MINIMUM FUNCTIONALITY OF ADVANCED METERS

ADVICE TO COAG ENERGY COUNCIL

November 2014
IMPORTANT NOTICE

Purpose
The purpose of this advice is to provide information about minimum functionality requirements for advanced meters in response to a request from the Council of Australian Governments (COAG) Energy Council.

This publication is based on information available to AEMO as at 14th November 2014.

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Acknowledgement
AEMO acknowledges the support, co-operation and contribution of all members of the stakeholder reference group, established to assist the development of the advice.
EXECUTIVE SUMMARY

On 25 June 2014, the Council of Australian Governments (COAG) Energy Council requested two pieces of advice from the Australian Energy Market Operator (AEMO) on requirements to inform a competitive framework for metering and related services. These requirements are for:

- A minimum functionality specification for advanced meters (due to be submitted to COAG EC in November 2014).
- A shared market protocol for advanced meter communications (due to be submitted to COAG EC in February 2015).

The advice sought from AEMO will support the development of a competitive, market-led roll-out of metering and related services within the National Electricity Market (NEM), which is the subject of a Rule change currently being considered by the AEMC. The draft determination on that Rule change is expected in December 2014.

Key finding

This paper provides AEMO’s advice on the minimum set of services and requirements to meet the requirements of a market-led roll-out of advanced meters, and also on some additional requirements for any mandated rollout of advanced meters.

Consistent with the terms of reference received from COAG EC, AEMO’s approach to developing the advice focused on the services and business outcomes delivered through advanced metering systems. AEMO considered the market’s objective and developed criteria to allow a range of possible services to be tested and evaluated against the criteria to determine which functions, if any, could form a mandated minimum specification.

AEMO identified six services that met the assessment criteria, and could be mandated for both a competitive roll-out of advanced metering systems. These services enable efficiency gains across the market, support market settlements, market participants, customers and their agents in accessing the benefits of metering information and remove barriers to the development and implementation of new tariffs and customer choice:

1. De-energisation (turn electricity supply off remotely)
2. Re-energisation (turn electricity supply on remotely)
3. Meter read – on demand (obtained remotely as required by a retailer, customer or other authorised party)
4. Meter read – scheduled (obtained remotely as per contracted dates and times)
5. Meter installation enquiry (remotely obtaining energy information, meter status, and usage data)
6. Meter Reconfiguration – (to remotely enable access to new tariffs and new arrangements, such as solar connections and energy demand tariffs)

AEMO identified other advanced metering services that did not meet the assessment criteria when considered in the context of a competitive roll-out.

AEMO advises that an outcome-focused services specification is preferable to a functional specification for advanced metering devices and systems, because:

- A services specification allows meter manufacturers, service providers and retailers to innovate and compete on the basis of their products and performance. A services specification is ideally suited to a market-led approach to advanced metering.
- Mandating a functionality specification could unnecessarily limit service delivery innovations. It could also delay the adoption of new technologies as it would lock in the functional design of a particular technology at a point in time.

AEMO’s advice meets the COAG EC objectives of supporting policy decision-making, providing certainty as to the required services and meter functions, and reducing the time required to develop technical documentation. It also seeks to answer all questions asked in the terms of reference.
AEMO developed this advice following consultation with an industry stakeholder reference group\(^1\). The majority of stakeholders consulted during the development of this advice, agreed on the range of advanced metering services that could be mandated in support of a market-led roll-out. This report also documents the contested positions to represent the views garnered through the process.

**Next steps**

AEMO recognises that one of the most important features of an advanced metering system is the wealth of data that can be readily provided to authorised parties.

Accordingly, COAG Energy Council could consider that an advanced metering services specification be developed concurrently with the shared market protocol under the NER, and a review of the standard format for delivering data to the market and participants, since the former informs the latter.

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\(^1\) See full list of stakeholder reference group members at Appendix A.
## CONTENTS

### EXECUTIVE SUMMARY

1. INTRODUCTION  
   1.1 Objectives  

2. METHODOLOGY

3. ADVANCED METERING SERVICES  
   3.1 Service categories  
   3.2 Service classifications  
   3.3 Primary services  
   3.4 Secondary services  
   3.5 Value-added services  
   3.6 Performance standards and service levels

4. REGULATION, STANDARDS AND ADVANCED METERING

5. CONCLUSION

APPENDIX A. REFERENCE GROUP MEMBERS
1. Introduction

In December 2012, the Standing Council on Energy and Resources (now the Council of Australian Governments’ Energy Council, or COAG EC) agreed to establish a framework to support competition in the provision of metering and related services. The COAG EC submitted a rule change request to the Australian Energy Market Commission (AEMC) to establish this framework. The rule change request included proposals relating to advanced meter capability.

On 25 June 2014, the COAG EC requested advice from AEMO on:

- The requirements for a minimum functionality specification for advanced meters.
- Requirements for a shared market protocol for advanced meter communications.

This paper provides AEMO’s advice on the minimum set of services and requirements for advanced meters to meet the requirements of a market-led roll-out.

This advice is intended to inform:

- Jurisdictions developing metering policies for consideration at the COAG EC meeting in December 2014.
- The AEMC Metering Competition Rule Change on the specification of minimum service requirements for advanced meter functionality.

In February 2015, AEMO will provide its advice on the requirements for a shared market protocol for advanced meter communications.

1.1 Objectives

Advanced meters currently available on the market can provide a wide range of services. Further services have been proposed or applied for some circumstances. The question addressed in this report is, which of these services could be mandated and under which circumstances.

AEMO established the criteria for assessing the various candidate services that advanced metering might supply, and for deciding which services could be included in the minimum specification. A decision to mandate minimum requirements needs to promote the National Electricity Objective (NEO).

AEMO notes that the minimum services and requirements for advanced meters in any specified standard might be different for a competitive roll-out from those required for a mandated or regulated rollout. To promote and encourage development and innovation under a competitive roll-out, the requirements should be set at a level that minimises the barriers to market entry. Regulation should only be required in a situation of market failure.

A competitive meter provider (or retailer) would need to offer meter services and prices that are attractive to at least some customers as part of a package. While this should deliver an appropriate service/price trade-off to these customers, it would not necessarily deliver all the necessary functionality. Mandatory standards may therefore be required to ensure that the interests of the market overall, and important third parties, are considered.

AEMO used the following criteria to assess the services that could be mandated:

- The interests of the market to deliver efficient business processes and low transaction costs.
- The broader market and society’s interest in meter accuracy, safety and security.
- The common interest in being able to provide efficient network services and efficient pricing of those services.

In a competitive roll-out, the provision of a range of other potential value-adding services will be decided by the market. A regulated roll-out, by contrast, would also need minimum standards specified in these areas.

In providing this advice, AEMO has taken the view that the functionality should be defined by the services or outputs that the meter provides, and the accuracy and level to which it provides them. AEMO believes this is preferable to specifying how the meter should operate. A services-based approach should then allow meter manufacturers and service providers to innovate and compete on the basis of their products and performance.
In addition, the COAG EC’s stated objectives of this advice are to support:

- Implementation of a framework for competitive metering, if adopted, by reducing the time required to develop technical documentation.
- Ministerial discussion on the advanced meter functions that may be required, and jurisdictional decisions on the functions that may be required for advanced meters under a new and replacement policy.
- Certainty of the services that stakeholders expect smart meters to support in the NEM.
- The AEMC’s considerations regarding the appropriate governance arrangements and status of the minimum functionality specification proposed in the metering competition rule change request.
- Consideration of the services and meter functions required to be supported through a shared market protocol.
2. METHODOLOGY

AEMO used a “top-down” approach to assess the requirements for a National Electricity Market (NEM) advanced metering minimum functionality specification. AEMO initially focused on developing a longer list of the services that could be delivered through advanced metering systems. This list of candidate services was then tested against the criteria and classified into three groups: primary, secondary and value-added services, i.e.:

**Primary services:** COAG Energy Council to consider mandating as part of a competitive rollout.

**Secondary services:** COAG Energy Council to consider mandating as part of a non-competitive rollout.

**Value-added services:** other advanced metering services for COAG Energy Council consideration.

AEMO then considered the performance standards and service levels to which the primary (and secondary) services should be delivered. Finally, AEMO considered which functions, if any, could form a minimum functionality specification.

AEMO has drawn from the work undertaken by industry during the National Smart Metering Program\(^2\), which was adjusted to reflect the outcomes of the AEMC’s Power of Choice review.\(^3\) AEMO has also incorporated international experience to both define the potential service offerings, and to consider current international standards initiatives.

AEMO used this information to identify specifications that are not commonly available in advanced metering products and systems, as well as any specifications that would require the procurement of bespoke products. AEMO also identified specifications with the potential to create barriers for advanced metering service providers, or barriers to the adoption of advanced metering in a market-led approach.

Clearly identifying advanced metering services, will contribute to the development of advice on a shared market protocol. The objective of the shared market protocol is to deliver messaging arrangements to support a competitive metering services framework.

Regulation

By definition, regulation is a set of rules or laws designed to control or govern conduct. Regulation creates, limits, or constrains a right, creates or limits a duty, or allocates a responsibility.

One of the objectives of AEMO’s advice is to provide a framework for a market-led roll-out of advanced meters in the NEM. In the terms of reference for this advice, the COAG EC stated that it expects the provision of advanced meters to be driven primarily by customer and business choices, based on the costs and benefits available to each party. This means that to achieve the required benefits, the roll-out of advanced meters should be driven using market dynamics to roll out new technologies and services. The implication is also that the market-led roll-out is driven by the retail sector.

In this case, where the aim is to support a market-led roll-out, there should be little need to regulate market services; market dynamics will drive the roll-out and ensure that market focused outcomes are achieved. However, to fully realise the benefits of an advanced meter roll-out, the requirements of other parties also need to be considered, such as the network businesses for network management services. Accordingly, sufficient regulation will be needed to ensure that the services required by other parties, can be obtained without creating barriers for market adoption of advanced metering.

Stakeholder engagement

AEMO established a stakeholder reference group which met fortnightly from 25 July 2014. The reference group comprised representatives from:

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\(^2\) Initiated by the then Ministerial Council on Energy and ran from July 2008 to December 2010.
\(^3\) Completed in December 2012.
• Electricity retailers and distribution businesses.
• Potential third party providers of energy services via advanced meters.
• Potential metering coordinators.
• Meter manufacturers.
• Consumer representatives.
• Representatives from Standards Australia and the National Measurement Institute.
• Jurisdiction government officials.
• Representatives from the AEMC and the Australian Energy Regulator.

A complete list of the reference group members and their respective organisations is attached at Appendix A.

Meetings took the form of round table discussions that were minuted in a working document, capturing all points of agreement, dispute, actions, and issues. AEMO and the AEMC also met regularly to make sure that progress aligned with the AEMC’s Metering Competition Rule change and broader Power of Choice initiatives.

This paper documents the services considered by AEMO, and for the most part, agreed by industry (via the reference group) as part of the minimum services specification required, and the rationale for each. This paper also lists services that were discussed but where no agreement was reached, and documents the contested positions to represent all views.

AEMO has used all of this information to formulate its advice to the COAG EC.

Service definition

AEMO developed a working document to facilitate the consultation process, which contained a complete list of known and developing advanced metering services in operation locally and internationally. Reference group participants were able to articulate the business outcomes, service levels, and performance standards they would require in respect to each service. Moreover, equipment manufacturers and service providers were able to confirm whether their core product suite facilitates the delivery of these services as standard.

As a result of the consultation process, AEMO identified three groups of services:

1. The services that could be mandated for both a competitive and regulated roll out of advanced metering systems:
   • De-energisation (turn electricity supply off remotely)
   • Re-energisation (turn electricity supply on remotely)
   • Meter read – on demand (obtained remotely as required by a retailer, customer or another authorised party)
   • Meter read – scheduled (obtained remotely as per contracted dates and times)
   • Meter installation enquiry (remotely obtaining energy information, meter status, and usage data)
   • Meter Reconfiguration – (to remotely enable access to new tariffs and new arrangements, such as solar connections and energy demand tariffs)

2. The services that should be not mandated for a competitive roll out of advanced metering systems, but could be mandated for a regulated roll out:
   • Re-energisation (remotely arming the meter to enable the customer to reconnect supply via a switch at the meter)
   • Load limiting (the ability remotely establish or remove a limit that restricts the amount of energy that can be consumed)
   • Load management (turning designated loads off and on at a customers’ premises, remotely on command, or under a schedule)
• Local access to a metering system via a registered device (connectivity with the meter from a device owned and operated by the customer or their agent)

3. The set of services that should be not mandated for a competitive roll out of advanced metering systems, or for a regulated roll out:

• Enabling a Home Area Network (HAN)
• Supply failure and restoration notifications
• Metering installation asset management
• Safety monitoring
3. ADVANCED METERING SERVICES

In preparing this advice, AEMO considered the services of an advanced meter should be to:

- Support billing and settlement in the market, i.e., the basic metrology services of electricity meters.
- Support efficient business practices.
- Enable efficient, reliable, and safe operation of the national grid.
- Deliver an accessible and secure platform for the delivery of flexible tariffs and demand-side and data services to consumers and other market participants.

To define the required business outcomes, all identified services were classified into categories.

3.1 Service categories

In addition to remotely operated advanced metering services, the reference group discussions also addressed some infrastructure services. Infrastructure services are services that require a physical action at site, and may otherwise be covered by existing business processes.

However, this advice paper only covers services that are delivered specifically through advanced metering systems, and not the physical infrastructure services currently managed in the NEM. As a result, infrastructure services are not included.

3.2 Service classifications

AEMO identified services that can deliver required business outcomes through advanced metering systems, and classified them as primary, secondary, or value-added, as below.

**Primary services:**

Primary services are those that:

- Meet the stated policy objectives as described in section 1.1
- Could be mandated for a competitive roll-out of advanced metering systems.
- Would be enabled upon installation of an advanced metering system.
- Would be provided across all advanced metering installations.

**Secondary services:**

Secondary services are those that:

- Do not meet the stated policy objectives as described in section 1.1
- Should not be mandated under a competitive roll-out of advanced metering systems (as their value has not been tested by the market).
- Could be considered to be mandated as a minimum service under a regulated rollout.
- Would apply to some (but not all) advanced metering installations.
- Would be activated in an advanced metering system following a request from an authorised party, either upon installation or (more typically) at a later date.

**Value-added services:**

Value-added services are those that:

- Do not meet the stated policy objectives as described in section 1.1
- Can be implemented and delivered if required on a commercial basis under a competitive or regulated rollout.
3.3 Primary services

Energisation services

Energisation services enable the electricity supply to be remotely disconnected and reconnected, without the need for any physical action at the metering installation. These services operate in overseas markets and in the Victorian AMI programme, and have demonstrated their ability to deliver desired outcomes in reduced timeframes at a fraction of the previous cost. These services also provide low cost options for ensuring the safety and security of a premises, such as in emergencies, for supply disconnection to vacant premises, or where there are hazardous electrical installations.

- **De-energisation**: The ability to completely de-energise electricity supply from the meter by remote action, immediately or on a future date. This service turns **off** the electricity supply for reasons such as: When a customer has vacated the premises
- When a customer requests that the supply be disconnected
- Work safety, such as when electrical work is being done at the customers’ premises
- Non-payment of energy bills.
- **Re-energisation**: The ability to completely re-energise supply to the meter by remote action, immediately or on a future date. This service turns **on** the electricity supply for reasons such as: When a new customer is moving into the premises
- A customer requests re-energisation following a disconnection
- Reconnection of supply after the resolution of bill payment issues.

**CONCLUSION**: Energisation services are commonplace in global advanced metering systems and product offerings. When mandated, they provide certainty of service availability for supply disconnection and reconnection across all metering installations to enable efficiency gains in service delivery across the market.

Information services

This group of services provides the backbone of demand side participation initiatives as well as many retailer and network efficiencies, including network fault management. They enable market participants, customers and their agents to make informed decisions based on access to a rich source of energy and metering installation status information. These services also provide assurance of the metering installations’ accuracy, safety and security, and they enable the operation of market settlement processes.

These services include the measurement of real (watt-hours) and reactive energy (Volt-Amp-reactive-hours) while accounting for both forward and reverse energy flows – energy being drawn from and sent to the grid. This facilitates measurement and billing for kWh and kVARh tariffs, for both load and generation.

- **Meter Read – On Demand**: The ability to provide metering data outside the normal collection cycle any time it is requested. This service provides on-demand meter reads for:
  - Retailers to bill their customers (including Final Bills)
  - A final meter read before a customer transfers to another retailer, and a ‘start’ reading for the new retailer
  - A customer billing enquiry
  - To provide information that supports demand-side participation products

- **Meter Read – Scheduled**: The ability to provide scheduled meter readings for:
  - AEMO and market participants to perform energy settlement, billing and reconciliation processes
  - Monitoring vacant premises to determine whether electricity is being used, or a new customer is at the premises
  - Use profiles for load management and planning functions.
**Metering installation enquiry:** The ability to provide up-to-date information on the status of the metering installation, including metering data, meter status, meter alarms, and quality of supply, to determine:

- Energisation status of the meter
- Warning alarms requiring investigation, such as metering tamper, detection of reverse energy flows, and metering device temperature
- Information relating to the quality and reliability of the electricity supply such as voltage (volts), current (amperes) and frequency (hertz).

**CONCLUSION:** AEMO considers these services to be the foundation and main benefit of any advanced metering roll out. Market settlements, market participants, customers and their agents can all access the benefits of metering data when there is certainty in the ability to source that data.

**Reconfiguration services**

Advanced metering systems can facilitate customers’ access to a broad range of tariff options and configurations without the need for costly visits to the customers’ premises. Current market arrangements include options for customers to move between single rate, variable rate or full time-of-use tariff offerings.

- **Meter Reconfiguration:** to remotely enable access to new tariffs and new arrangements, such as solar connections, energy demand pricing, controlled loads and new network or retail tariffs.

**CONCLUSION:** A NEM wide advanced metering reconfiguration service removes cost barriers for retailers and their customers to access alternate tariff arrangements. AEMO consider that this service could be mandated to ensure certainty of service availability for all customers and market participants.

### 3.4 Secondary services

- **Re-energisation (arming of the meter):** This service provides the ability to remotely establish conditions for reconnecting the supply of electricity to the customer’s premises. Once completed, the meter is ready for the customer, or their agent to perform an action, typically pressing a designated button or switch on the meter to reconnect their supply.

**CONCLUSION:** This is an alternative method for managing reconnections to the service (identified in the Primary Services section above) and is available through most current advanced metering systems. This service provides no additional benefits to those stated in the Primary Services section, but could be negotiated should a party wish to offer this service as part of a competitive roll out. In a regulated roll out, this service could be mandated to provide market participants with the flexibility to meet customer’s needs.

- **Load limiting:** This service provides the ability to establish or remove a limit that restricts the amount of energy able to be consumed whenever an agreed limit has been reached, or at a future date. Typically this service can be used as alternative to existing processes for credit management, limiting load at vacant premises and restricting supply during times of supply shortage.

**CONCLUSION:** This service provides options for managing loads, either a specific load or the entire load at customers’ premises, but does not meet the objectives stated in section 1.1. The service could be negotiated should a need be identified.

- **Load management:** Traditional forms of load management include load control devices such as time switches or ripple relays that are either set up or operated by the distributor to facilitate access to controlled network tariffs, typically for the control of loads such as storage heaters or immersion water heaters. These traditional forms of load management are not proposed to be altered through the adoption of advanced metering systems. However, there may be more efficient ways to control loads within a customers’ premises that can be enabled through advanced metering systems and other existing and emerging technologies whether offered as an alternative to traditional network control solutions, or to facilitate customer energy management.
systems and demand side participation product offerings. For example, there are commercially available products on the market today that facilitate customer in-home load management.

**CONCLUSION:** AEMO consider that under a market-led roll-out, market forces can determine whether using advanced metering systems (as opposed to any traditional or other alternate methods of control) will lead to greater efficiencies. The service could be mandated under a regulated roll-out providing the advanced metering service provides more efficient solutions than other commercially available products.

- **Local access to a metering system via a registered device:** The ability to register devices that can access the metering system. See “Enabling a Home Area Network (HAN)” in the value added services section below.

### 3.5 Value-added services

AEMO discussed the following services with the reference group. In each case, solutions for the design of a minimum specification were either not immediately apparent, or there were strongly opposing views regarding the best solution for a market-led advanced metering roll-out in the NEM.

- **Enabling a Home Area Network (HAN)**

A HAN is a network that is deployed and operated within a small boundary, typically a house or small office. It enables the communication and sharing of resources between computers, mobile devices, smart appliances, and other devices, over a network connection. The reference group considered the role of the metering device within a HAN, and in particular, providing local energy use information to make it easier for customers to access new electricity pricing and services.

Traditionally, a HAN uses an In Home Display as the focal point for customer engagement. Smart phone and web applications are developing rapidly and they are typically available as a low-cost or no-cost alternative for customers.

Many mandated roll-outs, including the Victorian Advanced Metering Infrastructure (AMI) program and the planned approach in the UK, specify a technology solution requiring additional hardware within the metering device, enabling it to connect to a HAN within the premises.

The reference group acknowledged that authorised parties should be able to provide customers with close to real-time data access and connectivity to a HAN upon request. However, there was minimal support within the group for mandating any specific technology solution to facilitate this service.

Meter device manufacturers within the reference group confirmed their ability to adopt a range of options to facilitate HAN operation. These included via internet protocol (IP), radio frequency, and other local HAN connectivity methods, all based on international standards. Accordingly, AEMO included a service requirement to provide local access to the advanced metering system via a registered device, acknowledging there are multiple methods for doing so.

Consumer representatives did raise concerns, questioning the likelihood of services being provided unless a technology solution was mandated.

**CONCLUSION:** As tools are still being developed, AEMO considers that mandating a technology solution under a market-led approach risks limiting the potential to adopt developing technologies, and imposes unnecessary costs that may inhibit the business case for a roll-out.

- **Supply failure and restoration notifications**

Often referred to as the “last gasp” service, supply failure notification requires the advanced metering system to provide a message every time the supply of energy is disrupted. The supply failure notification could be used by the receiving party as an input to existing energy supply outage detection processes. Similarly, the supply restoration notification could be used as an input to existing processes to validate that supply of energy has been restored.

The single proponent for these services within the reference group was the Energy Networks Association (ENA), which provided service level and performance standard requirements to enable the review. The ENA
confirmed that these notification services become beneficial where there is a significant density of metering installations (more than 60%) supporting this service within a designated area.

AEMO believes there are other primary services that could provide similar business outcomes (e.g., scheduling a Metering Installation Enquiry). The communications infrastructure required to support advanced metering systems, significantly influences hardware and system design costs to support the supply failure notification service. For example, where a point-to-point cellular communications network is used, a separate power supply would be required to enable the advanced metering system to send notification messages if the energy supply failed.

As observed in New Zealand, market-led roll-outs are primarily supported through point-to-point cellular communications networks. AEMO believes it is reasonable to postulate that a market-led approach in the NEM will also rely primarily on this type of communications infrastructure.

**CONCLUSION:** AEMO does not consider it viable to assign these notification services as part of any minimum specification at this time, since a market-led roll-out does not provide assurance that the required density would be achieved in any designated area over any period of time. AEMO also considers that the likely additional investment required solely to deliver the supply failure notification service further precludes this service from a minimum specification. However, interested recipients could negotiate the activation and delivery of these services outside of a minimum specification.

- **Safety monitoring**
  
  The ENA raised customer safety monitoring as a potential service, in particular as a monitoring service for the degradation of the neutral connection from the distribution network to a customer’s premises.

  In discussions with manufacturers and metering providers, AEMO understands that this concept is an emerging service and is not clearly understood or defined at this time.

  **CONCLUSION:** AEMO proposes that the business outcomes proposed by the ENA be enabled under the Metering Installation Enquiry Service in the short term. Hence, the service is not included in this document.

- **Metering installation asset management**

  Advanced metering systems have a range of recording and reporting capabilities to enhance metering installation asset management. Typical examples include:
  - Detection and alert of a meter terminal cover removal.
  - Detection and alert of an unexpected reverse flow of energy.
  - Measurement of the temperature internal to the metering devices.

  When combined with the rich source of metering data available through advanced metering systems, these capabilities can act as a powerful tool to identify potential anomalies that in turn may prompt the metering provider or responsible person to instigate an action such as a physical site investigation.

  The metering provider and the responsible person are obliged within the National Electricity Rules (NER) to manage metering installation assets and installation compliance. AEMO and the reference group were unable to identify another party who would either want or need access to information related to these capabilities.

  **CONCLUSION:** AEMO has determined that there is no requirement to include any services or functionality relating to these capabilities, as the parties interested in acquiring access are the same parties that will be investing in and deploying the advanced metering systems. In addition, AEMO considers that the Meter Installation Enquiry service could provide the specified information should a need be identified.

### 3.6 Performance standards and service levels

To determine the advanced metering system requirements, the following performance standards and service levels that apply to the delivery of each service were considered:
• Service availability (days/hours within a calendar week).
• Timeframes for service request acknowledgement notifications.
• Timeframes for service request completion notifications.
• Quality requirements of a service request completion notification.

AEMO identified service levels and performance standards that reflect the requirements for:

1. The requesting party’s and customers’ expectations.
2. Technical requirements for the management of distribution networks.
3. NEM settlements.

As a result, five categories of service levels were identified. Each service could be requested under one or more of these service categories.

1. **Instant response**
   – A one-off transaction requesting that a service be performed immediately and a single response is received to confirm completion of the service, for example, Re-Energisation.

2. **Within a specified timeframe, but before the end of the business day.**
   – A one-off transaction requesting that a service be performed within a specified timeframe and a single response is received to confirm completion of the service prior to the end of the business day, for example, Meter Installation Enquiry.

3. **By the end of the business day**
   – A one-off transaction requesting that a service be performed prior to the end of the business day, and a single response is received to confirm completion of the service. For example, De-Energisation.

4. **Set and forget**
   – A transaction requesting that a service be performed, either tomorrow or in the future, and recurs to a schedule, for example, Meter Read – Scheduled.

5. **Set and expect**
   – A one-off transaction requesting that a service be performed, either tomorrow or in the future and a single response is received to confirm completion of the service for the requested date and time, for example, Meter Reconfiguration.

AEMO considers that when creating a services specification, detailed service level and performance standard requirements be developed. In addition to the service level and performance criteria stated above, these requirements could consider:

• Requestor dependencies (such as requestor responsibilities and cancellation rules)
• Supplier dependencies (such as validations, rejection rules and notifications of acceptance, completion and failure to complete)
• Performance standards, including:
  – Currency (for example, data requested can be no later than 140 days prior to the date of the request)
  – Conditions (for example, a measure against a performance standard would not include metering installations under fault conditions)

This advice does not attempt to specify service levels or performance standards in detail. Following development of specifications for proposed minimum services, consequential changes will need to be made to the appropriate service level procedures through a Rules consultation process. Through this process, the service levels and performance standards will be quantified.
4. REGULATION, STANDARDS AND ADVANCED METERING

As instructed by COAG EC, AEMO considered the roles of Standards Australia and the National Measurement Institute regarding advanced metering specifications. Standards Australia’s role in developing local standards, or adapting international standards for local use, is particularly important with respect to changes in technology.

The Standards Australia EL/011 electricity metering equipment committee has not been active for the last few years. As a result of AEMO’s work with developing this advice, Standards Australia is reforming the EL/011 working group, with an initial meeting scheduled for late 2014 to consider future actions.

AEMO does not propose that any requirements already covered in other legal and regulatory instruments (such as Australian and international metering and metrology standards), are included in any minimum standard service specification for advanced metering. If there is a requirement to adapt or amend any provision, the changes should be undertaken in the relevant instrument. For example, there are existing requirements for metering device accuracy in the NER and the Metrology Procedure, and any changes to accuracy requirements should be undertaken in those instruments.

There is likely to be a need for some amendments and additions to existing NER procedures to reflect business process requirements for the operation of advanced metering services. These include the Metering Data Provider and Metering Provider Service Level Procedures, the Market Settlement and Transfer Solution (MSATS) Procedures and the shared market protocol. The shared market protocol is the subject of a separate advice paper from AEMO, due in February 2015.

AEMO advises that advanced metering systems should be considered in the same manner as other metering arrangements that support the remote acquisition of metering data in chapter 7 of the NER. This includes the requirement to remotely communicate with the metering installation and have a communications interface to enable local data collection.

AEMO reviewed the requirement to specify functional requirements, referencing both the Victorian Advanced Metering Infrastructure (AMI) and National Smart Metering Steering Committee (NSSC) minimum functionality specification. AEMO identified that the requirement to specify functions was negated by the construction of a services specification, designed to ensure certainty of business outcomes with associated performance standards and service levels.

For example, the requirement to specify that a meter function must be designed to provide readings for measurement of real (watt-hours) and reactive energy (Volt-Amp-reactive-hours), this requirement can instead be stipulated as business outcomes to be delivered from the Information Services group.

Functions are constructed within an advanced meter and system to support the concept of delivering service outcomes rather than being directly related to a service per se. Having explored all known advanced metering services as well as some developing services, AEMO did not find that the construction of a functional specification aligned with the objectives in section 1.1.
## 5. CONCLUSION

Providing there is a robust, outcome-focused services specification in place, AEMO were unable to identify benefits through mandating a functional specification for the advanced metering devices and systems.

AEMO advises that COAG Energy Council consider implementing a services specification, as it provides the opportunity for the market to deliver services in a consistent fashion, whilst removing barriers to innovation in product design that could bring new technologies to the market. Creating a functionality specification risks unnecessarily limiting innovation in efficient service delivery by delaying the adoption of new technologies, as it locks in the functional design of a particular technology at a point in time.

A services approach also allows currently-installed meter stock, operating today as both type 4 and type 5 metering installations, to be modified to meet required outcomes. A functional specification would likely make those devices unnecessarily redundant.

At the time of publication, large-scale global deployments of advanced metering products and systems are underway. This has likely contributed to the reference group’s understanding of the services that these systems can deliver, the value that can extracted from those services, and the ability for new services to be developed following deployment of a baseline product suite.

The services AEMO proposes for mandating (Section 3.3 Primary Services), will support the market to deliver efficient business processes and low transaction costs. Participants in the reference group were able to articulate the business outcomes, service levels and performance standards they would require in respect to each service. Moreover, equipment manufacturers and service providers were able to confirm that their core product suites will facilitate the delivery of those services as standard.

Where AEMO was able to identify an advanced metering service, but found that it did not meet the objectives, to ensure that the interests of other parties are considered in a competitive roll-out, the service has been captured as a Secondary Service (Section 3.34 Secondary Services). AEMO considers that a number of these services will be available in standard advanced metering systems. However, they are not critical to the adoption of advanced metering in the NEM under a market-led roll-out. The majority of these services could be enabled with no physical action required at the metering installation – should a customer need be identified in the future.

Other value-added services were identified that could also be delivered through advanced metering systems, if there is an agreement between parties to do so. For example, supply outage and restoration notifications are not considered part of the minimum services at present. AEMO considers the nature of a market-led roll-out, as distinct from a cost-benefit assessment per se, precludes these services from forming part of a minimum specification. These services rely on geographical density of advanced metering systems, which cannot be guaranteed over any period of time under a market-led approach. Therefore, AEMO believes that parties interested in acquiring these services could negotiate delivery on a case-by-case basis.

Importantly, all of the services considered in this advice, with the exception of the supply outage notification service, can be delivered through standard advanced metering products and systems with no need for manufacturers, communication and system providers to create bespoke designs for the NEM. Accordingly, AEMO believes that the implementation of a services specification within the NEM, as detailed within this advice resolves the need for jurisdiction specific advanced metering specifications when considering jurisdictional new and replacement policy.

If adopted, AEMO consider that an advanced metering services specification could be developed as a component of the procedures under the NER designed to support the shared market protocol. Changes would also be required in the Metrology Procedures to support the shared market protocol and the Metering Provider and Metering Data Provider Service Level Procedures would need to reflect obligations on providers related to the delivery of the services. AEMO recognises that one of the most important features of an advanced metering system is the rich source of data that can be made available to authorised parties on a frequent basis. The currently available standard file formats, known as Meter Data File Format Specification (NEM 12 and NEM 13), have been founded on traditional metering data sets and developed and maintained by AEMO under section 7.14.1A of the NER.
There is a potential for the number of service request transactions to be reduced significantly if the standard formats are updated to consider advanced metering information. Accordingly, COAG Energy Council could consider that the development of an advanced metering services specification and the shared market protocol be undertaken concurrently with a review of the standard format for delivering data to the market and participants.
## APPENDIX A. REFERENCE GROUP MEMBERS

<table>
<thead>
<tr>
<th>Government and regulatory bodies</th>
<th>Member</th>
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<tbody>
<tr>
<td>Australian Energy Market Commission (AEMC)</td>
<td>Julian Eggleston (Chantelle Bramley and Lisa Nardi, first meeting)</td>
</tr>
<tr>
<td>Australian Energy Market Operator (AEMO)</td>
<td>Margarida Pimentel (Chair)</td>
</tr>
<tr>
<td>Australian Energy Regulator (AER)</td>
<td>Lee Brown</td>
</tr>
<tr>
<td>Commonwealth – Department of Industry</td>
<td>Kristen Clarke</td>
</tr>
<tr>
<td>New South Wales – Department of Trade and Investment, Regional Infrastructure and Services</td>
<td>Roy Kaplan</td>
</tr>
<tr>
<td>Victoria – Department of State Development, Business and Innovation</td>
<td>Sarah McDowell</td>
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<tr>
<td></td>
<td>Michael Whitfield</td>
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<td></td>
<td>Andrew Burnard</td>
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<td>Dr David Cornelius</td>
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<th>Distribution businesses and retailers</th>
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<tbody>
<tr>
<td>Energy Networks Association (ENA)</td>
<td>Michael McFarlane (Jemena)</td>
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<tr>
<td></td>
<td>Greg Flynn and Tom Cole (Energex Limited)</td>
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<tr>
<td></td>
<td>Dr Bryn Williams (SA Power Networks)</td>
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<tr>
<td></td>
<td>Sam Chen (Endeavour Energy on behalf of Networks NSW)</td>
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<tr>
<td></td>
<td>Chantal Hopwood (Tasmania Networks Pty Ltd)</td>
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<tr>
<td>Energy Retailers Association Australia (ERAA)</td>
<td>Stephanie Bashir (AGL)</td>
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<tr>
<td></td>
<td>Inger Wills (EnergyAustralia)</td>
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<td></td>
<td>Stefanie Macri (Lumo)</td>
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<td></td>
<td>Jenna Polson (ERM Power)</td>
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<td>James Barton (Simply Energy)</td>
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<tr>
<th>Metering manufacturers, third party and consumer representatives</th>
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<tbody>
<tr>
<td>Acumen Metering</td>
<td>Shaun Cupitt</td>
</tr>
<tr>
<td>Alternative Technology Association (ATA)</td>
<td>Craig Memery</td>
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<tr>
<td>EDMI</td>
<td>Simon Mouat</td>
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<tr>
<td>Landis+Gyr</td>
<td>David Mclean</td>
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<tr>
<td>Metropolis</td>
<td>Charles Coulson (Marco Bogaers 1st meeting)</td>
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<tr>
<td>National Measurement Institute (NMI)</td>
<td>Dr Phillip Mitchell</td>
</tr>
<tr>
<td>Secure Australia</td>
<td>Peter Taylor</td>
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<tr>
<td>Standards Australia</td>
<td>Varant Meguerditchian</td>
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<tr>
<td>Vector</td>
<td>Doug Ross</td>
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