services in the small customer market.
- Market-led approach to the deployment of advanced meters, with a framework that facilitates this.
- New category of Registered Participant, the Metering Coordinator who takes on the responsibilities of the Responsible Person and some new ones (i.e., ensure only certain parties have access to services provided and energy data held in the metering installation).
- All Metering Coordinators will be required to register with AEMO
- Other changes to support the competitive framework, i.e. minimum requirements for new and replacement meters for small customers.
- The new arrangements commence on 1 December 2017.
- AEMO needs to complete procedure/guide and system changes prior to this date to support the new rules.

METERING COMPETITION - WHAT DOES IT MEAN?



- Retailers and large customers can contract providers to deliver advanced metering solutions and services across the NEM – based on business case rather than mandate.
- The provision of metering and related services becomes fully contestable, which facilitates:
 - Customer choice in the delivery of new services and supporting technology
 - Demand side participation initiatives
 - Pricing innovation (i.e. design of new tariffs for customers)
 - Operational efficiencies (e.g. remote reconnections, disconnections, metering reading, accurate billing, etc.)
 - Settlement and prudential efficiency (through provision of interval metering data)
- New parties have already entered the market in anticipation of the changes
- The implementation of competition and customer choice in Victoria has additional hurdles due to the VIC AMI regulated service model – with no effective competition until 2020 at the earliest.

METERING COMPETITION OBJECTIVES



- Implement a competitive framework for metering services in the NEM.
- Facilitate a market-led approach to the deployment of advanced meters.
- Consumers drive the uptake of technology through their choice of products and services.
- Promote innovation and lead to investment in advanced meters that deliver the services valued by consumers at a price they are willing to pay.

METERING COMPETITION HIGH LEVEL CHANGES - SUMMARY



- The role and responsibilities of the existing Responsible Person to be performed by a new type of Registered Participant - a Metering Coordinator
- Any person can become a Metering Coordinator subject to satisfying certain registration requirements.
- Retailers are required to appoint the Metering Coordinator for their retail customers, except where a large customer has appointed its own Metering Coordinator.
- Other features to support the competitive framework:
 - minimum requirements for new and replacement meters for small customers
 - obligations on the Metering Coordinator that are in addition to the existing obligations on the Responsible Person.

- ***Metering Coordinator***

- A person who is registered by *AEMO* as a *Metering Coordinator* under Chapter 2.

- ***large customer***

- (a) In a *participating jurisdiction* where the *National Energy Retail Law* applies as a law of that *participating jurisdiction*, has the meaning given in the *National Energy Retail Law*.
- (b) Otherwise, has the meaning given in *jurisdictional electricity legislation*.

The **Metering Coordinator** is appointed by the **FRMP***, and is responsible for:

- The provision, installation and maintenance of the **metering installation**;
- The collection, processing and retention of **metering data** from the **metering installation**, and delivery of the data to AEMO; and
- Managing access to and the security of:
 - The **metering installation**;
 - Services provided by the **metering installation**;
 - Energy and metering data relating to the **metering installation**.

(* Note that large customers can engage their own Metering Coordinator)

Parties acting as MC

- Any party may act as a Metering Coordinator, provided it is registered with AEMO for that role.
- Only LNSPs may act as MC for a type 7 metering installation.
- Only FRMP or LNSP may act as the MC at a transmission connection point.

Appointment of MC

- FRMP must ensure that a MC is appointed at a connection point.
- FRMP must appoint a MC except where MC has been appointed by:
 - Large customer
 - Non-Market Generator, or
 - exempt Generator
- Where there is a retailer at a connection point, FRMP must appoint MC where a large customer has not appointed its own MC

Transitional requirements - Initial MCs

- LNSPs acting as existing RPs for a type 5 or 6 metering installations become the initial MCs.
- LNSP will continue in MC role until
 - another MC is appointed, or
 - the services cease to be classified by the AER as direct control services.

MC default arrangements

- FRMP must appoint a MC for a connection point where
 - A metering coordinator default event has occurred, or
 - Appointment of the existing MC by a person other than where the FRMP is terminated or expired and the relevant person has not appointed another MC
- Terms and conditions of the contract between the FRMP and the relevant person relating to the appointment of the MC must be fair and reasonable
- Contract of appointment of MC in accordance with 7.6.2(a) must include terms relating to appointment of a new MC following a MC default event

Responsibilities of MC

- Assume existing responsibilities of the Responsible Person including (but not limited to):
 - Provision, installation and maintenance of metering installation.
 - Collection, processing, retention and delivery of metering data to metering database and other persons permitted under the rule.
 - Managing access to, security of, services provided by and energy and metering data held in the metering installation.

Responsibilities of MC

- Additional obligations relating to:
 - security controls for managing access to small customer metering installations, including services provided by, and energy data held in, such installations;
 - ensuring that access to all metering installations, the services provided by, and energy data held is managed in accordance with emergency priority procedures; and
 - network devices used by DNSPs.

Responsibilities of the initial MC

- Notify FRMP promptly of a metering installation malfunction.
- Not required to comply with clause 7.8.10(a)(2) relating to a metering malfunction.
- FRMP to promptly appoint a MC when it receives a notice from the LNSP of a metering installation malfunction.

MINIMUM SERVICES SPECIFICATION OBJECTIVE



- The final rule includes a minimum services specification, which all new and replacement meters that are installed for small customers must meet. The minimum services specification only includes services that are expected to deliver benefits to the majority of small customers receiving those services at a relatively low cost.
- It is anticipated that a minimum services specification will lower the cost of negotiations between Metering Coordinators and parties seeking access to services that are enabled by advanced meters and provide a starting point from which small customers and other parties can choose additional services that they value.

MINIMUM SERVICES SPECIFICATION SUMMARY



- All new and replacement meters that are installed for small customers must meet the minimum services specifications, except in the following two circumstances:
 - Where the Metering Coordinator obtains an exemption from AEMO because there is no existing telecommunications network which enables the remote access to the metering installation
 - Where the customer has communicated its refusal to have a meter that meets the minimum services specifications (i.e. a meter that is capable of remote access) installed
- While all new and replacement metering installations for small customers will need to be capable of meeting the minimum services specification, there will be no obligation on Metering Coordinators to provide the minimum services. Rather, the terms and conditions on which those services are provided, if at all, will be subject to commercial negotiation between the Metering Coordinator and third parties.
- A description of the services that are contained in the minimum services specification are set out in schedule 7.5 of the NER final rule, with more detailed service levels and performance standards for each of the services to be developed by AEMO in procedures. Mandating service levels and performance standards reduces transaction costs associated with negotiating access to services, and may facilitate price comparison between Metering Coordinators **[Access to metering services including those services contained in the minimum services specifications is not regulated, rather it is subject to commercial negotiations between the Metering Coordinator and the requesting party].**

MINIMUM SERVICES SPECIFICATION SUMMARY



- To meet the minimum services specifications, the meter must be capable of providing the following services:
 - Remote disconnection service
 - Remote reconnection service
 - Remote on-demand meter read service
 - Remote scheduled meter read service
 - Meter installation inquiry service
 - Advanced meter reconfiguration service
- Under schedule 7.5.1(d) , metering installations that are connected to a current transformer must only be capable of providing services listed in items (c) to (f) in table S7.5.1.1, meaning these metering installations will not be required to be capable of remote disconnection and reconnection services
- Links to a shared market protocol (SMP): A shared market protocol is an electronic platform that allows parties to communicate with each other regarding the services that will be offered by advanced meters including the minimum services specifications. It also defines the format of the associated messages between parties to provide those services. A shared market protocol is a default method of communication and does not preclude parties from agreeing to alternative methods of communication.

NEXT STEPS



Based on our analysis to date based on draft Rules received, we do not anticipate material changes to the NEM Metrology Procedure to incorporate WA provisions, and the Jurisdictional material that will be submitted by COAG.

AEMO's assumption is that this Procedure will supercede the WA Metering Code and WA Metrology Procedure.

Based on these positions, AEMO expects to commence consultation on this Procedure in March 2017.

QUESTIONS



For further questions and feedback: WAMRPRetail@aemo.com.au