29 May 2014

Mr John Pierce
Australian Energy Market Commission
PO Box A2449
SYDNEY SOUTH NSW 1235

Consultation Paper: Expanding competition in metering and related services in the National Electricity Market (ERC 0169)

Dear Mr Pierce,

ENA welcomes the opportunity to make a submission to the AEMC Consultation Paper on expanding competition in metering and related services in the National Electricity Market.

ENA's submission concentrates upon addressing key issues of concern in achieving customer benefits from smart metering infrastructure. Most significantly, ENA is concerned that network operations and responsibilities have not been adequately recognised to date within the proposed new metering framework under consideration.

The ENA submission was developed through an extensive and active collaboration by ENA Members.

The ENA submission reflects the need for:

- Ensuring that establishment of the policy framework precedes consideration of process issues;
- Ensuring that safe and secure delivery of energy services to customers is maintained; and
- Customer interests are paramount in delivery of metering contestability.

ENA's detailed submission in response to the issues raised in the AEMC Consultation paper is attached, along with a report commissioned from Energeia providing a review of potential network benefits from smart metering.

I would be pleased to discuss this review and these broader issues with you at any time and can be contacted at the ENA offices on (02) 6272 1555.

Yours sincerely,

John Bradley

Chief Executive Officer
Energy Networks Association

energy networks association

EXPANDING COMPETITION IN METERING AND RELATED SERVICES RULE CHANGE

ENA submission on AEMC Consultation Paper

29 May 2014

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EXECUTIVE SUMMARY

INTRODUCTION

The Energy Networks Association (ENA) is the national industry association representing the businesses operating Australia's electricity transmission and distribution and gas distribution networks. Member businesses provide energy to virtually every household and business in Australia. ENA members own assets valued at over $100 billion in energy network infrastructure.

ENA welcomes the opportunity to make a submission to the Australian Energy Market Commission (AEMC) Consultation Paper on National Electricity Amendment (Expanding Competition in Metering and Related Services) Rule 2014 and National Energy Retail Amendment (Expanding Competition in Metering and Related Services) Rule 2014 ('the metering competition rule change'). ENA considers that transformation of the metering framework will be a complex and difficult process which needs to be undertaken in realistic stages.

ENA considers that transformation of the metering framework should be undertaken in logical stages of policy and regulatory reform.

In delivering the metering framework, it will be critical that AEMC takes into account the different metering circumstances between jurisdictions and ensures that transition and implementation arrangements are realistic and viable for these different circumstances.

ENA understands that the process to develop the final rule change will involve extensive and detailed consultation. ENA looks forward to engaging in more detailed consideration of these and other significant issues relating to the rule change with AEMC and other stakeholders to work towards an effective end to end outcome.

This submission will concentrate on addressing key issues of concern to ENA in achieving the intended customer benefits. In this submission, ENA also provides brief responses to the thirty questions posed by the AEMC in the Consultation Paper. These responses are included at Appendix 1.

In addition to this submission, ENA also refers the AEMC to the submissions made by individual distribution network businesses, which will reflect in more detail the circumstances confronting these businesses within their jurisdictional frameworks.

ASSESSMENT CRITERIA

ENA notes that AEMC will consider the National Energy Objective (NEO) as the overarching framework for assessment. The NEO states:

> *"the objective of this Law is to promote efficient investment in, and efficient operation and use of, electricity services for the long term interests of consumers of electricity with respect to:*
>
> *(A) price, quality, safety, reliability, and security of supply of electricity; and*
>
> *(B) the reliability, safety and security of the national electricity system."*

Despite this, the Consultation Paper then proposes limited criteria for assessment of the proposed new framework:

- Facilitating competition;
- Transparency and predictability; and
- Administrative burden and transactions costs.

In ENA's view, the primary purpose of the rule change should be to maximise the potential economic use of smart metering infrastructure to provide benefits to all customers.

The AEMC model appears to be so focused upon maximising the scope for new metering market participants that it does so at the risk to:

a) safety and operational objectives of the NEO; and
b) potential for higher cost outcomes to customers who rely on efficient network access to smart metering infrastructure.

ENA would add two further assessment criteria:

- Alignment with the NEO
- Ensuring that the benefits of DSP and the more advanced metering required to support it are captured across the supply chain.

KEY ISSUES

The key issues addressed in this submission are:

- Need for coordinated outcomes
- Roles and responsibilities
- Safety and security of energy supply
- Network services
- Network deployments
- Delivery of contestability, and
- Services to customers

Need for coordinated outcomes

Establishment of the metering policy framework must precede consideration of the administrative and functional elements of the process.

ENA suggests the AEMC should ensure that even where individual elements are considered in separate policy processes or Rule changes, their assessment is not undertaken in isolation but is tested against the need to achieve a coherent package of policy and regulatory reform.

In this context, ENA notes the COAG Communique of 1 May 2014 states:

> '*Ministers agreed to task AEMO to provide further advice on minimum functionality for smart meters by October 2014, and a shared market protocol for smart meter communications by February 2015. This advice will support consideration of jurisdictional metering policies and market procedures which should apply under the new metering framework.'*

The ENA would be concerned if the development of the shared market protocol occurred before a clear and robust framework and rules had been resolved and were understood by all stakeholders.

Áustralia's energy ministers rely on the AEMC as the principal architect of integrated, national energy policy reform. In this context, ENA strongly supports the ability of the Commission to advise Governments on the appropriate sequencing of energy reform projects within its own responsibilities and those of other institutions to ensure coherence. The ENA supports the need for the Commission to ensure the collective capacity of the energy institutions to implement logically sequenced policy reforms which minimise the risk of unintended consequences.

Roles and responsibilities

ENA does not believe that material benefits have been proven to warrant establishing a role of Metering Coordinator. This issue requires detailed consideration and justification.

ENA prefers a model which retains existing framework of Responsible Person, Meter Provider and Meter Data Provider and reviews allocation of tasks (including from the proposed Metering Coordinator) between these roles within the context of the National Energy Customer Framework (NECF) and national electricity law and regulatory structure.

Safety and security of energy supply

The most critical changes proposed by AEMC relate to the proposed 'gatekeeper' responsibility – managing security and access control to meter functions and the interface to the market gateway.

ENA seeks clarification of the AEMC's proposed allocation of responsibility and liability for the 'gatekeeper' actions and decisions.

Depending upon how the Responsible Person/Metering Coordinator role and the gatekeeper role is established and configured, this will have significant implications for the role of networks in ensuring

- safety,
- reliability,
- security of supply, and
- delivery of power for example to life support customers.

These responsibilities are allocated to networks within the current regulatory framework and NECF.

The ENA does not support wholesale changes to the responsibilities of networks implicit in this analysis and considers that urgent detailed review needs to be undertaken of the roles and responsibilities envisaged by the proposed rule change before such changes are advanced.

Network services

The current reform proposal puts at risk the delivery of network-level outcomes, including safety, greater access to power quality and outage information; and improved reliability of supply, which are important to all customers.

ENA commissioned Energeia to undertake a review of the potential network benefits identified as a result of

experience gained from utilisation of Victorian advanced meters and projects such as Smart Grid Smart City. The report notes that the indicative new potential benefits (which are greater than the benefits initially anticipated in the Victorian or national cost benefit reviews) will vary significantly due to circumstances. They will not be relevant to or delivered across all networks. However potential benefits identified in the report include:

- Low Voltage (LV) phase balancing: to detect where there are unequal amounts of load on each phase of supply.
- LV dynamic reconfiguration: to optimise the configuration of the LV network as conditions change.
- LV automated Volt-Var: to drive an automated Volt-Var control (AVVC) scheme to manage voltage as the level of distributed energy resource increases
- LV Power quality investigations: to provide information that distribution businesses can use to proactively identify power quality issues before they lead to customer complaints.
- LV incipient asset failure detection: to detect incipient faults in a growing range of LV and HV assets.

While these network benefits may not appear of specific significant value to any individual customer, the ability of the distribution business to more effectively and efficiently deliver energy services provides significant benefits to customers overall.

The attached Energeia report highlights that the potential benefits to consumers derived from efficient network access to smart meter services are wider than earlier identified and likely to be realised in dynamic, rather than static, operational processes. This underscores the importance of a metering framework which permits the economic realisation of network-derived benefits of smart meters for consumers and does not sterilise the potential for businesses cases for smart meter investment to leverage potential network value.

There are risks to providing network service benefits in establishing a new Metering Coordinator with powers over existing metering assets but without regulatory oversight.

ENA has identified two major issues relating to this omission:

1. A MC taking advantage of its 'monopoly' position in providing these services to networks, and/or
2. An MC seeking to reduce costs by rolling out a smart meter without network functionality.

ENA consider that to ensure that access to the required data and service for support of network services:

- The new and replacement minimum specification in each jurisdiction must include necessary functionality for network services
- The Shared Market Protocol must have the capability for the request for and provision of the necessary data and services
- A light-handed regulatory regime must be established to ensure that the price for access to the necessary data and services reflects the provision costs
- Where service delivery from other parties at required functionality, price and service level is unsatisfactory,

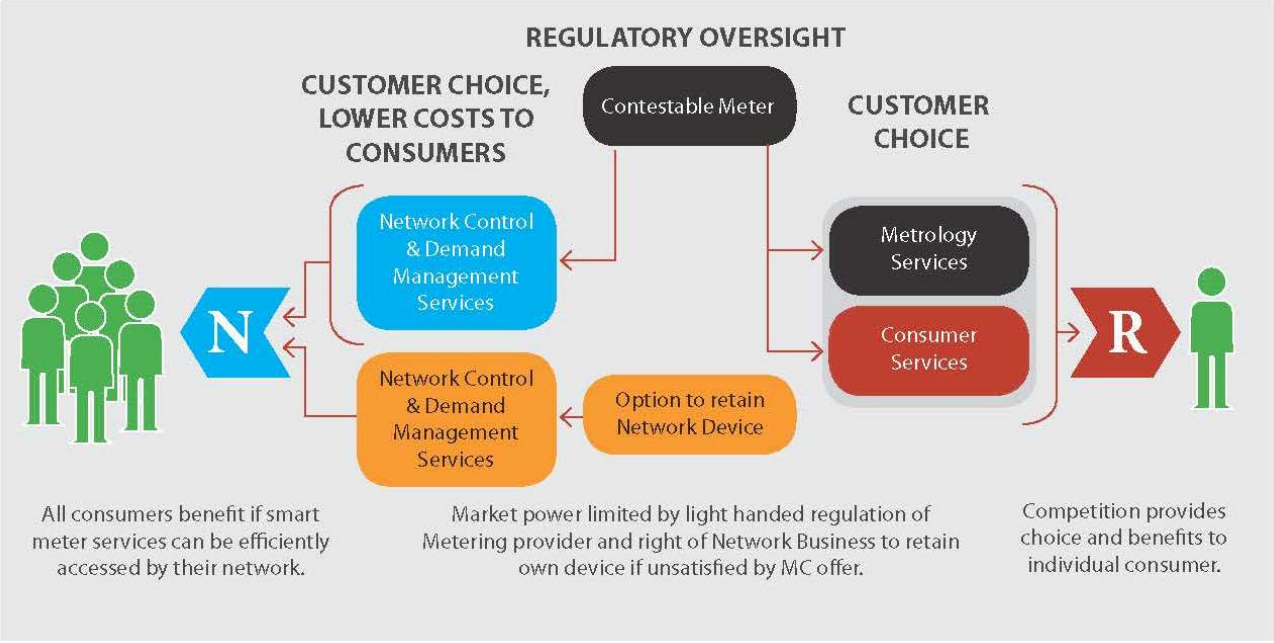


Figure 1: An alternative model to benefit customers

networks must retain the capacity to utilise their own device(s) for network services to benefit customers overall.

This is illustrated by the alternative model shown in Figure 1 above.

The contestable metering framework is yet to substantively consider changes required to permit network businesses to rollout meters in line with a business case, as intended in the AEMC Power of Choice review.

The effect of the current Rules is that many network meters that could operate to provide customer and system-level benefits cannot be interrogated remotely.

The effective utilisation of metering infrastructure as a non-network solution requires clarity in the ability of networks to install or commission smart meters and the incentive support available to them to favour such alternatives to traditional network augmentation and reinforcement solutions.

In addition, where networks are deploying meters for overall network benefit, it is critical that these initiatives, which will be reviewed and authorised by the regulator, should not be made more expensive to customers due to additional and unnecessary ring fencing provisions.

Delivery of contestability

ENA supports contestability of metering services but considers that the framework proposed by the AEMC is limited in its capacity to deliver the full range of potential benefits from smart (advanced) metering to provide most cost effective services for customers.

The ENA supports a balanced framework for contestable metering which maximises the potential for the full benefits of smart meter technology to be utilised and for business cases for smart meter rollouts to be underwritten by not only the benefits to *individual* consumers, but the benefits to *all* consumers provided by network uses.

Australia's energy system will benefit from the fastest takeup of smart meters if this can occur whenever the benefits outweigh the costs.

Services to customers

Competition doesn't have to be complicated. The key objectives of Metering Contestability can be achieved without compromising outcomes for all electricity consumers who rely on safe, reliable and efficient network operations.

Put simply, all customers of metering services must have choice.

- The end-use customer (or their retailer) should be free to choose their smart metering provider of Metrology Services and Customer Products and Services.
- Similarly, Network businesses, as the customers of Metering services for network operations, must be free to choose between engaging a smart meter provider or continuing to provide those services internally through their own devices.

TRANSITION

In delivering the metering framework, it will be critical that AEMC takes into account the different metering circumstances between jurisdictions and ensure that consideration of transition and implementation are realistic and viable for these different circumstances.

For example, advanced meters are now the standard metering infrastructure that all electricity distributors in Victoria will install. Customers should be able to realise the benefits from this rollout. Many of the benefits arise from improved network operations, improvements in safety and timely delivery of services remotely.

Within other jurisdictions, most customers still have accumulation meters, although there are significant numbers of interval meters rolled out in some jurisdictions, including Queensland, where distribution businesses are unable to read these remotely.

ENA recognises the benefits of national standards for meters and for smart meter service provision. ENA firmly support the concept of the Shared Market Protocol. However we also recognise the different Jurisdictional starting points with respect to current arrangements for smart meters and smart meter services, and also with respect to different network and market service arrangements.

While a national approach to metering policy and regulation is generally preferred, ENA members consider that:

- the consensus required for a national approach to metering policy and regulation is threatened if the proposed Metering framework remains unbalanced, and key risks to consumer outcomes are not addressed;
- the metering framework should be undertaken in logical stages of policy and regulatory reform which address consequential issues in national and state regulation; and

- the AEMC framework must provide for appropriate transitional frameworks which recognise the context of each jurisdiction

CONCLUSIONS AND RECOMMENDATIONS

ENA is concerned to ensure that changes to the metering framework deliver cost effective outcomes in the interests of consumers.

The ENA supports a balanced framework for contestable metering which maximises the potential for the full benefits of smart meter technology to be utilised and for business cases for smart meter rollouts to be underwritten by not only the benefits to *individual* consumers, but the benefits to *all* consumers provided by network uses.

Australia's energy system will benefit from the fastest takeup of smart meters if this can occur whenever the benefits outweigh the costs, including where:

- the customer accepts an offer to install a smart meter to enable an energy product offering (eg. a time-varying tariff); a new technology (eg. a Solar PV) or participation in markets (eg. Demand Side Participation);
- the local network business installs a smart meter to support network control and management which provide whole of system benefits such as lower costs, improved reliability, quality or safety of supply;
- a combination of both incentives.

In order to deliver these outcomes, ENA believes that the following is necessary:

- Include explicit consideration of the NEO and enabling DSP services as assessment criteria for the rule change process.
- Ensure the review and assessment of rule change outcomes are undertaken in terms of the overall package of reforms, rather than elements considered in isolation.
- Demonstrate that the proposed model for a metering contestability framework would have a positive cost-benefit analysis.
- Introduce minimum changes to the current roles and responsibilities within the current framework necessary to meet the objectives.
- Enable network rollouts of smart meters within consideration of network operations and responsibilities.
- Support metering service competition and most cost effective service delivery by ensuring the network business' right to retain a network device to perform network functions.
- Recognise jurisdictional differences in implementation and transition processes.

INTRODUCTION

The Energy Networks Association (ENA) is the national industry association representing the businesses operating Australia's electricity transmission and distribution and gas distribution networks. Member businesses provide energy to virtually every household and business in Australia. ENA members own assets valued at over $100 billion in energy network infrastructure.

ENA welcomes the opportunity to make a submission to the Australian Energy Market Commission (AEMC) Consultation Paper on National Electricity Amendment (Expanding Competition in Metering and Related Services) Rule 2014 and National Energy Retail Amendment (Expanding Competition in Metering and Related Services) Rule 2014 ('the metering competition rule change').

METERING SERVICES

Electricity meters are installed in almost every Australian home and business. Depending on their sophistication, they can provide up to three uses:

1. *Metrology* - measuring electricity consumption for market and billing purposes.
2. *Customer products and services* -like the control of a customer's load; customer information on energy use; allowing pricing options to improve affordability; disconnection & reconnection; and potential new services such as remote control of appliances in smart applications.
3. *Network control & management services* - supporting reliability, outage recovery, load management to defer network augmentation, increase network utilisation, lower costs, improve safety, and (with smart meters) enabling intelligent networks.

Electricity meters provide services needed by individual customers, retailers, distributors and other service providers. They are already an essential part of our electricity system, integrated with network operations. It is vital that metering technology provides a cost effective tool to support customers in their energy supply and demand choices but also assist safe, reliable and efficient network operation and services to consumers.

As technology and energy markets develop rapidly, smart meters and other devices will benefit individual customers. Customers should receive practical information and more rewarding tariff structures that match their needs; be able to control their energy use to get better deals and participate in new markets, such as exporting energy to the Grid through solar panels or supporting energy storage options, as these develop commercially.

Importantly, smart meters also provide a simple way to achieve benefits to all customers by assisting network control and management, which supports lower costs as augmentation is delayed. These whole of system outcomes include improved safety, greater access to power quality and outage information to reduce customer time off-supply, and improved outcomes for reliability performance. It has been estimated that the benefits for all customers at the network level from the use of smart meters, can be up to double those achieved for retailers and individual customers.

ENA supports a metering framework that achieves desired benefits at the lowest societal cost by:

- Enabling a safe, competitive, open and fair market for demand side services;
- Benefiting customers through economic achievement of future network operational benefits;
- Facilitating broader adoption of smart meters while minimising cross-subsidies and any associated price impact on customers;
- Enabling a transition to cost reflective network tariffs as quickly as practicable;
- Maintaining current network services and efficiently leveraging existing investments; and
- Fostering innovation in energy management solutions for customers and network operations.

Delivery of efficient network access for all customers relies upon support of cost effective delivery of network services, which require the ability of networks to introduce technology, including smart meters where justified, or cost effective purchase of smart meter enabled services from other parties (which will need light handed regulation to ensure cost effective access), or the network's ability to retain its own devices to provide competitive pressure to alternative suppliers. These points will be expanded within this submission.

ENA looks forward to working with the AEMC and other stakeholders to deliver a metering framework to meet these objectives.

ASSESSMENT CRITERIA

ENA notes that AEMC will consider the National Energy Objective (NEO) as the overarching framework for assessment. The NEO states:

> *"the objective of this Law is to promote efficient investment in, and efficient operation and use of, electricity services for the long term interests of consumers of electricity with respect to:*
>
> *(A) price, quality, safety, reliability, and security of supply of electricity; and*
>
> *(B) the reliability, safety and security of the national electricity system."*

The Consultation Paper notes the obligation in the NEO to ensure that any proposed framework benefits all consumers. Despite this, the Paper then proposes limited criteria for assessment of the proposed new framework:

- Facilitating competition;
- Transparency and predictability; and
- Administrative burden and transactions costs.

Facilitating competition

The AEMC identifies 'facilitating competition' as its first criterion for assessment, stating that

> *A competitive market for metering should promote incentives for commercial parties to supply consumers with the energy products and services that consumers want, and should reflect the efficient cost of providing those services.*
>
> *…We will consider any interactions between the regulated and competitive market frameworks that may lead to distortions in competition. In particular, arrangements for the efficient identification and recovery of the regulated costs of existing metering infrastructure in way that does not undermine the competitive provision of more advanced metering infrastructure (for example, through regulated exit fees).*[1]

The AEMC defines the scope of this assessment to considering competition in 'metering and related services,' which does not include the consumer-side services these meters enable[2]. This seems to restrict the primary goal of the rule change.

ENA draws attention to the opening statement within the metering rule change:

> *The rule change request proposes to amend the National Electricity Rules (NER) and National Energy Retail Rules (NERR) to establish a competitive regime that would enable widespread investment in advanced metering technology. The objectives of these arrangements are to:*
>
> » *support the uptake of efficient demand side participation (DSP) products and energy services that promote consumer participation and choice; and*
>
> » *allow for the benefits of demand side participation to be captured across the supply chain.* [3]

In ENA's view, the primary purpose of the rule change should be to maximise potential economic use of smart metering infrastructure to provide benefits to all customers.

Facilitating competition should be about consumer choice of energy services products, enabling services in the interest of customers, and the use of metering to achieve this end.

It is important that the broader factors relating to facilitating metering competition be considered including cost effective service delivery, the ability of new entrants to operate, the need for adequate information to enable informed choices, and enabling delivery of network services to benefit all customers.

The AEMC model appears to be so focused upon maximising the scope for new metering market participants that it does so at the risk to:

a) safety and operational objectives of the NEO; and
b) potential for higher cost outcomes to customers who rely on efficient network access to smart metering infrastructure.

Without broad assessment, rules that are intended to achieve competition in metering may fail to deliver competition in demand side services – an example being where a retailer's metering business offers unfavourable terms for access to competing retailers or inflated, monopoly priced services to networks.

The ENA note that the recommendations in the Power of Choice review for wholesale demand response and the multiple trading arrangements were proposed to expand

[1] Australian Energy Market Commission, National Electricity Amendment (Expanding Competition in Metering and Related Services) Rule 2014: Consultation Paper, 17 April 2014, p. 26

[2] Ibid, p.7

[3] Ibid, p.i

competition and facilitate development of new markets, although it was recognised that uptake of the service may be limited. The ENA understand that the detailed designs and cost/benefit analysis for these proposals have indicated that care should be taken in creating complex frameworks for market offerings that may not be used or be used to a limited extent.

Similar caution is required regarding implementation of a metering framework to ensure that the benefits are delivered at the most cost effective price to customers.

Transparency and predictability

AEMC also identifies transparency and predictability as assessment criteria. The transparency and predictability criteria focus on a clear legal framework and roles and responsibilities and recognising that customers should have sufficient information from which to make efficient decisions and tradeoffs.

These criteria also need to be considered in light of all services including supply and energisation services provided by distributors. NERL Rule 66 obliges distributors to provide customer connection services which are defined as:

> *"customer connection service for premises means any or all of the following:*
>
> *(a) a service relating to a new connection for the premises;*
>
> *(b) a service relating to a connection alteration for the premises;*
>
> *(c) a supply service for the premises, including (but not limited to) the energisation, de-energisation or re-energisation of the premises;*
>
> *(d) a service prescribed by the Rules as a customer connection service for the purposes of this definition; '*

ENA has serious concerns that the rule change gives inadequate consideration to:

- the potential impacts on customer safety and the reliability/availability of customer's supply, and
- the real risks to reliability, safety and security of the network,

that could arise through a widespread deployment by multiple parties of devices capable of switching load and disconnecting customer supply under remote control.

Clear delineation of roles and responsibilities will be critical to the successful application of a new metering framework. The implication of proposed changes especially for the responsibilities of networks will be further considered in this submission under Key Issues.

Administrative burden and transactions costs

ENA agrees strongly that:

> *Any new arrangements should be simple and practicable from a consumer's perspective … The rules should be simple from the perspective of businesses and the minimum necessary to achieve their intended objectives.*[4]

Additional criteria

ENA would add two further criteria:

Alignment with the NEO

AEMC states that its overall assessment must be against the overarching goals of the NEO.

ENA notes specifically the NEO requirements:

> *(A) price, quality, safety, reliability, and security of supply of electricity; and*
>
> *(B) the reliability, safety and security of the national electricity system."*

Consequently, ENA considers that meeting the NEO should be included as a specific criterion for assessment of the rule change.

Ensuring that the benefits of DSP and the more advanced metering required to support it are captured across the supply chain.

As this objective is cited as the key driver for the rule change, it should be included as a key criterion against which to assess the recommended outcome.

[4] Ibid p. 27

KEY ISSUES

NEED FOR COORDINATED OUTCOMES

Processes and decision points for changes to the metering framework should proceed in a logical and coherent manner.

Establishment of the policy framework must precede consideration of the administrative and functional elements of the process. The framework needs to start with the overall economic and customer benefits, develop clear roles and responsibilities and then an underlying rule framework that will serve the test of time

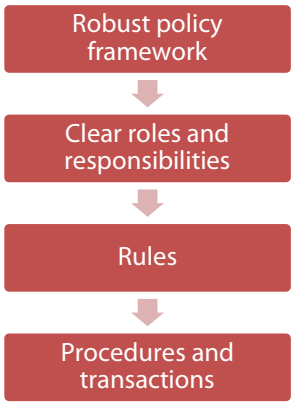


Figure 2: Development of Metering Framework

Although each of these issues is individually important, it will be critical to ensure that the overall policy framework is considered in its entirety to provide the optimal outcome. Consequently, the process whereby AEMC undertakes its analysis of the metering framework must ensure that where individual elements or issues are considered separately, their assessment is not undertaken as an isolated element but reviewed as part of the comprehensive package.

The consultation paper appears to be still teasing out aspects of the roles and responsibilities as they relate to metering services without fully addressing the implications for current roles and responsibilities in the market and regulatory environments today. A range of other changes in NERL, NERR, AER guidelines, MSATS procedures, National Metrology Procedures, B2B procedures, accreditation check lists etc. will follow. It is important to get the economic framework, roles and responsibilities right before the subordinate elements are developed.

The COAG Communique of 1 May 2014 states:

> *'Ministers agreed to task AEMO to provide further advice on minimum functionality for smart meters by October 2014, and a shared market protocol for smart meter communications by February 2015. This advice will support consideration of jurisdictional metering policies and market procedures which should apply under the new metering framework.'*

The ENA would be concerned if the development of the shared market protocol occurred before a clear and robust framework and rules were understood by all stakeholders.

Australia's energy ministers rely on the AEMC as the principal architect of integrated, national energy policy reform. In this context, ENA strongly supports the ability of the Commission to advise Governments on the appropriate sequencing of energy reform projects within its own responsibilities and those of other institutions to ensure coherence. The ENA supports the need for the Commission to ensure the collective capacity of the energy institutions to implement logically sequenced policy reforms which minimise the risk of unintended consequences.

ROLES AND RESPONSIBILITIES

ENA does not believe that material benefits have been proven to warrant establishing a role of Metering Coordinator. This issue requires detailed consideration and justification.

There are a number of functions and outcomes associated with the provision and management of meters, smart meter infrastructure, and associated service access.

The Consultation Paper recognises that smart meters have three main elements:

'The AEMC's Power of Choice review highlighted that when considering a minimum specification for smart meters, three elements should be taken into account:

1. The measuring element (or multiple elements) that measures and records the energy consumption (ie basic function of meters
2. Energy management system functions that allows messages to be sent via the meter into the consumer's premise and communicate with its appliances (eg for load control, home area networks).
3. Smart Grid business functions that enable distribution network businesses, retailers, and other parties to communicate with the meter, to both receive information and send messages /instructions to the

metering installation. These could support such network operational functions as supply capacity control, loss of supply detection and energisation/de-energisation of a load at a settlement point.

The ENA consider that AEMC Open Access Report and the metering rule change Consultation Paper fail to provide a clear overview of these functions and outcomes, and do not detail how the introduction of smart meters impacts on the roles and responsibilities for carrying out these functions. Hence the basis for the introduction of a Metering Coordinator (MC) model is unclear.

The Paper largely "promotes" the concept of a Metering Coordinator (MC) being in place which would potentially not be the distributor or the retailer but an accredited third party. Further this MC could be contracted by the customer. This is seen as providing "competitive tension" in the MC "market" by ensuring that where the retailer (or distributor) as MC is not providing customer required service, the customer can contract a third party MC. The concept is also identified as necessary to minimise meter churn.

The ENA has concerns that the third party MC concept will:

- add complication to an already complicated market service model,
- involve costly registration, setup, and audit costs; and system and process change of potentially many millions of dollars,
- add risk to the level of responsibility achieved (and presumably require the MC service provider to be established as a Market Participant to enable Civil Penalties / financial liability to be applied), and
- not provide the competitive dynamics envisaged and necessary to realise all three categories of potential smart meter functions identified in the Power of Choice review.

The model does not provide a mechanism to ensure cost effective distributor access to network service enablers.

ENA prefers a model which retains existing framework of Responsible Person, Meter Provider and Meter Data Provider and reviews allocation of tasks (including from the proposed Metering Coordinator) between these roles. ENA notes that the identity of the Responsible Person in a contestable environment will also require consideration.

There seems little justification for the MC role given that the functions of the role appear to be within the capabilities of the current service provider roles and the responsibility for ensuring service could be handled with the broad scope of the existing Responsible Person role. Complicating the existing service/ responsibility framework with another party, necessitating process and transactions changes to include the new role, and adding an additional accreditation process with its associated costs and resource impacts cannot be justified.

The development, interaction and relative responsibilities of roles relating to smart metering to provide efficient and effective service delivery and facilitate customer choice needs detailed review.

SAFETY AND SECURITY OF ENERGY SUPPLY

The most critical changes proposed by AEMC relate to the proposed 'gatekeeper' responsibilities – managing security and access control to meter functions and the interface to the market gateway. ENA seeks clarification on the AEMC model's allocation of responsibility and liability for the 'gatekeeper' actions and decisions.

Depending upon how the RP/MC role and the gatekeeper role is established and configured, this will have significant implications for the role of networks in ensuring

- safety,
- reliability,
- security of supply, and
- delivery of power for example to life support customers.

When/if another party becomes responsible for decisions relating to when and which customers are switched on/off supply, this needs to be considered in the light of network licensing conditions. This includes safety and supply conditions applied within jurisdictions.

The current regulatory framework is clear on the role of the Responsible Person regarding meter provision, metrology availability, accuracy, etc. However, within the AEMC"s proposed new framework, the responsibility for non metrology network services is not clear. The NER, NERR, National Energy Customer Framework (NECF) and the Distribution Licenses allocate specific market roles and responsibilities to the distributor.

The AEMC Report suggests that the Metering Coordinator will take the liability for the responsibilities of the role. In the AEMC smart meter model, this would include the liability for erroneous switching of bulk numbers of customers which impact network licensing provisions relating to minutes off supply (and hence adversely financially impact the distributor through the S factor mechanism).

This would also include responsibility for safety of life support customers if they were erroneously disconnected, a

critical customer safety responsibility currently held by networks.

In the AEMC proposed framework these liabilities, which currently rest with the networks, would conceptually rest with the MC who could be a third party provider. Any initiative to introduce a new third party role with such significant implications for safety and security of supply would require engagement with state-based safety regulators to ensure safety and security of supply is not jeopardised.

If it is the intention of the AEMC that such changes of responsibility are made, this would involve review of the National Energy Customer Framework (NECF) as well as significant changes to the Rules and NERR and the Distribution Licenses to make these changes in responsibility and liability clear. It will also require a complicated accreditation process which enables confidence to be gained that the MC understands and can manage these responsibilities (which currently sit with the distributor) and are financially prepared to meet the associated liabilities.

The ENA does not support wholesale changes to the responsibilities of networks implicit in this analysis and reiterates that urgent detailed review needs to be undertaken of the roles and responsibilities envisaged by the proposed rule change before such changes are advanced.

However, if the MC role was established, the metering framework would need to ensure the parties carrying out the role are subject to similar prudential and enforcement consequences applicable to the market participants undertaking the roles in the current framework.

ENA further notes that when considering aspects of the 'gatekeeper' role which have potential impact on energy system operation and security, we would draw the attention of AEMC to the Load Management and Network Security and Communication and Data Security protocols which were developed by the ENA to address essential system issues impacted by activities of multiple parties in energy services.

NETWORK SERVICES

ENA notes the cost benefit report on Victorian advanced meters by Deloitte[5] in 2011 which undertook a cost benefit assessment of the Advanced Metering Infrastructure (AMI) program. The report acknowledged that not all possible benefits of smart meters had been quantified in their review and that the AMI program could 'deliver additional benefits in network operations and energy management that are as yet unknown'[6]

ENA commissioned Energeia to undertake a review of the potential network benefits which have been identified since the earlier reviews. A copy of the report is at Appendix 2.

The report represents a catalogue of potential new network benefits being identified as a result of experience gained from utilisation of Victorian advanced meters and projects such as Smart Grid Smart City. This report includes further advice on potential network benefits that may be delivered. The report notes that the indicative new potential benefits (which they conclude are greater than the benefits initially anticipated in the Victorian or national cost benefit reviews) will vary significantly due to circumstances and they have not attempted any cost/benefit assessment. They will not be relevant or delivered across all networks. While some benefits can be obtained with a sample of meters providing data and services, others require high penetration levels to make the service workable.

However, Australian network businesses are utilising or planning to utilise smart meters data and services to develop and enhance a range of network services which provide broad benefits to customers. The current reform proposal puts at risk the delivery of these outcomes.

Whilst not uniformly being considered by all networks the potential benefits in place or under consideration include:

- improved asset utilisation leading to reduced network augmentation and reduced secondary system capital expenditure
  - phase balancing increases LV network capacity
  - dynamic asset rating increases allowed LV rating
  - power factor improvements with kVA tariffs and identification of poor power factor customers
  - optimised configuration dynamic management increases LV network capacity

[5] Deloitte (2011) Department of Treasury and Finance Advanced Metering Infrastructure cost benefit analysis.
[6] Ibid, p.8

- cost reflective pricing provides signals to customers through cost reflective tariffs or alternative pricing mechanisms
- control of secondary loads including water heaters, pool pumps and air-conditioners.

» potential quality benefits leading to reduced power quality capital expenditure and reduced distributed energy resource congestion

- service data used to drive automated Volt-Var solutions to avoid need for new assets or increased tap change visits
- more accurate impedance models improve investment performance
- LV Power quality investigations: advanced metering can provide information that distribution businesses can use to proactively identify power quality issues before they lead to customer complaints.
- Data from smart meters can also be used to verify power quality related claims by customers, eliminating the need in some cases for a formal investigation.

» Operations and maintenance improvements including customer safety

- Outage management capability to detect meters going off supply and to request meter status on demand allows better outage detection and restoration management hence reducing outage durations
- Connection management: smart metering can be used to remotely energise or de-energise a premise already connected to the LV network
- LV incipient asset failure detection: smart metering can be used to detect incipient faults in a growing range of LV and HV assets. Includes:
  - ☐ Anticipated condition failures avoid outages and overtime
  - ☐ Identification of hazardous conditions
  - ☐ Identification of HV fuse breakdown (candling)
  - ☐ Identification of impaired earth path to improve customer installation safety (neutral integrity)
  - ☐ Ability to pinpoint HV and LV outages

These benefits range from broad network benefits which are passed through to all customers as a result of reduced broad network costs (eg reduced augmentation costs) or better service (eg improved voltage levels), to individual financial benefits (eg reduced peak load costs) and non-financial benefits (eg safety of customer supply lines).

The attached Energeia report highlights that the potential benefits to consumers derived from efficient network access to smart meter services are wider than earlier identified and likely to be realised in dynamic, rather than static, operational processes. This underscores the importance of a metering framework which permits the economic realisation of network-derived benefits of smart meters for consumers and does not sterilise the potential for businesses cases for smart meter investment to leverage potential network value.

Risks to all customers from Metering Coodinator

All customers benefit from efficient network outcomes which may be derived from smart meter services. Customers are exposed to potential increased costs where the new proposed contestability framework establishes an unregulated monopoly at the customer location with market power. Under the AEMC model, a single party (the Metering Coordinator) will have the ability to remove the existing network metering asset and become an un-regulated gatekeeper of metering services. The Metering Coordinator would not have a commercial incentive to provide the required smart meter data and services at a cost reflective price but would have no regulatory oversight.

ENA has identified two major issues relating to this omission:

1. A MC taking advantage of its 'monopoly' position with respect to providing these services to networks to charge above the cost reflective price, and/or
2. A MC seeking to reduce costs by rolling out a smart meter without the functionality to support network services or without the capability to provide these services to the distributor on request.

Market power of Metering Coordinator

In its 'Supplementary Paper' on Contestable Metering Open Access and Communication Standards, the AEMC highlighted the real potential for the Metering Coordinator to exert market power resulting in inefficient charges or distortion of downstream markets.

The Supplementary Paper identifies the following issues

» *"There appear to be incentives for retailers to take on the role of the MC, as this would enable them to frustrate their competitor's access to the functions of smart meters offered to rival services."*

» Where the Retailer contracts the MC, *"…it has an incentive to argue for a type of exclusivity agreement with the MC whereby the retailer receives more*

favourable access than its competitors" and "… the retailer may succeed in hindering the development of competition in energy services by frustrating access to a smart meter."

- Firms faced with an MC seeking to frustrate access *"…may incur costs by bypassing the smart meter to provide these services. In this respect we would be concerned that a reduction in competitive access to smart meters may restrict the ability of firms to offer innovative and competitively priced energy services."*
- *"… [T]he retailer may have an incentive to frustrate access to the smart meter in order to make its [DSP] products appear more competitive to the consumer."*[7]

Whilst the retailer MC would not be a competitor for all the services to be potentially provided by the Distributor (eg voltage information), for others (eg load control) they may see themselves as competing for independent control of the customers' key loads.

The AEMC have argued the fact that the distributor is the only potential purchaser of these network services somehow reduces the incentive on the MC to take advantage of their monopoly position. The Distributors' cost (and societal costs) of not having access to these services is likely to be materially higher than the MCs costs. Hence, market power will rest with the MC creating the potential to extract monopoly rents at the expense of all network users.

The metering framework needs to ensure that this market power is balanced by light handed regulation to ensure cost effective services to customers. This also requires balancing by networks being enabled to provide network functions via their own devices.

Network service functionality

Under the proposed contestable metering framework, a retailer does not derive any competitive advantage from enabling benefits that are not directly visible to the customer at the time of installation. However the data and service required by the distributor are to support a range of customer and societal benefits which are likely not to be immediately apparent to the customer and/or not valued by them.

Hence, where the Jurisdictional New and Replacement minimum specification is a low specification meter with minimal data and services capabilities (and the national Minimum Functionality Specification a "shopping list" guideline only), retailers may prefer to install a lower-cost meter that is not capable of network functions, even if the incremental cost of a more capable meter is small relative to the total value of these functions to the community over the life of the meter.

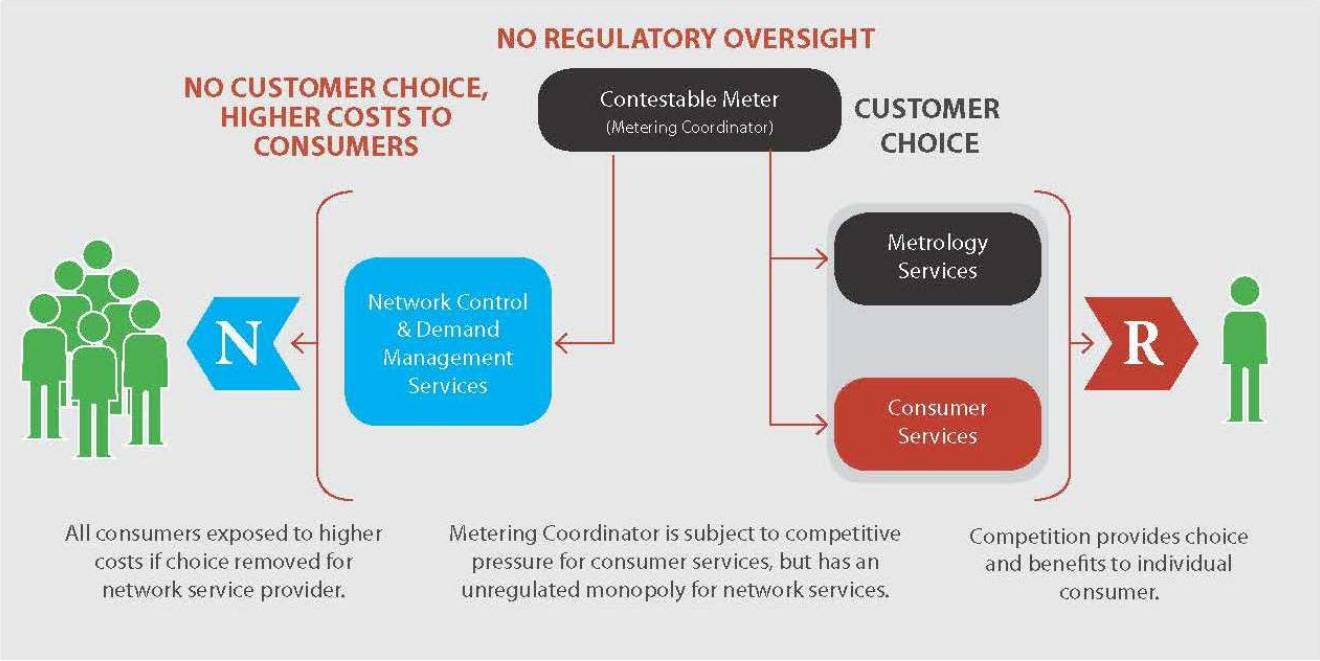


Figure 3: Current proposal for Contestable Metering Framework for small consumers

[7] AEMC (2014), *Supplementary paper: Regulatory Framework for open access and common communication standards review*

The Consultation Paper is largely silent on this aspect of the contestability model. However it is of concern that in Section 8.1 on p61 when discussing load management services it is stated "*if the load management service* ***operates*** *through additional functionality in the existing metering installation, an upgraded or replacement metering installation should include equivalent functionality which is activated and operational at the time of the replacement*". This would imply that if the additional functionality in the existing metering installation is **not** operational at the time of replacement then the replacement meter does **not** have to have the functionality.

This is of concern as networks are looking to have functionality in their meters to support load control even though at the time of installation this may not be activated eg the customer may have a gas hot water and no immediate need for hot water load control, or no air conditioner at that point in time. The concept of a homogeneous meter fleet is important to ensure customer installation changes and future service can be provided.

ENA consider that this model of ensuring the full meter functionality not just for load control is retained in a replacement meter is an important one and must be part of the contestability framework.

Further, if the Shared Market Protocol is restricted in scope and the range of data and services supported, then again the distributors' access to these data and service to support network services may be limited, or the distributor seeking access will need to negotiate for bi-lateral access arrangements to be established. Again this will be from a position of relative commercial weakness.

Network functions, which provide whole of system benefits, can generally be added at relatively low cost into the meter if incorporated at the design stage, but will be more expensive if they must be augmented later or provided through a duplicate meter, as has occurred in New Zealand.

ENA consider that to ensure that access to the required data and service for support of network services:

- The New and Replacement minimum specification in each Jurisdiction must include the necessary functionality
- The Shared Market Protocol must have the capability for the request for and provision of the necessary data and services
- A regulatory regime must be established to ensure that the price for access to the necessary data and services reflects the MC's costs
- Where service delivery from other parties at required functionality, price and service level is unsatisfactory, networks must be able to utilise their own device(s) for network services to benefit customers overall.

NETWORK DEPLOYMENT

The contestable metering framework is yet to substantively consider changes required to permit network businesses to rollout meters in line with a business case, as intended in the AEMC Power of Choice review.

Smart metering enables more effective demand management and network utilisation programs if Distributors are able to utilise smart metering installations in a regulated environment.

Given the significance of network infrastructure costs, potential efficiency benefits (such as network tariff reform) can be up to double the value of those realised from retailer/energy services. AEMC representatives have indicated that a targeted network-led deployment may still need to be 'initiated by customer agreement' which is impractical at scale and constrains the potential benefits to customers from network efficiencies.

The effect of the current Rules is that many network meters that could operate to provide customer and system-level benefits cannot be interrogated remotely. Meters that are capable of being remotely read continue to be installed due to replacement activity (driven by factors such as take up of solar PV systems) but can only be interrogated manually, with significant opportunities to better manage the network and associated services being lost to distributors, retailers and customers.

Distributors have been limited in their opportunity to interrogate interval capable metering remotely to extract a range of key data sets available in the meters including voltage events and peak demand. Distributors such as Ergon Energy currently configure specific meters to record broader data sets than just kilowatt hour data but can only interrogate through manual probe readings at site. Enabling remote read communications should require all customers to fund the metering charges as the data is used for Standard Control Services. However, this is complicated by the fact that once communications are installed it currently must be registered as a type 1-4 meter, which is an unregulated service.

Price review uncertainties

Network companies in Queensland, New South Wales, South Australia and Victoria are currently preparing material for their imminent regulatory determination processes.

Critical within these processes (amongst other details) is consideration of optimal solutions to address network constraints. The uncertainty relating to future investment capability in metering and related services by network companies is introducing significant complication to the development of these network applications for some jurisdictions. The effective utilisation of metering infrastructure as a non-network solution requires clarity in the ability of networks to install or commission smart meters and the incentive support available to them to favour such alternatives to traditional network augmentation and reinforcement solutions.

In addition, where networks are rolling out meters for overall network benefit, it is critical that these initiatives, which will be reviewed and authorised by the regulator, should not be made more expensive to customers due to additional and unnecessary ring fencing provisions.

DELIVERY OF CONTESTABILITY

ENA supports contestability of metering services but considers that the framework proposed by the AEMC is limited in its capacity to deliver the full range of potential benefits from smart metering to provide most cost effective services for customers.

The current metering contestability framework for large consumers has worked well and can be extended to small or 'mass market' customers. It will require clear information about the new market from government and service providers to support consumers.

It doesn't need complex new institutional roles, as long as consumers are free to change their meter and metering provider; and networks are able to efficiently operate the network using either a network device or accessing a smart meter service.

The AEMC framework proposes that a Metering Coordinator be established and exercise market power by:

- removing and appropriating the network meter asset with unclear compensation;
- displacing the network business asset in the meter box; and
- providing (or not providing) Network Control and Management Services without regulatory oversight.

Most small consumers currently receive metering services from their network provider, a regulated monopoly. The current AEMC reform proposal (see Figure 2 above) would introduce competition in metering for an individual consumer. However the changes also remove the right for network businesses, as metering customers, to choose their service. This would expose all consumers, who benefit from an efficient network, to the risk of higher cost outcomes from the new unregulated monopoly.

Of most concern is the assumption that an existing network meter asset can be removed, with unclear arrangements to ensure appropriate compensation or preserve existing network management capability provided by the current meter:

- Compensation: The AEMC proposes compensation will be paid to the network business in the form of an 'exit fee' based on lost metrology revenues. While early suggestions were the exit fee would be arbitrarily capped to lower costs for new metering providers, this would just mean all consumers were subsidising the cost of one consumer's new smart meter. Compensation should reflect the real economic loss.
- Load management: While the AEMC proposes a new Metering Coordinator will be required to preserve existing load management functionality, this may be difficult to regulate. It is vital that network businesses can, if necessary, retain the current asset if they are not satisfied by the new metering offer.

Regulatory changes are needed to allow network businesses to initiate smart meter deployments based on a business case. In some locations, the meters are already in place but rules prevent networks from remotely reading them. Some network businesses could lower the costs to consumers of meter reading quickly if those regulations were changed.

The ENA supports a balanced framework for contestable metering which maximises the potential for the full benefits of smart meter technology to be utilised and for business cases for smart meter rollouts to be underwritten by not only the benefits to *individual* consumers, but the benefits to *all* consumers provided by network uses.

Australia's energy system will benefit from the fastest take-up of smart meters if this can occur whenever the benefits outweigh the costs, including:

- The customer accepts an offer to install a smart meter to enable an energy product offering (eg. a time-varying tariff); a new technology (eg. a Solar PV) or participation in markets (eg. Demand Side Participation);
- The local network business installs a smart meter to support network control and management which provide whole of system benefits such as lower costs, improved reliability, quality or safety of supply;
- A combination of both incentives.

The ENA supports a market-driven rollout of smart meters as proposed by the AEMC, with additional measures to ensure all consumers are protected:

1. Consumers should be free to choose a new metrology provider and to install a new meter at the premises.
2. An existing meter and any load control devices may still be required by the network business for network purposes (ie. other than metrology) and should not be replaced without consent.
3. Market participants (including networks) should have the right, at their discretion, to choose to accept delivery of services from another party's contestable meter at acceptable service levels, reliability and cost. If acceptable services and conditions cannot be agreed, the market participant must have the right to maintain its functions via its own device(s)
4. With a balanced framework covering replacement of the incumbent asset, networks and other market participants should be able to agree a negotiated framework that allows 80 to 90% of meter/load control device removals to occur without specific discussion based on agreed principles.
5. Light handed access regulation should ensure access to smart metering services is available, and provided at an efficient cost, to the benefit of all consumers.

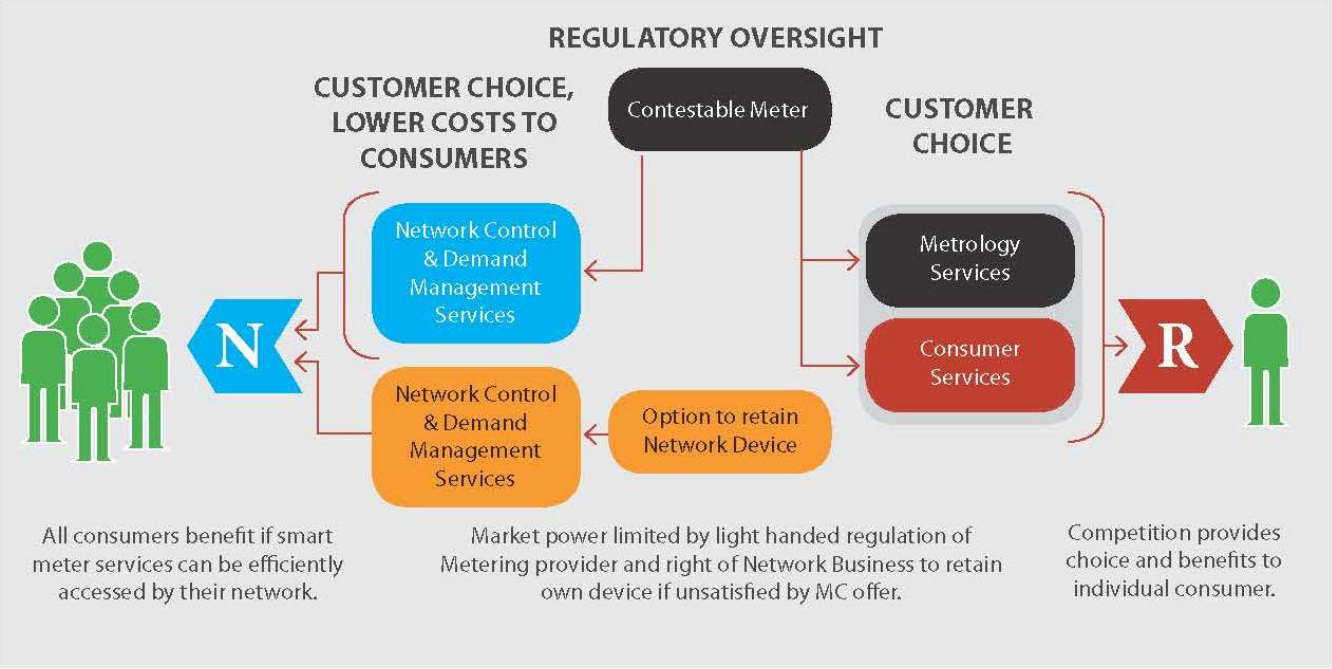


Figure 4: An alternative model to benefit customers

SERVICES TO CUSTOMERS

Competition doesn't have to complicated. The key objectives of metering contestability can be achieved without compromising outcomes for all electricity consumers who rely on safe, reliable and efficient network operations.

Put simply, all customers of metering services must have choice.

- The end-use customer (or their retailer) should be free to choose their smart metering provider of Metrology Services and Customer Products and Services.
- Similarly, network businesses, as the customers of metering services for network operations must be free to choose between engaging a smart meter provider or continuing to provide those services internally through their own devices.

A competitive market should protect small consumers from overcharging for meter services because they will be able to switch their meter provider if they are not happy with their service. However, because this choice will be made by the consumer in the future, not the network business, it will be important to have light handed regulation of smart metering services to networks. This will stop a meter provider overcharging for network services from the meter and avoid those extra costs being passed on to all consumers.

ENA considers that customers will benefit from the alternative proposed contestable metering model as follows:

- Better outcomes to consumers. The alternative model gives consumers choice in their metering services and enables retail innovation, while preserving the capacity of network businesses to efficiently operate the network. By contrast, the AEMC model risks creating a Metering Coordinator with market power which it admits may have incentives to frustrate access and downstream competition. The AEMC model constrains network businesses in their ability to retain a network device, even where it is more efficient. These outcomes are a cost to energy consumers and may lead to a value transfer from *all* end-use consumers, to retailers and *some* consumers who take up new metering services.
- Lower network costs. It is critical the metering framework does not limit network businesses in achieving efficiency in network operations, which extend beyond load control to reliability, outage recovery and enabling intelligent networks. Given the significance of network costs in the supply chain, the value of network efficiency realised by smart devices can be twice as great as that realised in retailer/energy service delivery. These efficiencies reduce pressure on network charges to end consumers. For instance, some network businesses could lower their costs significantly if they were permitted by current rules to remotely read advanced meters which are already in place.
- More competition in metering services. The alternative model ensures all customers of metering services are free to choose the most efficient option for them, including a network business supplying network control and management internally with its own device. It avoids the scenario where a Metering Coordinator would have the power to compulsorily remove a network business' option for such insourcing by: a) appropriating an incumbent network meter asset; b) displacing the asset in the meter box; and c) providing (or not providing) Network Control and Management Services without regulatory oversight.
- A basis for willing parties to negotiate. New metering providers should compete by providing valued services to metering customers (including consumers, retailers and networks). Network businesses may contract for load control or other network services from a new metering provider; or may agree to the removal of its asset for fair compensation. However, each metering customer (including network businesses) should be free to choose. If contestable market outcomes are genuinely beneficial, then network businesses and other metering customers should not need to be compelled. A network business shouldn't be able to stop a consumer or retailer shopping around for a new metering provider for metrology or energy services, but it also must be free to choose how it delivers network control services.

TRANSITION

ENA considers that transformation of the metering framework should be undertaken in logical stages of policy and regulatory reform. It should also recognise the different context in jurisdictions.

In implementing the metering framework, it will be critical that AEMC takes into account the different metering circumstances between jurisdictions and ensures that transitional arrangements are realistic and viable for these different circumstances.

For example, advanced meters are now the standard metering infrastructure that all electricity distributors in Victoria will install. The rollout of smart meters across Victoria is more than 95 per cent complete with more than 2.5 million meters now installed in homes and businesses across the state.[8]

Customers must be able to realise the benefits from the Victorian rollout, notwithstanding the introduction of the proposed metering contestability framework. Many of the benefits arise from improved network operations, improvements in safety and the timely delivery of services remotely.

The Victorian derogation was extended as the necessary transitional arrangements to address a range of significant issues under a national framework were yet to be clarified. These issues include: connection and energisation processes, management of life support customers, delivery of customer energisation status, near real time access to network data and uniquely identifiable AMI meters. The consequences for regulatory frameworks such as NER procedures, NECF and Victorian regulatory instruments were yet to be resolved.

The introduction of a contestable metering framework also has different operational implications in an area of high penetration of AMI. For instance, it is important that the consequences of switching of customer loads in a localised area which may impact the operation and security of the network can also be considered and appropriately managed.

Within other jurisdictions, various types of metering have been installed. Most customers still have accumulation meters, although there are significant numbers of interval meters rolled out in some jurisdictions, including Queensland, where distribution businesses are unable to read these remotely.

ENA recognises the benefits of national standards for meters and for smart meter service provision. We firmly support the concept of the Shared Market Protocol. However ENA also recognises the different starting points in each jurisdiction with respect to current arrangements for smart meters and smart meter services, and also with respect to different network and market service arrangements.

While a national approach to metering policy and regulation is generally preferred, ENA members consider that:

- the consensus required for a national approach to metering policy and regulation is threatened if the proposed Metering framework remains unbalanced, and key risks to consumer outcomes are not addressed;
- the metering framework should be undertaken in logical stages of policy and regulatory reform which address consequential issues in national and state regulation; and
- the AEMC framework must provide for appropriate transitional frameworks which recognise the context of each jurisdiction.

[8] http://www.smartmeters.vic.gov.au/installation

CONCLUSIONS AND RECOMMENDATIONS

ENA is concerned to ensure that changes to the metering framework deliver cost effective outcomes in the interests of consumers.

ENA supports a balanced framework for contestable metering which maximises the potential for the full benefits of smart meter technology to be utilised and for business cases for smart meter rollouts to be underwritten by not only the benefits to *individual* consumers, but the benefits to *all* consumers provided by network uses.

Australia's energy system will benefit from the fastest take-up of smart meters if this can occur whenever the benefits outweigh the costs, including where:

- The customer accepts an offer to install a smart meter to enable an energy product offering (eg. a time-varying tariff); a new technology (eg. a Solar PV) or participation in markets (eg. Demand Side Participation);
- The local network business installs a smart meter to support network control and management which provide whole of system benefits such as lower costs, improved reliability, quality or safety of supply;
- A combination of both incentives.

In order to deliver these outcomes, ENA believes that the following is necessary:

- Include explicit consideration of the NEO and enabling DSP services as assessment criteria for the rule change process.
- Ensure the review and assessment of rule change outcomes are undertaken in terms of the overall package of reforms, rather than elements considered in isolation.
- Demonstrate that the proposed model for a metering contestability framework would have a positive cost-benefit analysis.
- Introduce minimum changes to the current roles and responsibilities within the current framework necessary to meet the objectives.
- Enable network rollouts of smart meters within consideration of network operations and responsibilities.
- Support metering service competition and most cost effective service delivery by ensuring the network business' right to retain a network device to perform network functions.
- Recognise jurisdictional differences in implementation and transition processes.

APPENDIX 1: ENA RESPONSE TO QUESTIONS IN AEMC CONSULTATION PAPER EXPANDING COMPETITION IN METERING AND RELATED SERVICES

No	Issue	Question	ENA response
1	Chapter 4: AEMC proposed assessment framework	Are there any additional criteria that should be considered in assessing this rule change request. Proposed criteria: » Facilitating competition » Transparency and predictability » Administrative burden and transaction costs	In ENA's view, the primary purpose of the rule change should be to maximise potential economic use of smart metering infrastructure to provide benefits to all customers. Facilitating competition should be about consumer choice of energy services products, enabling services in the interest of customers, and the use of metering to achieve this end. It is important that the broader factors relating to facilitating metering competition be considered including cost effective service delivery, the ability of new entrants to operate, the need for adequate information to enable informed choices, and enabling delivery of network services to benefit all customers. The AEMC model appears to be so focused upon maximising the scope for new metering market participants that it does so at the risk to: a. safety and operational objectives of the NEO; and b. potential for higher cost outcomes to customers who rely on efficient network access to smart metering infrastructure. ENA agrees strongly that: *Any new arrangements should be simple and practicable from a consumer's perspective … The rules should be simple from the perspective of businesses and the minimum necessary to achieve their intended objectives* ENA would add two further criteria: » Alignment with the NEO ENA considers that meeting the NEO should be included as a specific criteria for assessment of the rule change. ENA notes specifically the NEO requirements:

			(A) price, quality, safety, reliability, and security of supply of electricity; and *(B) the reliability, safety and security of the national electricity system."* » **Ensuring that the benefits of DSP, and the more advanced metering required to support it, are captured across the supply chain.**
2	Chapter 5: Efficient provision of metering and related services	What are the benefits for competition by allowing any registered and accredited party to take on the Metering Coordinator role?	ENA does not believe that material benefits have been proven to warrant establishing a role of Metering Coordinator. This issue requires detailed consideration and justification. There are a number of functions and outcomes associated with the provision and management of meters, smart meter infrastructure, and associated service access. Some of these functions and outcomes exist in the non smart meter regime and some of these are modified with the introduction of smart meters. Other functions and outcomes are required for smart meters. The ENA has concerns that the third party MC concept will: » add complication to an already complicated market service model, » involve costly registration, setup, and audit costs; and system and process change of potentially many millions of dollars, » add risk to the level of responsibility achieved (and presumably require the MC service provider to be established as a Market Participant to enable Civil Penalties / financial liability to be applied), and » not provide the competitive dynamics envisaged and necessary to realise all three categories of potential smart meter functions identified in the Power of Choice review. The model does not provide a mechanism to ensure cost effective distributor access to network service enablers.
3		Are there alternatives that are preferable to creating a separate Metering Coordinator role? For example, would it be appropriate to combine the proposed Metering Coordinator responsibilities with the existing Metering Provider role? If so, what advantages would this alternative deliver?	ENA prefers a model which retains existing framework of Responsible Person, Meter Provider and Meter Data Provider and reviews allocation of tasks (including from the proposed Metering Coordinator) between these roles. ENA notes that the identity of the Responsible Person in a contestable environment will also require consideration. There seems little justification for the MC role given that the functions of the role appear to be within the capabilities of the current service provider roles and the responsibility for ensuring service could be handled with the broad scope of the existing Responsible Person role.

Complicating the existing service/ responsibility framework with another party, necessitating process and transactions changes to include the new role, and adding an additional accreditation process with its associated costs and resource impacts cannot be justified.

The development, interaction and relative responsibilities of roles relating to smart metering to provide efficient and effective service delivery and facilitate customer choice needs detailed review.

The most critical changes proposed by AEMC relate to the proposed 'gatekeeper' responsibilities – managing security and access control to meter functions and the interface to the market gateway. ENA seeks clarification on the AEMC model's allocation of responsibility and liability for the 'gatekeeper' actions and decisions.

Depending upon how the RP/MC role and the gatekeeper role is established and configured, this will have significant implications for the role of networks in ensuring

- safety,
- reliability,
- security of supply, and
- delivery of power for example to life support customers.

When/if another party becomes responsible for decisions relating to when and which customers are switched on/off supply, this needs to be considered in the light of network licensing conditions. This includes safety and supply conditions applied within jurisdictions.

The current regulatory framework is clear on the role of the Responsible Person regarding meter provision, metrology availability, accuracy, etc. However, within the AEMC"s proposed new framework, the responsibility for non metrology network services is not clear. The NER, NERR, National Energy Customer Framework (NECF) and the Distribution Licenses allocate specific market roles and responsibilities to the distributor.

The AEMC Report suggests that the Metering Coordinator will take the liability for the responsibilities of the role. In the AEMC smart meter model, this would include the liability for erroneous switching of bulk numbers of customers which impact network licensing provisions relating to minutes off supply (and hence adversely financially impact the distributor through the S factor mechanism).

		This would also include responsibility for safety of life support customers if they were erroneously disconnected, a critical customer safety responsibility currently held by networks. In the AEMC proposed framework these liabilities, which currently rest with the networks, would conceptually rest with the MC who could be a third party provider. Any initiative to introduce a new third party role with such significant implications for safety and security of supply would require engagement with state-based safety regulators to ensure safety and security of supply is not jeopardised. If it is the intention of the AEMC that such changes of responsibility are made, this would involve review of the National Energy Customer Framework (NECF) as well as significant changes to the Rules and NERR and the Distribution Licenses to make these changes in responsibility and liability clear. It will also require a complicated accreditation process which enables confidence to be gained that the MC understands and can manage these responsibilities (which currently sit with the distributor) and are financially prepared to meet the associated liabilities. The ENA does not support wholesale changes to the responsibilities of networks implicit in this analysis and reiterates that urgent detailed review needs to be undertaken of the roles and responsibilities envisaged by the proposed rule change before such changes are advanced.
4	If established, should the new Metering Coordinator role be classified as Registered Participant under the NER or should other arrangements be put in place? If so, what accreditations may be required?	As noted above, the ENA does not support wholesale changes to the responsibilities of networks implicit in this analysis and reiterates that urgent detailed review needs to be undertaken of the roles and responsibilities envisaged by the proposed rule change before such changes are advanced. However, if the MC role was established, the metering framework would need to ensure the parties carrying out the role are subject to similar prudential and enforcement consequences applicable to the market participants undertaking the roles in the current framework. ENA further notes that when considering aspects of the 'gatekeeper' role which have potential impact on energy system operation and security, we would draw the attention of AEMC to the Load Management and Network Security and Communication and Data

		Security protocols which were developed by the ENA to address essential system issues impacted by activities of multiple parties in energy services. If a new MC role is introduced or an expanded RP role, there should be a review of the enforcement provisions. The RP role is currently undertaken by a licenced or authorised entity who is also registered in the NEM. The introduction of an MC role may allow any person to assume these responsibilities. The RP role to manage the metering installation in line with the NER Chapter 7 is currently a civil penalty provision, rule 7.2.5 (d). However the RP role to provide meter data services in rule 7.2.5 (g) is not a civil penalty provision. The ENA note that civil penalties may apply to body corporates or a person. This appears to be reinforced by the NEL clauses 61 and 68. The AEMC should consider the adequacy of the civil penalty regime to non registered and non licensed participants. The ENA is not aware that the AER has taken any action against any party other than licenced entities, nor is the ENA aware that the AER perform any monitoring of non licenced/registered entities. The ENA suggests that this be considered further once the roles and responsibilities are clearly articulated. Distributors are solely reliant on the MC for metering data and the ability to network bill and may be reliant on the MC for network operational data. Analysis and an appropriate enforcement regime: civil penalty, conduct provision and application of the dispute resolution process under Chapter 8, should be included in the AEMC consultation on the proposed new framework. The ENA remain concerned that the clarity in the framework and this sort of detail will only be considered in the Draft Determination. ENA considers that the framework should be developed as a whole in an iterative manner and be part of formal public consultation before the Draft determination. An appropriate enforcement regime also needs to consider that the MC may be remotely de-energising life support customers, may impact network operations with significant switching on the network etc. The MC or an MDP may be undertaking traditional distribution activities which are subject to various penalty regimes and AER compliance reporting frameworks etc. This requires significant review and consideration.
5	Are any specific arrangements required in the event that a Metering Coordinator fails?	Under current RoLR arrangements when the failed retailer is the RP this role is transferred to the RoLR retailer as part of the RoLR arrangements for MSATS. Under the smart meter framework the additional responsibilities associated with the provision of smart meter services would need to similarly transfer to the RoLR

		retailer. Whereas the current RoLR Metrology arrangements for "large" customers manage RoLR events through replacing the meters. The AEMC OA Review has moved away from the concept of meter interoperability. This is supported by the ENA. This means that the point of common access will be the Shared Market Protocol and from there the MC's Protocol Translator will turn this into the language/protocol of THEIR meter. This will in most cases be a proprietary protocol. If the MC fails then that access to their meter will be lost with them. The MC Of Last Resort will have no option but to replace the meter with one compatible with their own protocol translator. If it is the service provider that fails the existing metrology framework does not provide clear guidance as to the mechanism for maintaining continuity of metrology services. The RP continues to have the role of ensuring these services and hence must make alternative arrangements. However ENA understand that there are not formal obligations with respect to the measures that the RP must have in place for the ensuring service continuity, nor any obligation for service providers to have contingency plans for rapid take up of additional installations. These arrangements are left to the potential regulatory risk and commercial considerations of the businesses involved. This approach may be satisfactory for metrology, but the continuity of the some of the critical services associated with smart meter services, for example customer switching, energisation, supply services or load switching, should probably be subject to more formal arrangements for service provider failure. Whilst the current ROLR procedures cater for the transfer of a failed retailer as RP to the ROLR as RP, it should be noted that the volume of sites or instances where this may apply is limited to the failed retailers share of "large" customers. Where metering competition applies to all NMIs or customer sizes the application of the ROLR procedures in this respect may involve significantly higher "mass market volumes" and create more work for the ROLR with less rewards as RP has significantly more complex contracting arrangements and the energy volumes are lower than for "large" customers.
6	Should there be any specific changes to the ROLR arrangements regarding metering?	The development of the framework will need to include a body of work to consider the continuity of smart meter services. This is a subordinate decision which should be considered after clarification of roles (eg Metering Coordinator versus Responsible Person) The AEMO Service Level Procedure for Metering Data Services Categories D and C does

		provide in Section 5.1.3 for continuity of metering data following a RoLR event by obligating the MDP to continue to "process and deliver metering data". However this obligation does not appear to be matched by obligation on the RoLR to continue with the financial arrangements in place between the failed retailer and the MDP, and certainly does not include the types of non metrology services envisaged in the smart meter framework.
7	How would the proposed jurisdictional arrangements impact on the proposed approach for competitive provision of metering and related services?	ENA considers that transformation of the metering framework should be undertaken in logical stages of policy and regulatory reform. It should also recognise the different context in jurisdictions. In implementing the metering framework, it will be critical that AEMC takes into account the different metering circumstances between jurisdictions and ensures that transitional arrangements are realistic and viable for these different circumstances. Customers must be able to realise the benefits from the Victorian rollout, notwithstanding the introduction of the proposed metering contestability framework. Many of the benefits arise from improved network operations, improvements in safety and the timely delivery of services remotely. The introduction of a contestable metering framework also has different operational implications in an area of high penetration of AMI. For instance, it is important that the consequences of switching of customer loads in a localised area which may impact the operation and security of the network can also be considered and appropriately managed. Within other jurisdictions, various types of metering have been installed. Most customers still have accumulation meters, although there are significant numbers of interval meters rolled out in some jurisdictions, including Queensland, where distribution businesses are unable to read these remotely. ENA recognises the benefits of national standards for meters and for smart meter service provision. We firmly support the concept of the Shared Market Protocol. However ENA also recognises the different starting points in each jurisdiction with respect to current arrangements for smart meters and smart meter services, and also with respect to different network and market service arrangements. While a national approach to metering policy and regulation is generally preferred, ENA members consider that: » the consensus required for a national approach to metering policy and regulation is

		threatened if the proposed Metering framework remains unbalanced, and key risks to consumer outcomes are not addressed; » the metering framework should be undertaken in logical stages of policy and regulatory reform which address consequential issues in national and state regulation; and » the AEMC framework must provide for appropriate transitional frameworks which recognise the context of each jurisdiction.
8	Should SCER's proposal for prescribing Metering Coordinator exclusivity be limited certain metering types? If yes, what are the metering types that should be considered?	Note ENA's views above regarding the Metering Coordinator role. ENA supports the ongoing role for networks to continue to offer a base regulated metering service. This base-level service would be determined by the New and Replacement (N&R) meter standard imposed by the Jurisdiction. This N&R meter standard is likely to be different across Jurisdictions given the varying metering starting points in each as discussed in Q 9, and could also be variable within a Jurisdiction based on variable conditions. In Victoria ENA would envisaged that broadly New and Replacement (N&R) meter standard would be a high specification smart meter consistent with the current Victorian AMI meter specification, but with recognition that in some geographical areas conditions with respect to communications availability and costs make remote reading problematic. Further ENA considers that jurisdictions should be allowed to make decisions on prescribing exclusivity for meter types, without restriction. This may be a significant factor to enable an economic and orderly transition for some jurisdictions. The ENA understands that potentially this would mean a change to Chapter 7 which removes any national concept that different meter types have a related default exclusivity, but rather are all contestable unless the Jurisdiction determines otherwise. For example this conceptually could mean the a Jurisdiction may determine that remotely read interval meters (but not smart meters) are their N&R meter and that these are exclusively provided by networks. The ENA welcome discussion with the AEMC regarding how this will operate in practice in a contestable framework.

9	Chapter 6: Roles and relationships between parties	What information and consent requirements would be appropriate under the competitive model for provision of metering and related services?	This section needs to also take into account need for engagement and information by and with distribution businesses. The contestable metering framework is yet to substantively consider changes required to permit network businesses to rollout meters in line with a business case, as intended in the AEMC Power of Choice review. Smart metering enables more effective demand management and network utilisation programs if Distributors are able to utilise smart metering installations in a regulated environment. Given the significance of network infrastructure costs, potential efficiency benefits (such as network tariff reform) can be up to double the value of those realised from retailer/energy services. AEMC representatives have indicated that a targeted network-led deployment may still need to be 'initiated by customer agreement' which is impractical at scale and constrains the potential benefits to customers from network efficiencies. The effect of the current Rules is that many network meters that could operate to provide customer and system-level benefits cannot be interrogated remotely. Meters that are capable of being remotely read continue to be installed due to replacement activity (driven by factors such as take up of solar PV systems) but can only be interrogated manually, with significant opportunities to better manage the network and associated services being lost to distributors, retailers and customers. Distributors have been limited in their opportunity to interrogate interval capable metering remotely to extract a range of key data sets available in the meters including voltage events and peak demand. The ENA supports a market-driven rollout of smart meters as proposed by the AEMC, with additional measures to ensure all consumers are protected: 1. Consumers should be free to choose a new metrology provider and to install a new meter at the premises. 2. An existing meter and any load control devices may still be required by the network business for network purposes (ie. other than metrology) and should not be replaced without consent. 3. Market participants (including networks) should have the right, at their discretion, to

		choose to accept delivery of services from another party's contestable meter at acceptable service levels, reliability and cost. If acceptable services and conditions cannot be agreed, the market participant must have the right to maintain its functions via its own device(s). 4. With a balanced framework covering replacement of the incumbent asset, networks and other market participants should be able to agree a negotiated framework that allows 80 to 90% of meter/load control device removals to occur without specific discussion based on agreed principles. 5. Light handed access regulation should ensure access to smart metering services is available, and provided at an efficient cost, to the benefit of all consumers Where an RP/MC's device is retained in addition to a contestable smart meter, an exit fee will still be paid. In the case of network businesses, the metering capital value will be removed from the DNSP's Metering RAB, and installation and maintenance costs for the network devices and services will be maintained in DuOS in line with a business case established as part of the DNSP regulated price determination.. The key points above need to be catered for in the NER and SLP. As currently drafted the distributors have no say in retaining their existing services if they are in the RP role and they also have no rights regarding continuation of load control or metering configurations that support the current network tariffs and are consistent with the distributor's ability to collate and bill accurately.
10	Should opt-in / opt-out provisions apply where a party seeks to upgrade a consumer's metering installation to achieve business operational efficiencies that may lead to reduced costs for consumers?	See above
11	Should retailers be required to inform consumers of their metering services charges? If so, what is an appropriate means for retailers to fulfil this obligation?	Support in principle. 'Appropriate means' is up to the retailers and customers. Like any contractual requirement where the customer is effectively making a decision to change metering they should be provided with sufficient information to be well informed about the price , terms and conditions and exit fee if any. The customer also needs to be informed of the differences in services eg if none of the network/safety operational benefits

		are able to be provided on suitable terms to the distributor. The customer should have the opportunity to compare the current offer and services with a new offer and be in a position to compare on a like for like basis. Information could be presented on the simple price fact sheets as required by jurisdictional regulators, or, for NECF adopting jurisdictions, the AER.
12	Should the relationship between the retailer and the Metering Coordinator be based on a commercial arrangement? If not, what alternatives should be considered? What are considered the costs and benefits of a standard contract for this relationship?	Consistent with the direction in the POC final decision where customers are selecting the MC or the MP/MDP (if the RP role is retained) then there is benefit in having a standardised contract which is able to be readily understood by the customers and meets all of the NER/NMA requirements and is able to be novated to the next MC or RP to avoid meter churn. This standardisation of contract and adequacy of contract scope is required where customers are making the choice given that they are less familiar with all of the NER and NER procedures and what is required for a compliant metering installation.
13	Should residential and small business consumers be able to exercise a right to appoint their own Metering Coordinator? If so, what arrangements would need to be put in place to govern that relationship?	ENA is opposing the creation of an MC and proposing to retain the status quo, where the retailer is the RP. The consumer can switch retailer – no changes required. This will need to be considered within the full context of establishment of roles (ie RP versus MC). Regardless of the RP or MC position, where the distributor is not the metering provider for small customers there will be a number of impacts which will need to be explained to the consumer and managed: » Connections services generally involve a meter and initial energisation and safety checks, there will be a need for different sequencing of the service and multiple parties visiting site » Where a distributor attends a fault, restoration of supply may be delayed where the customer has a meter other than a distributors meter and this needs replacing » Customers may receive reduced service or increased costs where they seek restoration of supply and the distributor is unaware of whether a third party has remotely de-energised the meter » To effect supply restoration for a life support customer, the only opportunity may be to install a distributor meter if the third party meter is causing the supply issue

14		Are any additional consumer protections required to support a direct relationship between a consumer and a Metering Coordinator?	See above – if there is no MC, then the consumer who wants better metering achieves this by churning to another retailer, in which case existing protections presumably apply. As noted in our response to Q11 and Q13, the customer needs to be clear on any services or changes in services that are conceded when making a choice of a different metering provider. A number of customer protections in NECF relating to planned maintenance and notifications, management of life support for planned maintenance, energisations and protected periods, the ability to restore supply may be delayed where there is a need for a new third party meter etc will all need to be reviewed and considered where the MC or the MDP is undertaking these arrangements which impact small customers instead of the licenced distributor.
15	Chapter 7: Network regulatory arrangements	Do the NER require any changes to facilitate unbundling of metering charges from distribution use of system charges? If so, what factors should be considered?	No. The NER does not need to be changed to facilitate the unbundling of metering charges from distribution use of system charges. In each price review process the metering charges can be categorised and agreed with the AER as standard control or alternative control, negotiated or unregulated. The metering competition and economic framework need to be clear, including the timing of the commencement of the framework for each distributor. It is not yet clear over the next 5-8 years whether the distributor will be providing regulated default option metering service for small customers. The arrangements need to be clear for a cost allocation methodology and the change of the service if any from the regulated arrangement to a competitively provided service. There will also need to be consideration of the obligations and services within the metering roles, for example whether like for like services is the base offering which would include the provision of network data, near real time energisation status, ping access etc. Given the timing of many of the jurisdictions price reviews which are submitted from now until April 2015, it is poor timing for such major policy change in the economic framework.
16		Should the AER have a role in determining exit fees for accumulation and manually read interval meters?	If metering services continue to be classified as a direct control service, the AER will have a role in determining the exit fees that should apply to the replacement of accumulation and manually read interval meters. A transparent exit fee should be payable, and may be set by the AER, where the consumer,

		retailer or other party on behalf of the consumer chooses to install a new metering asset to provide the metrology services currently provided by a meter owned and managed by network businesses. However, ENA emphasises that an existing meter and any load control devices may still be required by the network business for network purposes (ie. other than metrology) and should not be replaced without consent. Market participants (including networks) should have the right, at their discretion, to choose to accept delivery of services from another party's contestable meter at acceptable service levels, reliability and cost. If acceptable services and conditions cannot be agreed, the market participant must have the right to maintain its functions via its own device(s).
17	If so, are SCER's proposed criteria for determining exit fees appropriate, and should a cap on fees be considered?	An arbitrary cap on fees is inappropriate noting that the exit fee should be no less (and no more) than the true cost imposed by the replacement of the meter service. Networks businesses and all other network users should be economically neutral to the decision of an individual customer to replace the current meter service. In this context, SCER's criteria appear appropriate, noting that the 'efficient and reasonable costs associated with transferring the customer to another Metering Coordinator' must necessarily include a component of residual operating cost that cannot be fully avoided when the meter is replaced, e.g. due to reduction in manual meter reading efficiency. ENA notes that the Consultation Paper is far from clear with respect to the mechanism and criteria proposed for exit fees for smart meters. The Paper (and Q16 above) is largely directed to accumulation and manually read interval meters. The Paper suggests (on page 65) that with respect to the criteria for smart meters AEMC "will need to consider whether this criteria [that for non-smart meters] is appropriate ….for meters installed under the AMI program…" Where a smart meter is replaced in such circumstances, the exit fee for a smart meter owned by a distribution network service provider should not only include the depreciated value of the meter and unutilised component of systems but also the cost to the network provider of retaining the smart meter services it has been achieving from its own smart meter. To ensure economic efficiency and avoid cross-subsidies to individual consumers, it is important that the customer/retailer making the meter replacement decision faces the full and true cost of the decision including any lost benefits imposed on other network

		users. It is not clear how such impacts will be transparently addressed in the proposed contestable metering framework, if not through a cost-reflective exit fee.
18	Are the existing arrangements under the NER appropriate to enable a distribution network business to allow for advanced metering technology as part of a regulated DSP business case/program?	Networks must be enabled to provide smart meters or install communications to remotely read interval meters in line with operational requirements. It should be noted that this may not necessarily involve installation across the entire network. The contestable metering framework is yet to substantively consider changes required to permit network businesses to rollout meters in line with a business case, as intended in the AEMC Power of Choice review. Smart metering enables more effective demand management and network utilisation programs if Distributors are able to utilise smart metering installations in a regulated environment. Given the significance of network infrastructure costs, potential efficiency benefits (such as network tariff reform) can be up to double the value of those realised from retailer/energy services. AEMC representatives have indicated that a targeted network-led deployment may still need to be 'initiated by customer agreement' which is impractical at scale and constrains the potential benefits to customers from network efficiencies. The effect of the current Rules is that many network meters that could operate to provide customer and system-level benefits cannot be interrogated remotely. Meters that are capable of being remotely read continue to be installed due to replacement activity (driven by factors such as take up of solar PV systems) but can only be interrogated manually, with significant opportunities to better manage the network and associated services being lost to distributors, retailers and customers. Distributors have been limited in their opportunity to interrogate interval capable metering remotely to extract a range of key data sets available in the meters including voltage events and peak demand. Distributors such as Ergon Energy currently configure specific meters to record broader data sets than just kilowatt hour data but can only interrogate through manual probe readings at site. Enabling remote read communications should require all customers to fund the metering charges as the data is used for Standard Control Services. However, this is complicated by the fact that once communications are installed it currently must be registered as a type 1-4 meter, which is an unregulated service.

		There are several scenarios in which a network may seek to access advanced metering: 1. In order to implement a non-network solution to address a capacity constraint in a specific area, where this is more efficient than augmenting the network. In this case, the network would seek approval from the regulator for expenditure associated with establishing access to the advanced metering necessary, and to offer customers incentives to place load under network control. 2. In order to access power quality and other data at customer premises for network operational and planning purposes 3. Where widespread availability of smart meters across an area enables the networks to improve service delivery to customers 4. Where smart metering assists to balance and manage increased penetration of embedded generation and other demand/supply resources In either case, when the network submits the project to the AER as part of its regulatory submission, it needs certainty that the necessary access to advanced metering can be achieved, and it needs certainty of the associated cost of access. Clearly if the network proposes to install its own meters, it has this certainty. In a functioning market where (a) advanced metering is widely available through third party metering providers, (b) the relevant network services are offered in a consistent way by all providers through a common interface and (c) networks have long-term certainty of pricing for access to these services across multiple providers, then networks can build a business case to put to the AER based on purchasing access from other parties. Clearly these conditions do not yet exist, and it will take some time for them to develop in the proposed market. Moreover, networks have raised concerns that the proposed market arrangements could put at risk these outcomes. In the meantime, networks have immediate needs that can be met most efficiently through access to more advanced metering. In fact, networks have already deployed, and will continue to deploy, advanced meters in target areas for network purposes, and the current rules are impeding their use.
19	If not, what additional arrangements might need to be put in place to allow sufficient certainty to distribution businesses to do so?	Smart metering enables more effective demand management and network utilisation programs if Distributors are able to utilise smart metering installations in a regulated environment. Given the significance of network infrastructure costs, potential efficiency benefits (such as

		network tariff reform) can be up to double the value of those realised from retailer/energy services. AEMC representatives have indicated that a targeted network-led deployment may still need to be 'initiated by customer agreement' which is impractical at scale and constrains the potential benefits to customers from network efficiencies. The effect of the current Rules is that many network meters that could operate to provide customer and system-level benefits cannot be interrogated remotely. Meters that are capable of being remotely read continue to be installed due to replacement activity (driven by factors such as take up of solar PV systems) but can only be interrogated manually, with significant opportunities to better manage the network and associated services being lost to distributors, retailers and customers.
20	Are changes required to the AER's ring fencing guidelines to accommodate a distribution network business seeking to take on the role of Metering Coordinator?	There are a range of ringfencing outcomes and the Paper fails to identify the specific measures that the AEMC consider need to be applied to distributors. There is already in place a well tested arrangement which ensures that: » costs of providing regulated services are accounted for separate to contestable services, » services provided to specific customers are cost reflective in their prices, and, » in a number of Jurisdictions, metering service costs, are captured separate to other network costs. These arrangements are approved by the AER and audited. Hence with respect to financial ringfencing there are already rigorous arrangements in place which ensure service prices are cost reflective and hence ensure services to mass market customers are provided on a clearly defined basis. The current Jurisdictional ringfencing Guidelines already provide a basis for the regulator to take action if distributors do not deal equally with retailers. Further whilst not mentioned in the Paper any attempt to provide legal or systems separate within distribution businesses makes no sense when most of the services being provided are clearly inward looking, such as dynamic meter status, outage notification, voltage data, supply capacity control, to support clear network functions and requirements. If additional ring fencing requirements were imposed it would serve to increase distributors' costs and pose barriers to achieving the network benefits.

			Where networks are rolling out meters for overall network benefit, it is critical that these initiatives, which will be reviewed and authorised by the regulator, should not be made more expensive to customers due to additional and unnecessary ring fencing provisions.
21	Chapter 8: Minimum functional specification	What do you consider are the appropriate governance arrangements for allowing for a new smart meter minimum specification in the NER?	AEMO on advice from IEC/RMEC ENA supports development of the shared market protocol. Without a standard market interface that is well defined and enforced across all providers the market will fail.
22		Is AEMO the appropriate body to develop and maintain the proposed minimum functionality specification to support competition in metering and related services, or are there alternative options that could be considered?	See above
23		Should there be arrangements that allow for jurisdictions to determine their own new and replacement polices or should all new and replacements meet a common minimum functionality specification?	ENA considers that transformation of the metering framework should be undertaken in logical stages of policy and regulatory reform. It should also recognise the different context in jurisdictions. In implementing the metering framework, it will be critical that AEMC takes into account the different metering circumstances between jurisdictions and ensures that transitional arrangements are realistic and viable for these different circumstances. For example, advanced meters are now the standard metering infrastructure that all electricity distributors in Victoria will install. The rollout of smart meters across Victoria is more than 95 per cent complete with more than 2.5 million meters now installed in homes and businesses across the state.[9] Customers must be able to realise the benefits from the Victorian rollout, notwithstanding the introduction of the proposed metering contestability framework. Many of the benefits arise from improved network operations, improvements in safety and the timely delivery of services remotely.

[9] http://www.smartmeters.vic.gov.au/installation

The Victorian derogation was extended as the necessary transitional arrangements to address a range of significant issues under a national framework were yet to be clarified. These issues include: connection and energisation processes, management of life support customers, delivery of customer energisation status, near real time access to network data and uniquely identifiable AMI meters. The consequences for regulatory frameworks such as NER procedures, NECF and Victorian regulatory instruments were yet to be resolved.

The introduction of a contestable metering framework also has different operational implications in an area of high penetration of AMI. For instance, it is important that the consequences of switching of customer loads in a localised area which may impact the operation and security of the network can also be considered and appropriately managed.

Within other jurisdictions, various types of metering have been installed. Most customers still have accumulation meters, although there are significant numbers of interval meters rolled out in some jurisdictions, including Queensland, where distribution businesses are unable to read these remotely.

ENA recognises the benefits of national standards for meters and for smart meter service provision. We firmly support the concept of the Shared Market Protocol. However ENA also recognises the different starting points in each jurisdiction with respect to current arrangements for smart meters and smart meter services, and also with respect to different network and market service arrangements.

While a national approach to metering policy and regulation is generally preferred, ENA members consider that:

- the consensus required for a national approach to metering policy and regulation is threatened if the proposed Metering framework remains unbalanced, and key risks to consumer outcomes are not addressed;
- the metering framework should be undertaken in logical stages of policy and regulatory reform which address consequential issues in national and state regulation; and
- the AEMC framework must provide for appropriate transitional frameworks which recognise the context of each jurisdiction.

24	Chapter 9:Transitional and implementation arrangements	Is it appropriate that the Victorian distribution network businesses would become the Metering Coordinator for the smart meters they have deployed?	Yes The ENA agrees that the Victorian distributors should be the MC for the meters that they have rolled out. As mentioned in our response to Question 2, the ENA query the cost/benefit of the establishing the MC role and consider that the benefits proposed by this role may be gained in other ways.
25		Should an exclusivity arrangement be put in place to allow Victorian distribution network businesses to continue in the Metering Coordinator role for a specified period of time? If so, should this be determined by the Victorian Government or defined in the NER?	Yes, defined by Victorian Government The Victorian Government mandated the roll out in Victoria of smart meters based on a business case, the latest business case being undertaken by Deloittes. Customers should be able to realise these benefits, many of the benefits arise from improved network operations, improvements in safety and timely delivery of services remotely etc. The Victorian derogation was extended as the necessary arrangements to clarify connection and energisation processes, management of life support customers, delivery of customer energisation status, near real time access to network data, uniquely identifiable AMI meters etc was not clarified across the regulatory frameworks: NER, NER procedures, NECF and Victorian regulatory instruments. Given the penetration of advanced metering, it is also important that switching of customer loads in a localised area which may impact the operation and security of the network also be considered and appropriately managed. Before the development of any shared market protocol commences the regulatory framework and the clarification and matching of the activities to the roles, obligations and liabilities needs to be decided. Once the framework is clear industry can develop transaction level detail to deliver to those rules and obligations. Until the B2B or B2M arrangements are clarified across all of the network and metering services, implemented and tested, the ENA suggests that Victorian distributors maintain the current level of exclusivity for connections as provided for in the derogation. The transition to metering competition should be well managed and relatively seamless to consumers and should seek to retain the benefits outlined in the cost benefit analysis to the extent possible. The exclusivity period should be managed by the Victorian government in a Victorian instrument as this allows the Victorian Government flexibility for the transition timing and communication to consumers and also ensures that benefits realised in Victoria in the interim are also able to be catered for in the national framework.

26	Should Victoria's local distribution network business be required to take on the Metering Coordinator role as a ring fenced entity after the exclusivity period has ended?	No The ENA response to Q20, which deals more broadly with the question of ringfencing of distribution businesses taking on the role of responsibility for providing smart meter services, details the reasons why the specific ringfencing of distributors for provision of these service is not necessary. The views expressed in the Consultation Paper have given limited consideration to consumer benefits arising from smart meters. Rather the focus is on metering data and retailers being the only party to deal with consumers. As mentioned earlier the focus is on the metering component of the cost build up that consumers will see as opposed to the improvements that may be gained in the network component which is a higher portion of the customers bill. The ENA queries the value of ring fencing ping capability, last gasp, outage and voltage data, use of functions such as supply capacity control. This is data used by networks to improve the services, compliance of services and operations of the network for all consumers. The Victorian distributors have submitted and have AER approved cost allocation methodology and provide audited accounts and RIN's relating to costs. In addition Victorian distributors provide metering services where activities and costs are audited against the scope of providing these metering services and are approved by the AER. This provides considerable protection for small consumers in the mass market who may not fully understand offerings from other parties or being fully across the difference in services offered or the implications.
27	Is it appropriate that as part of the transitional arrangements, the local distribution network business would become the initial Metering Coordinator for existing meters for which it is the Responsible Person?	Yes The Paper proposes that at the end of the transitional period ie Day 1 of contestability, that the distributor would be the MC for all their AMI meters. The Paper is not clear what level of service access the distributor as the MC would offer to retailers (or third parties) to the smart meter services. The Paper proposes the same level of services as the RP in the pre Day 1 of contestability framework. This seems inconsistent with the concept of the transitional period defined in the Paper as understood by the ENA. Our understanding was that the transitional period would remain until the regulatory arrangements and Shared Market Protocol was in place to support

		"open access" to the smart meters services. Hence until the distributors could offer access to data and services to the retailers and conversely, the retailer could offer similar access to distributors, then the transitional period would remain and the distributor exclusivity for their in situ AMI meters and new customers' AMI meters would remain. Hence Day 1 of the contestability framework would be when the industry capabilities to exchange service requests and service outcome through the Shared Market Protocol were in place and not before. As noted above the shared market protocol can only be developed once the roles and responsibilities are assigned and a robust rule framework developed.
28	If so, should the local distribution network business be required to take on this role as a ring fenced entity? And by what stage of the transition would the ring fenced entity need to be established?	See above re ring-fencing No. Networks should be able to continue to offer a regulated metering service until such time as the market has developed to the point that there is no further demand for one. The ENA suggest that the AEMC should not compel networks to establish a commercial business. Networks should enter the market if they choose to do so. The ENA suggest that the metering arrangements and the transition need more detailed and careful consideration.
29	Is it appropriate that as part of the transitional arrangements, retailers would become the initial Metering Coordinator for existing meters for which it is the Responsible Person?	Yes
30	Are there any other systems, procedures or guidelines that might need to be amended to support competition in metering and related services?	In the new framework it is important that customers are afforded similar levels of protection as established under NECF and that the correct parties have the obligation and liability for services and notifying the market etc. Consideration of systems, procedures and guidelines should be undertaken once the policy framework has been set. The NECF framework which was a recent and large policy undertaking provided a framework where distributors have a role for providing services to consumers. Distributors under NECF (or the jurisdictional regulatory frameworks) are responsible for connection and energisation services. Connection services provided include metering and initial energisation, not to mention the safety of connection arrangements and infrastructure.

		The energisation services include initial energisation, de-energisation and re-energisation, ie supply services. The NECF (or the jurisdictional regulatory frameworks) also provide notices for planned interruptions including metering and also the management of life support customers. Flow on implications may also include jurisdictional safety arrangements and approved safety schemes.

In addition to the high level implications described above, the ENA offer the following more detailed list for consideration and inclusion in the new framework:

	Grandfathering meters	Depending on the jurisdictions new and replacement policy and any change in the jurisdiction minimum metering standard, Responsible persons (including distributors) should have an opportunity to use the previous minimum standard for meters in use in the field and in stock to ensure that meters costs are kept to a minimum. This is consistent with the drafting currently in the National Metrology Procedure 2.4.20.
	Clarity of CT and VT	Voltage transformers may be part of the customer installation or may be procured as part of the metering installation. Current transformers are generally considered a component of the metering installation and part of the RP responsibilities. The role of the RP or MC should be clear on whether the transformer is customer managed or RP/MC managed and flow through to clarity in the metering contracting arrangements presented to the customers. The ENA note that the testing and ongoing management of these in the market is subject to an AER Compliance report and there are already a number of RP's in the market who have not complied with the revised AER/AEMO arrangements. A new framework needs to make these responsibilities on the RP/MC role clear.
	Meter board/wiring and compliance to the current standards	Where meters and roles are being churned it is important to ensure that the obligations relating to compliance to current regulations and standards are clear ie who needs to bring the meter board, meter box, wiring to the meter etc up to the current wiring and Australian Standards or jurisdictional safety standards. These types of issues need to be clarified and expectations appropriately set with the customer so that the customer has a satisfactory experience. The new framework should also clarify whether these new parties need to have electrical safety management schemes approved, use REC's, whether they are monitored and reviewed by safety inspectors etc.

Review of the Potential Network Benefits of Smart Metering

Prepared by ENERGEIA for the Energy Networks Association

May 2014

1 Executive Summary

The AEMC's Power of Choice report on the key policy and regulatory changes required to unlock the value of demand management in the National Electricity Market (NEM) kicked off a range of policy reform activity by the Standing Committee on Energy and Resources (SCER).[1]

SCER published its draft Chapter 7 Rule change proposal in October 2013 to enable competition in metering services. The proposed rule changes introduce minimum smart metering functionality in order to achieve broader market benefits through certainty in the minimum level of smart meter functionality, performance and access.

A minimum specification is being proposed because SCER identified a risk that retailers and/or third parties may install metering technology with sub-optimal functionality and/or performance levels due to the higher costs that may be entailed and the lack of an incentive and/or mechanism for capturing the associated network benefits.[2]

Recognising the significant effort, time and cost associated with the development of the national Minimum Functional Specification (MFS), the AEMC proposes to use it as the starting point for parties to consider, noting it was developed in 2011 and the requirements to facilitate competition in metering services may have changed.[3]

While the functionality in the Victorian and national MFSs are largely aligned, the specified performance levels are more variable. The Victorian MFS includes additional service performance levels which cover the end to end minimum performance standard for each market service as well as the overall level of system availability.

A number of important developments have occurred since the Victorian and Australian MFSs were completed in 2008 and 2011, respectively:

- Victorian Cost Benefits Reviews
- Victorian Benefits Realisation Programs
- The *Smart Grid, Smart City* Program

They have generated new information relevant to the AEMC's consultation on whether there should be a smart metering infrastructure MFS, what it should contain, when it should apply, and the associated costs and benefits.

Energeia's Scope and Approach

Energeia was engaged by the Energy Networks Association (ENA) to undertake a high level review of the potential network benefits from Smart Metering Infrastructure (SMI) in order to develop an up-to-date catalogue to feed into the current consultation. While not the focus of the review, the implications of an updated catalogue of potentially material network benefits for smart metering functionality and performance levels were also assessed.

Although some quantification of potential network benefits has been used to classify their materiality, a detailed estimate is excluded from this high level review. Non-network benefits are also excluded, including those managed by the SCER defined Metering Coordinator function.

1. Energeia developed the following scope and approach in order to address the ENA's requirements:Review new information and circumstances
2. Assess the potential changes to material network benefits
3. Assess the potential changes to required functionality and performance

New Information and Circumstances

Energeia reviewed each of the relevant reports on the potential network benefits of smart metering to identify the original baseline set of network benefit use cases and new use cases that have been identified since the Victorian and Australian MFSs were developed.

[1] SCER is now called the Council of Australian Government (COAG) Energy Council.

[2] Ibid. page 57.

[3] Ibid. page 58.

Energeia's review of new information and circumstances of relevance to the scope, level, and realisation of network benefits from smart metering found that:

- The series of Victorian reviews conducted between 2009 and 2010 identified new network benefits and changes to previous valuations
- Victorian benefits realisation programs also identified new benefits as well as changes to functional and performance requirements
- The *Smart Grid, Smart City* program identified significant interrelationships between the costs and benefits of smart grid and smart metering technology
- Modelling carried out for the *Smart Grid, Smart City* program identified significant uptake in distributed energy resources, with significant implications for the network benefits from smart metering

Based on the outcomes of our review of new information and circumstances, Energeia developed a list of potentially material network benefits from smart metering. Any information relating to the expected materiality of each benefit, including the overall level of benefit, the certainty of the benefit, and the level of deployment necessary to realise the benefit was also captured as part of our assessment.

Potential Network Benefits

Energeia's review of new information and circumstances since the development of the national and Victorian MFS has identified significant changes in the scope and level of potentially material network benefits, as well as the industry's understanding of the smart metering functionality and performance levels required to access them.

Network benefits collated and developed as part of this review are largely concentrated in the low voltage network, including distribution substations and customer service mains. Specifically, smart metering can potentially benefit networks through its impact on:

- Meeting or managing of demand; and/or
- Maintaining reliability, quality and/or safety.

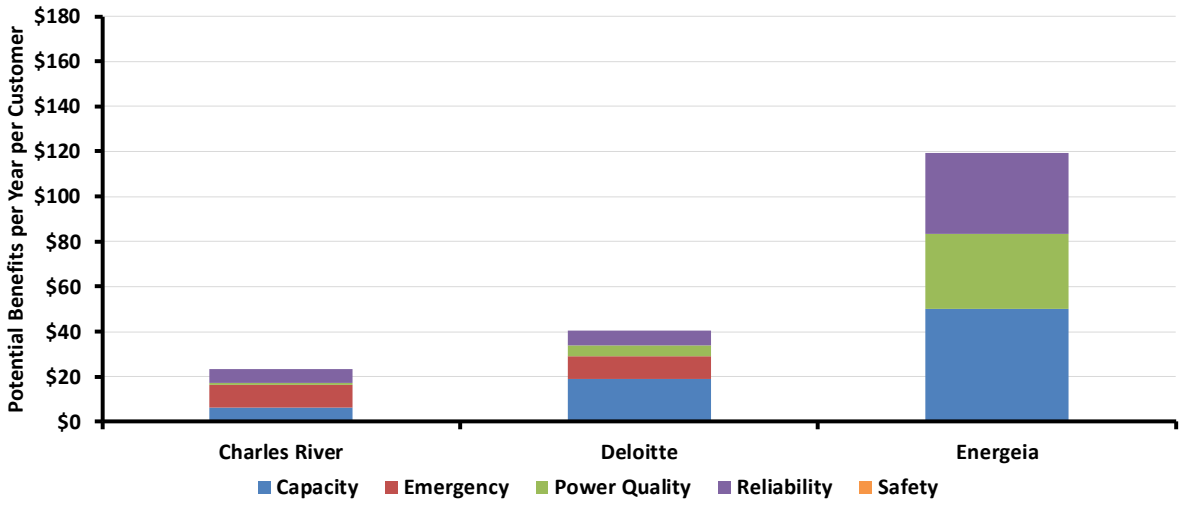
The costs of meeting these expenditure objectives under the National Electricity Rules (the Rules) is directly related to the rate of growth in peak network demand, the number of assets that need to be operated and maintained, the condition of these assets, and their reliability.

Based on the results of our review, Energeia developed what we believe is a relatively comprehensive list of the potentially material network benefits from smart metering services in an Australian context. As shown in Figure 1, new information and circumstances arising since the original MFSs were developed has increased the number and level of potential network benefits significantly, particularly related to power quality, reliability and safety.

This list was then subjected to a high level assessment of potential network benefits to determine their relative materiality, which resulted in the following list of likely material network benefits:

- Network Demand Management
- Low Voltage (LV) Phase Balancing
- LV Dynamic Reconfiguration
- LV Automated Volt-VAr Control
- LV Power Quality Investigations
- LV Vegetation Detection
- LV Incipient Asset Failure Detection

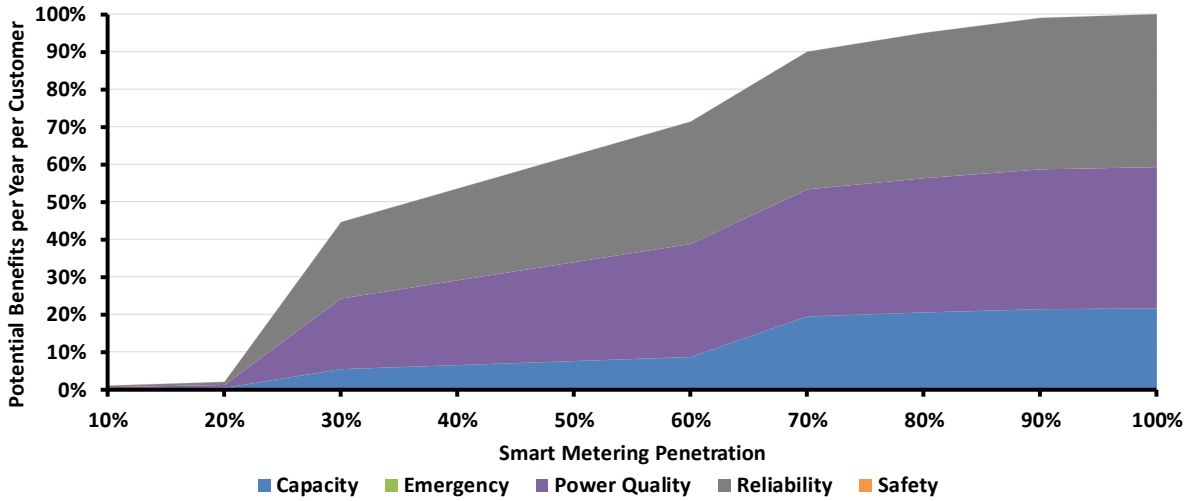
Figure 1 – Original, New and Energeia Estimates of Potential Network Applications by Type



Source: CRA, Oakley Greenwood, Futura, Deloitte, Energeia, DNSPs

Energeia then developed an indicative, conceptual estimate of the percentage of total potential network benefits as the level of penetration increases, which is shown in Figure 2. This conceptual analysis highlights that network benefits are unlikely to accrue at low levels of random deployment, but will begin to accrue once a particular threshold is reached, assumed here to be around 20-30%. At some stage, benefits will begin to accrue at a slower pace once the level of sampling accuracy reaches a particular threshold

Figure 2 – Illustration of Benefits Realisation by Smart Meter Penetration



Source: Energeia

In Figure 2, the network capacity benefits of smart metering see initial benefits at 20-30% penetration related to improved utilisation of assets through load balancing and dynamic reconfiguration. This is due to increased but still imperfect visibility into the LV network state on a sampling basis. The second step in benefits indicated from around the 70% penetration level is due to the greater likelihood of realising demand management benefits from this point forward, due to the high number of potential participants required to generate a sufficient response.

The impact of benefit thresholds is an important issue of relevance to the discussion of an Australian MFS for smart metering, and whether or not it should be optional, compulsory or apply only in certain circumstances, e.g. new connections and meter replacement scenarios. It is also important for the discussion of smart meter reversion, or the removal of existing smart meters in Victoria. The final Rules in this regard will have a major bearing on the timing and distribution of smart metering across Australia, including Victoria.

Importantly, this analytical framework also highlights the risk reversion in smart metering could have on the ability of networks to realise benefits.

Implications for Minimum Functionality, Performance and Access

Table 1 displays the potential changes to functionality and performance levels identified by Energeia through our interview process and review of key functional and performance requirements including those recently highlighted by the Victorian Distribution Network Service Providers (DNSPs).[4] These changes are required to unlock the newly identified network benefits from smart metering. Whether or not it is cost effective to include them in a MFS has not yet been assessed.

Table 1 – Summary of Potential New Functionality and Performance Levels Requirements

Network Benefit	New Functionality	Performance Level
Customer Safety Management	Neutral Impedance Detection	Existing Performance Level
LV Automated Volt-VAr Control	Voltage Banding (Excursions)	<1 Minute Alarms
LV State Model	Voltage and Current Interval Recording	At least 5 Minute Intervals
LV Incipient Asset Breakdown Detection	Voltage and Current Interval Recording	At least 5 Minute Intervals
LV Power Factor Detection	Reactive Power Interval Recording	At least 5 Minute Intervals
LV Technical Losses Optimisation	Reactive Power Interval Recording	At least 5 Minute Intervals
LV Dynamic Configuration	Existing Measurement Functionality	Progressive Reporting (e.g Hourly)
LV Outage Monitoring	Existing Measurement Functionality	<1 Minute Alarms
LV Power Quality Monitoring	Existing Measurement Functionality	<1 Minute Alarms
LV Power Quality Management	Voltage Interval Data Recording	At least 5 Minute Intervals
LV Automated Brownout Protection	Automated Disconnection	Immediate Upon Local Detection

Source: Victorian DNSPs, DNSP subject matter experts and Energeia

It is important to note that the above functionality and performance levels do not necessarily need to be implemented in all new smart meters to capture the benefits. Rather, smart meters would need to be able to be configured to support this functionality and level of performance when and where it is valuable. For example, high frequency voltage and current data may only be needed periodically in various targeted locations.

The need for high frequency communication between the smart meter and upstream systems, such as in the case of Automated Volt-VAr control, may lead to the need for direct access to the meter by network systems, which may themselves be localised in nature. It is important that the least cost option be investigated for meeting the required level of functionality and performance for any newly identified application.

Again, whether or not the newly identified functionality and/or enhanced performance levels should be included in a MFS, and whether or not it should be optional, compulsory or apply only in certain circumstances, is still subject to a separate cost benefit assessment exercise. It may well be that the additional functionality and performance level requirements do not warrant the incremental benefits that are expected to be gained.

Key Conclusions and Recommendations

In conclusion, Energeia's review of the latest information and current sector outlook has found that:

- Potentially material benefits (particularly network benefits) have been greater than initially anticipated in the original Victorian and National cost-benefit assessments;
- Energeia's indicative estimate is that the network derived benefits may be up to three times higher per annum (p.a.) than estimated by the most recent Victorian review in 2011; and
- Benefits will vary significant due to circumstances and so it is critical that the metering framework fosters innovative applications of smart meters and the economic realisation of benefits as they emerge.

[4] Jemena, CitiPower, Powercor, SP AusNet and United Energy, *Transitional arrangements for the expiry of the Victorian AMI Derogation*, 28 March 2013.

- The national framework should be tested against the newly identified functionality and performance levels to ensure it will drive appropriate investment decisions by stakeholders

Delays in the establishment of an efficient and certain regulatory framework could see many of the potential network benefits eroded as alternative investments are made in LV monitoring to address emerging issues.

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2 Disclaimer

While all due care has been taken in the preparation of this report, in reaching its conclusions Energeia has relied upon information and guidance from the ENA, information provided by Victorian Distribution Network Service Providers (DNSPs) and publically available information. To the extent these reliances have been made, Energeia does not guarantee nor warrant the accuracy of this report. Furthermore, neither Energeia nor its Directors or employees will accept liability for any losses related to this report arising from these reliances. While this report may be made available to the public, no third party should use or rely on the report for any purpose.

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3 Structure of this Report

The remainder of this report is structured as follows:

- **Section 4** – Discusses the background to this report, namely the current policy and regulatory reforms, the current minimum functional specification and key developments occurring since their development;
- **Section 5** – Scope and Approach describes Energeia's scope of work and details our methodology for undertaking this review;
- **Section 6** – New Information and Circumstances reports on the results of Energeia's review of key new developments relevant to determining potentially material network benefits from smart metering;
- **Section 7** – Australia's Low Voltage Networks outlines the relative size, performance, cost and emerging challenges facing the industry due to the rise of distributed energy resources;
- **Section 8 –** Presents the results of Energeia's high level assessment of potential network benefits from smart metering, and the key implications for deployment models and minimum specifications.

4 Background

4.1 SCER Rule Change Proposal

The Standing Committee on Energy and Resources (SCER) published its draft Chapter 7 Rule change proposal in October 2013 to enable competition in metering services.[5]

The purpose of the SCER rule change is to implement arrangements that would support a competitive market for metering and related services and would facilitate widespread investment in advanced metering technologies.[6]

The SCER's proposed Rule change package:

- Establishes the national framework for metering competition;
- creates a new, independent Metering Coordinator role;
- separates this role from the network and retailer roles and allows customer choice;
- unbundles metering service charges from distribution use of system (DUoS) charges;
- sets exit fees based on the Regulated Asset Base (RAB) with a possible cap set by the Australian Energy Regulator (AER);
- requires pre-existing load management arrangements be supported when replacing meters; and
- requires the Australian Energy Market Operator (AEMO) to maintain the national minimum functional specification for smart metering.

Importantly, the proposed Rule changes allow the states to determine the following key policy and regulatory settings on a jurisdictional basis:

- minimum functionality requirements for new and replacement metering;
- allowing reversion to lower functionality metering; and
- extension of metering monopolies, e.g. Type 7.

The SCER expects the proposed changes to the Rules to advance the National Electricity Objective (NEO) in three main ways:

- Improve overall market efficiency
- Promote efficiency investment in metering and related services
- Reduce the cost of maintaining quality, reliability and security of supply.[7]

The AEMC is required to assess whether proposed changes to the National Electricity Rules promote the NEO as set out in under section 7 of the National Electricity Law (NEL). The NEO states that:

The objective of this Law is to promote efficient investment in, and efficient operation and use of, electricity services for the long term interests of consumers of electricity with respect to:

(A) price, quality, safety, reliability, and security of supply of electricity; and

(B) the reliability, safety and security of the national electricity system.[8]

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[5] SCER, Introducing a new framework in the National Electricity Rules that provides for increased competition in metering and related services, Rule change request, October 2013.

[6] AEMC, Consultation Paper, National Electricity Amendment (Expanding Competition in Metering and Related Services) Rule 2014, National Energy Retail Amendment (Expanding Competition in Metering and Related Services) Rule 2014, 17 April 2014, page 2.

[7] Ibid. pages 23-24.

[8] Ibid. page 25.

The AEMC may make a more preferable Rule if it is satisfied that it is likely to better contribute to the achievement of the NEO.

The AEMC is also required to assess whether proposed changes to the National Energy Retail Rules (NERR) promote the National Energy Retail Objective (NERO). The NERO states that:

> The objective of this Law is to promote efficient investment in, and efficient operation and use of, energy services for the long term interests of consumers of energy with respect to price, quality, safety, reliability and security of supply of energy.[9]

Furthermore, the National Energy Retail Law (NERL) also requires the AEMC to:

> Where relevant, satisfy itself that the rule is "compatible with the development and application of consumer protections for small customers, including (but not limited to) protections relating to hardship customers (the "consumer protections test").[10]

The AEMC issued its consultation paper in response to the SCER's proposed rule change request on 17 April 2014, seeking stakeholder views on 30 specific questions related to:

- The SCER's model to facilitate competition; and
- The supporting changes required to enable competitive arrangements.

Section 8 of the consultation paper discusses the following issues related to SCER's proposal around minimum functionality specification:

- A new smart meter minimum functionality specification;
- Maintaining existing load management capabilities; and
- Jurisdictional new and replacements and reversion policies.

SCER's proposed rule changes would introduce new minimum smart metering functionality to achieve broader market benefits through certainty in the minimum level of smart meter functionality, performance and access.

A minimum specification is being proposed because SCER identified a risk that retailers and/or third parties may install metering technology with sub-optimal functionality and/or performance levels due to the higher costs that may be entailed and the lack of an incentive and/or mechanism for capturing the associated network benefits.[11]

The proposed minimum functional specification would not be a binding minimum standard unless prescribed by a jurisdiction. In other words, it would be a state-by-state standard, rather than a minimum national standard.

In its rule change proposal, SCER notes that the national Smart Metering Infrastructure (SMI) Minimum Functional Specification (MFS) provides a basis for such a standard.[12] This specification is discussed in detail in the next section.

In considering the appropriate minimum specification for smart meters, the AEMC's Power of Choice review recommended the following three elements should be taken into account:

- Measurement functions, e.g. what is measured and recorded
- Energy management system functions, e.g. load management and home area networking
- Smart grid functions, e.g. capacity, reliability, power quality and connection management

[9] Ibid. page 25

[10] Ibid. page 25

[11] Ibid. page 57

[12] Ibid. page 58

Recognising the significant effort, time and cost associated with the development of the SMI MFS, the AEMC proposes to use it as the starting point for parties to consider, noting it was developed in 2011 and the requirements to facilitate competition in metering services may have changed.[13]

Instead of consulting on the minimum specification itself, the AEMC instead consults on the governance arrangements for determining the minimum specification (Questions 21 and 22).

4.2 Australia's Minimum Smart Metering Specifications

SCER's proposed rule change takes the national minimum specification as the starting point for a process they propose will be managed by AEMO under yet to be defined governance arrangements.[14] It is important for the purpose of reviewing the potentially material network benefits and the implications for the current consultation that the bases of these specifications be well understood.

Following the completion of Phase I of the national business case in December 2007, the Ministerial Council on Energy (MCE) endorsed 19 minimum national functions for smart metering, and referred 4 potential functions back to the consultants to consider in greater detail as part of the Phase II business case.

The MCE's 2008 decision paper following the completion of the Phase II business case added the Home Area Network (HAN) interface to the national MFS, but referred the remaining undecided functions, as well as the HAN interface standard, to the National Smart Metering Program (NSMP) for consideration.

The NSMP developed the national MFS by defining the functionality and performance levels required to achieve the targeted benefits. This was achieved through an iterative process of testing the costs and benefits of each functionality and performance level, with advanced functionality priced at incremental cost.[15] The current SMI MFS (Version 1.3) was issued on 30 November 2011, and is attached to the SCER rule change proposal.[16]

[13] Ibid. page 58

[14] Ibid.

[15] A similar approach had been adopted in Victoria with inter-state attendance.

[16] NSMP, Business Requirements Work Stream, Smart Metering Infrastructure Minimum, Functionality Specification, 30 November 2011.

Table 2 – Australia's Minimum Functional Specifications

No.	Smart Metering Function	MCE 2007	MCE 2008	VIC 2008	NSSC 2010	NSMP 2011
1	Half hourly kWh measurement and recording	√	√	√	√	√
2	Remote reading	√	√	√	√	√
3	Local reading - hand-held device	√	√	√	√	√
4	Local reading - visual display on meter	√	√	√	√	√
5	Communication and data security	√	√	√	√	√
6	Tamper detection	√	√	√	√	√
7	Remote time clock syncronistation	√	√	√	√	√
8, 14	Load management at meters	√	√	√	√	√
9	Daily remote reading	√	√	√	√	√
10	Power factor measurement (3 phase meters only)	√	√	√	√	√
11	Import/export metering	√	√	√	√	√
12	Remote connect/disconenction	√	√	√	√	√
13	Supply capacity control	√	√	√	√	√
15	Load mangement outside of meters	×	×	×	×	×
16	Interface with a Home Area Network	?	√	√	√	√
17	In-home Display	×	×	×	×	×
18	Water and gas meter reading	×	×	×	×	×
19	Quality of supply and other event recording	√	√	√	√	√
20	Meter loss of supply and detection	√	√	√	√	√
21	Customer supply monitoring (safety)	×	×	×	?	√
22	Real-time suppply checking (ping)	?	?	√	√	√
23	Interoperable - application layer	?	?	×	√	√
24	Interoperable - device level (meters)	?	?	×	√	√
25	Remote configuration	√	√	√	√	√
26	Remote software upgrades	√	√	√	√	√
27	Separate (plug-in) baseplate	×	×	×	×	×
28	Non-meter board installtiion	×	×	×	×	×
29	Plug and play device commissioning	×	×	×	×	√

Source: Energeia, MCE and the NSMP

The national MFS largely aligns with the Victorian specification, however, a number of key differences do exist, as shown in Table 2. The main reasons the two specifications differ is due to the Victorian specification being completed earlier, before some functionality became widely available, and the high cost of Victoria complying with some specifications once they had already designed and procured their technology solution.

Table 3 – Key Variations in Australia's Minimum Performance Levels

No.	Function	National	Victoria
1	Half hourly consumption measurement and recording	No performance level	99% of meters by 4 am next day, 99.9% of meters within 24 hrs.
8, 14	Load management at meters	95% of individual meters < 5 mins, 99% < 10 mins. 90% of meters in group <5 mins.	90% of individual meters < 30 mins, 99% < 1 hr, 99.9% < 6 hrs. 99% of meters in group <1 min.
11	Import/export metering	99% of meters by 4 am next day, 99.9% of meters within 24 hrs.	No performance level
12	Remote connect/disconnection	95% of meters < 5 mins, 99% <10 mins.	90% of individual meters < 10 mins, 99% < 1 hr, 99.9% < 6 hrs.
16	Interface with a Home Area Network	95% of individual HANs < 5 mins, 99% < 10 mins. 90% HANs in group < 5 mins.	98% of HANs <3 hrs, 99.9% <12 hrs.
25	Remote configuration	No performance level	90% of individual meters < 30 mins, 99% <1 hr, 99.9% <6 hrs.

Source: Victoria DPI and the NSMP

While the required functionality in the Victorian and Australian MFSs are largely aligned, the specified performance levels are more variable, as shown in Table 3. The Victorian MFS includes additional service performance levels as well which cover the end to end minimum performance standard for each market service as well as the overall level of system availability.[17]

[17] Department of Primary Industries, *Advanced Metering Infrastructure, Minimum AMI Service Levels Specification (Victoria)*, September 2008.

In summary, the current national specification is the result of a systematic process that investigated the costs and benefits of each specification at the time. However, the national process was largely conducted over the 2009 to 2011 period, when there was virtually no Australian experience with applying the technology at scale, and the challenge of integrating large amounts of decentralised energy into the low voltage network had not yet emerged.

4.3 Key Developments

A number of important developments have occurred since the Victorian and Australian MFS were completed in 2008 and 2011 that have generated new information relevant to the current national dialogue regarding whether there should be a SMI MFS, what it should contain, when it should apply, and the associated costs and benefits.

4.3.1 Victorian Costs and Benefits Reviews

The Victorian Department of Primary Industries (DPI) commissioned a series of reports on the costs and benefits of SMI in Victoria starting in late 2009 following the release of the Victorian Auditor General's report:

- Towards a 'smart grid'—the roll-out of Advanced Metering Infrastructure, Victorian Auditor General, November 2009.
- Updated Assessment of AMI Costs for Victoria, Energy Market Consulting associates (EMCa) and Strata Energy Consulting, June 2010.
- Advanced Metering Infrastructure Program – Benefits Realisation Roadmap, Futura Consulting, December 2009.
- Review of AMI Benefits, Oakley Greenwood, July 2010.
- Benefits and Costs of the Victorian AMI Program, Oakley Greenwood, August 2010.

Following the change in state government in 2011, the Victorian Department of Treasury and Finance commissioned its own review of the program's costs and benefits:

- Advanced metering infrastructure cost benefit analysis, Final Report, Deloitte, 2 November 2011.

These reports provide more up to date network benefits information than that available during the development of the Victorian and Australian SMI MFS.

4.3.2 Victorian Benefits Realisation Programs

As the Victorian Distribution Network Service Provider's AIMRO programs approached completion, they have been mobilising their benefits realisation programs to investigate and identify the full range of smart meter related benefits. This includes scoping and costing the investment required to capture the additional benefits identified in previous consultant reports[18], as well as newly discovered beneficial applications of the technology.

The initial findings from these programs was highlighted in the joint submission by the Victorian Electricity Businesses in response to the Department of Primary Industries (the successor to the DPI) consultation paper on extending the Victorian metering derogation.[19] The submission contained a list of the key network benefits they had been discovering from smart metering, as well as information regarding identified gaps in the Victorian MFS.

The Victorian DNSPs joint submission therefore provides much more up to date network benefits information than that available during the development of the Victorian and Australian SMI MFS. It also foreshadows potential changes to the MFS required to access originally targeted benefits, or to access newly identified ones.

[18] Futura Consulting, Advanced Metering Infrastructure Program – Benefits Realisation Roadmap, December 2009.

[19] Jemena, CitiPower, Powercor, SP AusNet and United Energy, *Transitional arrangements for the expiry of the Victorian AMI Derogation*, 28 March 2013.

4.3.3 The Smart Grid, Smart City Program

The Australian Government launched its $100 million *Smart Grid, Smart City* initiative in its 2009 budget to test the business case for the deployment of key smart grid technologies through a commercial scale trial of:[20]

- Substation and HV Feeder Monitoring (SFM)
- Wide Area Measurement (WAMS)
- Conservation Voltage Reduction (CVR) and Automated Volt-VAr Control (AVVC)
- Fault Detection, Isolation and Restoration (FDIR)
- Distributed Generation (DG) and Distributed Storage (DS)
- Customer Applications including Feedback Technologies
- Electric Vehicles (EVs)

Ausgrid was selected to deliver the program, including the final cost benefit assessment. A consortium of Arup, Energeia, Frontier Economics and the Institute for Sustainable Futures (AEFI) was chosen by Ausgrid to undertake a national cost benefit assessment based on the results of the field trials and supplementary activities. The results of AEFI's analysis are expected to be released in the third quarter of 2014.

Although the final cost benefit assessment is not yet available, a number of reports involving the interactions between SMI and smart grid technology have been released.[21,22,23] These reports analyse areas of potential synergy and overlap between SMI and High Voltage (HV) and Low Voltage (LV) network monitoring and automation technologies, with implications for any SMI MFS aimed at maximising net network benefits.

The Final Report on the national business case for smart grid technologies, which is based on an integrated modelling of smart grid and smart metering costs and benefits, will provide more up to date network benefits information than that available during the development of the Victorian and Australian SMI MFS. It is therefore of interest when reviewing the range of potentially material network benefits and potential changes to the MFS.

4.3.4 Rapid Rise in Distributed Energy Resources

Rooftop solar PV generation was only just beginning to emerge as a significant new type of connection to distribution networks when the Victorian and National MFS were being developed in the 2007 to 2010 period. Since then, solar PV has become recognised as the harbinger of a more decentralised energy system underpinned by distributed energy resources, the transformative mega trend facing Australia's electricity industry.

The rapid rise in the penetration of Distributed Energy Resources (DER) across Australia is anticipated to have major implications for Distribution Network Service Providers (DNSPs), and in particular their LV networks. This is because as more decentralised generation, storage and electric vehicles are connected, they will increasingly lead to two way power flows, for which the reticulated distribution network was never designed.

Issues are already emerging around power quality, which are driving significant investments in the low voltage network.[24] Effectively and efficiently managing a growing level of DER on the LV network is constrained by the current lack of information regarding its state, which has not been needed in the past due to the relatively predictable nature of LV power flows and the relatively high cost of LV network monitoring and control.

The implications of rates of DER penetration for smart meter enabled network benefits should therefore also be considered when reviewing the scope and level of potentially material network benefits.

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[20] Department of the Environment, Water, Heritage and the Arts, *Smart Grid, Smart City, A new direction for a new energy era,* 2009.

[21] Ausgrid, Substation and Feeder Monitoring Smart Grid, Smart City Technical Compendium, April 2014.

[22] Ausgrid, Active Volt-Var Control Smart Grid, Smart City Technical Compendium, April 2014.

[23] Ausgrid, Fault Detection, Isolation and Restoration Smart Grid, Smart City Technical Compendium, April 2014.

[24] Energex, Distribution Annual Planning Report 2013/14 to 2017/18, Volume 1 Final, September 2013.

5 Scope and Methodology

Energeia was engaged by the Energy Networks Association (ENA) to undertake a high level review the potential network benefits from Smart Metering Infrastructure (SMI) in order to develop an up-to-date catalogue to feed into the current consultation. While not the focus of the review, the implications of an updated catalogue of potentially material network benefits for smart metering functionality and performance levels were also assessed.

Although some quantification of potential network benefits is has been used to classify their materiality, a detailed estimate is excluded for this high level review. Non-network benefits are also excluded, including those managed by the SCER defined metering coordinator function.

1. Energeia developed the following scope and approach in order to address the ENA's requirements:Review new information and circumstances
2. Assess the potential changes to material network benefits
3. Assess the potential changes to required functionality and performance

The following sections describe the key activities Energeia undertook as part of each package of work.

5.1 Review New Information and Circumstances

Energeia reviewed each of the following major reports on the potential network benefits of smart metering to identify the original baseline set of network benefit use cases and new use cases that have been identified since the Victorian and Australian MFSs were developed:

- CRA International and Impaq Consulting, Advanced Interval Meter Communications Study, for the Department of Infrastructure - Energy and Security Division (Vic), December 2005.
- CRA International, Cost Benefit Analysis of Smart Metering and Direct Load Control, Stream 2: Network Benefits and Recurrent Costs, Phase 2 Consultation Report, 27 February 2008.
- Victorian Auditor General, Towards a 'smart grid' – the roll-out of Advanced Metering Infrastructure, November 2009.
- Oakley Greenwood, Review of AMI Benefits, for Department of Primary Industries (Vic), July 2010.
- Oakley Greenwood, Benefits and Costs of the Victorian AMI Program, for Department of Primary Industries (Vic), August 2010.
- Futura Consulting, Advanced Metering Infrastructure Program – Benefits Realisation Roadmap, for Department of Primary Industries (Vic), December 2009.
- Deloitte, Advanced Metering Infrastructure Cost Benefit Analysis, for Department of Treasury and Finance (Vic), August 2011.
- Jemena, CitiPower, Powercor, SP AusNet and United Energy, Transitional arrangements for the expiry of the Victorian AMI Derogation, 28 March 2013.

In addition, Energeia reviewed the following reports on the implication of rising solar PV penetration on network costs:

- Ausgrid, Effect of small solar Photovoltaic (PV) systems on network peak demand, October 2011.
- Energex, Distribution Annual Planning Report 2013/14 to 2017/18, Volume 1 Final, September 2013.
- Ergon Energy, Energy Demand Management Plan 2013/14, 2013.
- SA Power Networks, Distribution Annual Planning Report 2013, November 2013.

Finally, Energeia interviewed subject matter experts from the DNSPs in Victoria, Queensland and South Australia to further inform our understanding of the potentially material network benefits and the MFS required to unlock them. Following on from these interviews, we received additional, confidential information regarding current estimates of the scope and materiality of network benefits from SMI.

Needless to say, while Energeia cannot report on the confidential information received, we did use it to verify our own list of benefits, high level valuation methodologies, and resulting materiality estimates.

5.2 Assess Potential Changes to Network Benefits

Based on the outcomes of our review of new information and circumstances, Energeia developed a list of potentially material network benefits from smart metering. Any information relating to the expected materiality of each benefit, including the overall level of benefit, the certainty of the benefit, and the level of deployment necessary to realise the benefit were also captured as part of our assessment.

Ultimately, each of the potentially material benefits were classified according to whether they were:

1. New or originally targeted as part of the Victorian and Australian MFS development programs
2. Material, based on previous estimates and/or a high level discounted present value estimate
3. Achievable using the MFS functionality and performance levels, or if not, why not

The list was then reviewed to determine the implications of our high level benefits assessment for the proposed MFS and the associated implementation issues raised in the AEMC's consultation paper.

5.3 Assess Potential Changes to Required Functionality

Based on the outcomes of our benefits assessment step, Energeia developed a list of enhanced functionality and performance requirements for each of the potentially material benefits that would not may not be accessible using the current Victorian or Australian MFS.

Energeia assessed functionality and performance requirements with respect to the broad categories outlined by the AEMC in their Power of Choice report:

- Metrology functions
- Energy management functions
- Smart grid functions

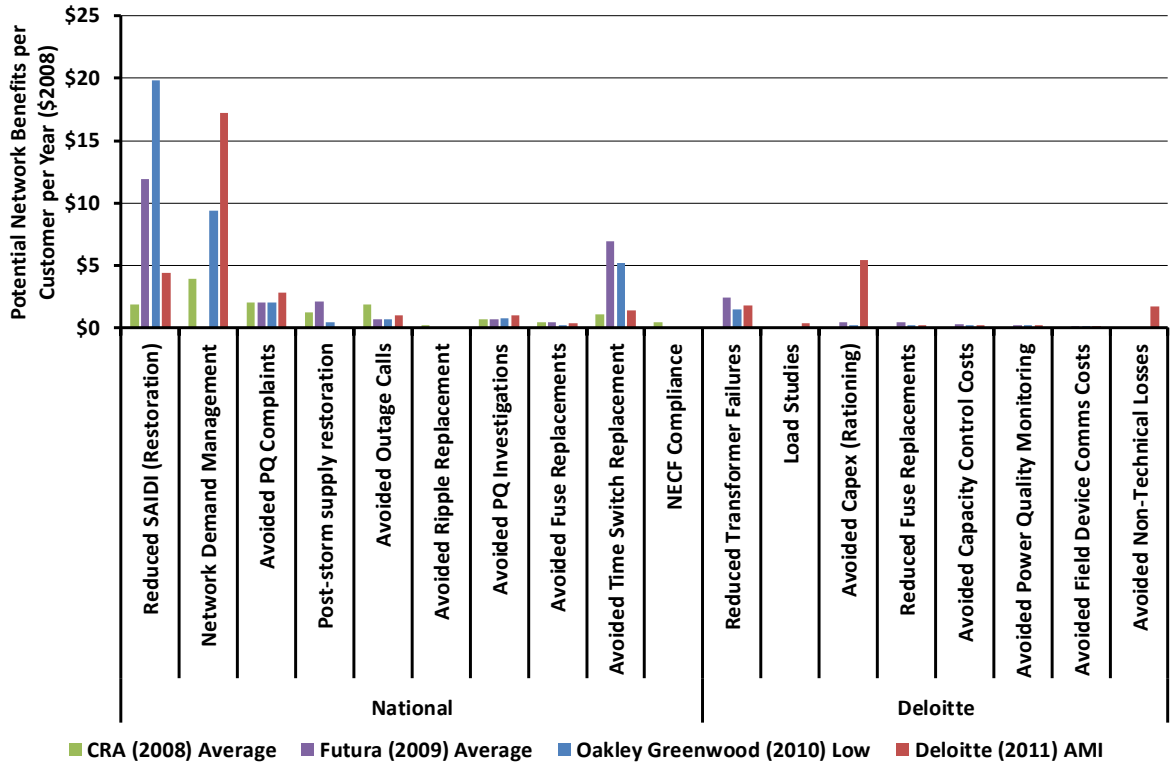
This analysis included the changes potentially required to address originally targeted network benefits, which the Victorian's had identified through their benefits realisation programs. Importantly, we did not assess whether or not the potential changes would be cost effective.

6 New Information and Circumstances

6.1 Victorian Cost Benefits Reviews

Energeia's review of the original National and Victorian cost and benefit assessments, and the subsequent updates developed over the course of 2009-2011 in Victoria, generated the list of network benefits shown in Figure 3, which have been classified according to whether they were originally in-scope or not.

Figure 3 – Estimated Network Benefits from Smart Metering Infrastructure



Source: Energeia, MCE and the NSMP

Figure 3 also presents the latest estimates of the materiality of each of the potential network benefits on a per customer per year basis where available. This analysis takes the present value of previous estimates and turns them into an annuity payment stream over 15 years assuming the associated number of customers.

As each of these estimates was developed under a presumption of a comprehensive rollout of smart metering infrastructure, they did not consider the implications of alternative deployment options on the certainty or accessibility of benefits. The currently proposed options include smart metering for new connections, condition based meter replacements, meter upgrades, retailer rollouts or demand management business cases.

The assumed level of deployment and its relationship to benefit certainty and realisation are discussed below in Section 8.1.3.

6.2 Victorian Benefits Realisation Programs

Energeia's review of the Victorian DNSP's joint submission in response to the Victorian DOI's consultation on the metering derogation rule change identified gaps in the current Victorian MFS, which are listed in Table 4.[25]

Table 4 – Key Performance Gaps of Existing Functionality

Network Use Case	Functional Specification	Performance Level	Performance Gap
Avoided transformer overload	7.1 Measurement and Recording	99% of meters by 4am	Currency of data
Demand management enablement	7.1 Measurement and Recording	99% of meters by 4am	Currency of data
Avoided customer calls (LV outages)	7.11 Meter Loss of Supply Detection	90% of meters in <1 hour	Currency of data
Optimised outage response	7.11 Meter Loss of Supply Detection	90% of meters in <1 hour	Currency of data
Avoided return trips (nested outages)	7.12 Remote Meter Service Checking	95% of meters in <5 minutes	Currency of data
Avoided wasted trips (customer outage)	7.12 Remote Meter Service Checking	95% of meters in <5 minutes	Currency of data

Source: Energeia, Victorian DNSPs

The description of network benefits in Table 4 has been changed in some cases to better align with the list in Table 5. The relevant functional specification and performance levels have been estimated by Energeia, and we have also classified the nature of the key performance gap.

The Victorian DNSPs are also proposing the additional functionality listed in Table 5 in order to access network benefits not able to be accessed using the current MFS.[26]

Table 5 – Proposed Enhanced Functionality and Performance Levels

Network Use Case	Network Benefit	New Functionality	Performance Level
Customer Safety Management	Avoided Inspection and Insurance Costs	Neutral Impedance Detection	Near-time Alarm
LV PQ Management (AVVC)	Avoided Network Investment	Voltage Banding (Excursions)	Near-time Alarm
LV PQ Management (Modelling)	Avoided Network Investment	Voltage Interval Data Recording	Up to 5 Minute Intervals
LV Asset Breakdown (incipient fault)	Avoided Field Labour and SAIDI	Voltage and Current Interval Recording	Up to 5 Minute Intervals
LV Phase Balancing	Avoided Network Investment and Losses	Phase Connection Identification	Routine

Source: Energeia, Victorian DNSPs

The joint submission includes commentary on the impact of less than 100% smart metering on the realisation of benefits in many of the identified enhanced performance of functionality use cases. However, no new information on the materiality of the benefits flowing from these network use cases is included in the submission.

Table 6 – Emerging Network Benefits and Associated Requirements

Network Use Case	Network Benefit	New Functionality	Performance Level
LV augmentation (power factor, AVVC)	Reduced Augmentation Capex	Reactive Power Interval Recording	Near-time Events/Alarms
LV augmentation (dynamic rating)	Reduced Augmentation Capex	N/A	Progressive Reporting (Hourly)
LV augmentation (configuration)	Reduced Augmentation Capex	N/A	Progressive Reporting (Hourly)
HV fuse breakdown (candling)	Reduced Insurance and Claims Costs	Voltage and Current Interval Recording	Up to 5 Minute Intervals
Unregistered generator detection (safety)	Reduced Field Labour and Insurance Costs	Export Power Detection	Routine
LV PQ surveys / monitoring	Avoided Field Labour and Equipment Opex	Voltage Interval Data Recording	Up to 5 Minute Intervals
LV power quality complaint management	Reduced Contact Cente Costs	N/A	Near-time Events/Alarms
LV power quality investigation (inverters)	Reduced Field Labour Costs	Voltage Interval Data Recording	Up to 5 Minute Intervals
LV technical energy losses (power factor, AVVC)	Reduced Distribution Loss Factors	Reactive Power Interval Recording	Near-time Events/Alarms
LV PQ Equipment damage (brownouts)	Reduced Equipment Maintenance Costs	Automated Disconnection	Immediate Upon Detection

Source: Energeia, Victorian DNSPs

In addition to the enhanced functionality and performance levels listed in Tables 5 and 6, Energeia was able to identify a number of additional network use cases through interviews with Victorian DNSP subject matter experts (see Table 6). The materiality of these benefits and the associated investment costs is under investigation, as well as the implications of less than 100% smart metering coverage.

[25] Jemena, CitiPower, Powercor, SP AusNet and United Energy, *Transitional arrangements for the expiry of the Victorian AMI Derogation*, 28 March 2013, pages 68-71.

[26] Ibid. pages 71-72

6.3 Smart Grid, Smart City Outcomes

Although the final Smart Gird, Smart City (SGSC) National Cost Benefit Assessment report is currently in draft stage, Energeia has nevertheless reviewed it along with information already available through the publically accessible Information Clearing House[27] to identify implications for the consideration of network benefits from SMI and the necessity and nature of a MFS.

Energeia's review of the outputs of the Smart Grid Smart City initiative has found that it has produced a significant amount of information relevant to the expected future network state to 2033, including the:

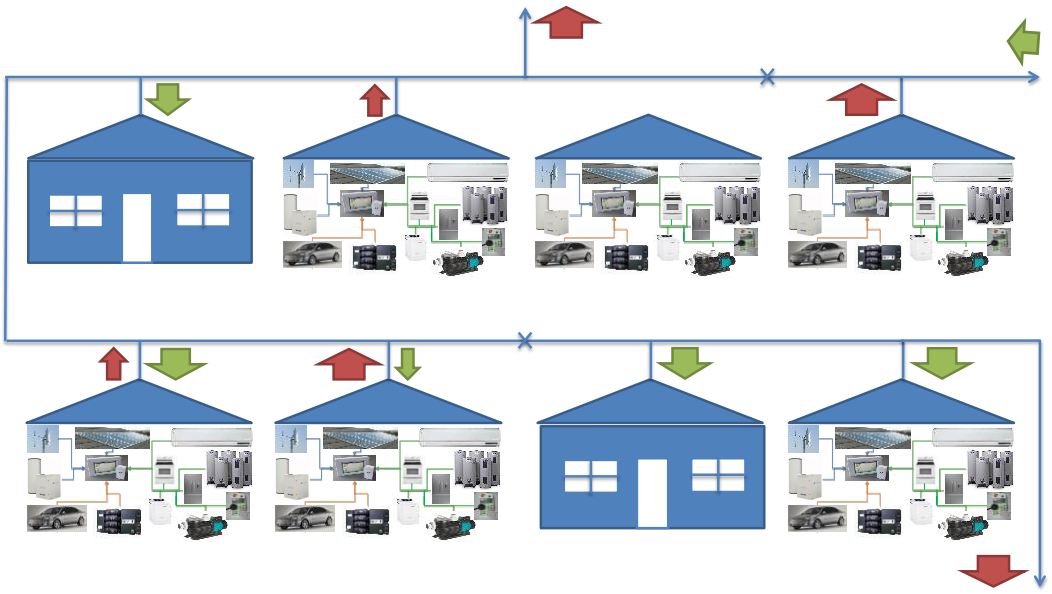
- penetration and mix of distributed energy resources,
- implications for the planning, operation and costs of the LV and HV networks,
- the incremental costs, benefits and interrelationships of various smart grid technologies[28]; and
- the anticipated timing and configuration of an optimised smart grid technology deployment.

Each of these issues is of interest to the consideration of network benefits from smart metering technology.

6.3.1 Widespread Distributed Energy Resources

Modelling undertaken by Energeia as part of the SGSC final report on the national business case for the deployment of smart grid technology has found that the current trend of rising decentralise generation is set to continue over the next twenty years or more. The fall in costs associated with electric vehicles, microgrids, distributed storage and emerging distributed generation technologies including fuel cells are expected to lead to a change in the mix of distributed energy resources over time.

Figure 4 – Illustration of LV Network Power Flows with Widespread Distributed Energy Resources



Source: Energeia

Figure 4 portrays a typical residential suburb in the not too distant future, which will contain a range of houses with varying levels of DER. Some houses, indicated by one way green arrows, will be largely the same in their consumption profile as today, while others, shown containing a mix of DER, may have a radically different import and export profile, including those that have disconnected completely (no wire or arrows).

[27] ich.smartgridsmartcity.com.au

[28] Smart metering infrastructure was one of the smart grid technologies included in the commercial scale field trials and the national cost benefit assessment.

Figure 4 illustrates the impact of high levels of DER on the flow of electricity across LV networks, with an associated change in the way LV and HV networks will need to be planned, operated and maintained. This scenario would require a significant amount of investment in the LV and HV networks to maintain the reliability, quality and safety of the network as it transitions to a much more dynamic state.

6.3.2 Impacts to the LV and HV Network

The field trials and complementary modelling undertaken as part of the SGSC initiative have identified the potential for rising penetration of decentralised generation, including storage and EV output, to impact on the quality and the safety of the LV and HV network primarily through two way power flows. These in turn may require additional investment in the following non-smart grid solutions:

- Increased operational monitoring of the LV network to better understand its state
- Service wire replacements to reduce impedance
- Additional distribution transformers to reduce impedance
- Additional capacitors and voltage regulators to manage voltage levels
- New protection schemes that cater for two way power flows

Each of these potential conventional responses will come at an increased cost in terms of higher operational and capital expenditure. This presumes policy and regulatory support for greater penetration of distributed energy resource, as the current AS 4777 standard that applies to inverters will automatically disconnect when voltage rises above the standard. This would otherwise lead to a natural curtailment of DER over time.

Despite the additional investment, it may still be necessary to limit the level and/or operation of distributed energy resources connected to the LV network to safeguard its performance.

6.3.3 Costs and Benefits of Smart Grid Technology

Energeia's cost benefit assessment of smart grid technology was undertaken against the expected future state of the network under an assumption of business-as-usual. This meant there were no changes to the current policy and regulatory settings, and external factors such as the adoption of DER were allowed to take their course, and the associated changes to industry costs were estimated for the baseline case.

Table 7 – Potential Network Impacts and Benefits of Smart Grid Technologies

Impact	Benefit	SFM	FDIR	AVVC	SMI
Faster restoration of customers	Avoided loss Value of Customer Reliability	√	√	×	√
Avoided condition based asset failures	Avoided unplanned outages	√	×	×	√
Avoided HV fault finding effort	Avoided field labour	√	√	×	×
Avoided HV field switching	Avoided field labour	×	√	×	×
Avoided customer outage reports	Avoided contact centre labour	√	√	×	√
Avoided voltage excursions	Avoided customer equipment damage	×	×	√	×
Avoid customer PQ investigations	Avoided PQ investigation costs	√	×	√	√
Avoided solar PV spillage	Avoided loss of solar PV benefits	×	×	√	×
Avoided LV load surveys	Reduced load survey costs	√	√	×	√
Reduced network peak demand	Avoided network capacity investment	×	×	√	√
Avoided HV line losses	Reduced distribution loss factors	×	×	√	√
Improved HV power factor	Avoided augmentation investment	×	×	√	×
Avoided ripple control system	Avoided ripple control investment	×	×	×	√
Avoided cost of de/energisation	Avoided field labour costs	×	×	×	√
Avoided wasted call outs	Avoided call-out charge, field labour costs	×	×	×	√

SFM = Substation and Feeder Monitoring, FDIR = Fault Detection, Isolation and Restoration, AVVC = Automated Volt-Var Control
SMI = Smart Metering Infrastructure
Source: Energeia

Each of the smart grid technologies were reviewed for the range of potential benefits based on an international review. A subset of these related to potential network benefits are reported in Table 7. It is evident from this table that smart grid technologies are both substitutes and complements of each other. While some benefits are exclusive to a single smart grid application, many can be accessed through a number of alternative technologies.

The implications of this analysis for smart metering enabled network benefits is that the timing and nature of smart grid investment will have an impact. Where a business case for smart grid investment is made, for example due to DER penetration related power quality issues, the benefits of smart metering could either become crystallised or sterilised, depending on the level and functionality of installed smart metering.

6.3.4 Timing and Configuration of an Optimised Smart Grid Deployment

The release of the results of the national smart grid cost benefit assessment will shed light on the expected timing and configuration of an optimised smart grid technology deployment, including SMI. However, the actual timing and configuration will depend on the actual development of the policy and regulatory framework, and the pace of technology cost declines, among other factors.

While the need to monitor the entry points to the LV network is only likely to increase over time with the growth of distributed energy resources, effectively managing increasingly dynamic power flows is also likely to impact on the necessary nature and level of smart metering performance. Further investigation of the future state of LV networks and the necessary control systems to manage them is required to inform this discussion.

The implication of this analysis for determining the potentially material network benefits of SMI is that the timing and configuration of other smart grid technologies is likely to have a significant impact. Where SMI is already deployed it may be able to provide services to smart grid applications at lower cost, but its benefits may also be eroded with the installation of intelligent distribution transformers and LV sectionalisers.

Solar PV penetration is already high in Queensland and South Australia, and is likely to increase more rapidly in other states in the future as costs continue to fall relative to retail energy prices. Establishment of a smart metering framework that does not permit the timely exploitation of potential smart metering benefits by networks could lead to remedial investments that are higher than they would otherwise need to be using smart metering.

7 Australia's Low Voltage Networks

Energeia's review of potentially material network benefits from smart metering infrastructure has found that these benefits are largely concentrated in the low voltage network, including distribution substations and customer service mains. Specifically, they benefit networks through their impact on:

- Meeting or managing of demand; and/or
- Maintenance of its reliability, quality and safety.

The costs of meeting these expenditure objectives under the National Electricity Rules (the Rules) is directly related to the rate of growth in peak network demand, the number of assets that need to be operated and maintained, the condition of these assets, and their reliability.

7.1 Assets, Capacity and Length

Table 8 compares Australia's low voltage (LV) network, high voltage (HV) and sub-transmission networks in terms of total number of assets, line length and asset capacity. This shows that Australia's LV networks has more nameplate capacity in its distribution transformers than the all the zone substations and HV network feeders combined, and they are also far more numerous in number.

Table 8 – Assets, Length and Capacity by Network

	33-132 kV Lines	33-132 kV Subs	11-22 kV Lines	Low Voltage Subs	Low Voltage Lines
Length (km)	79,786	N/A	352,368	N/A	250,504
Nameplate Capacity (MVA)	N/A	154,099	91,165	191,136	N/A
Number of Assets	N/A	12,740	11,362	635,715	N/A

Source: ESAA, DNSP proposals, etc.

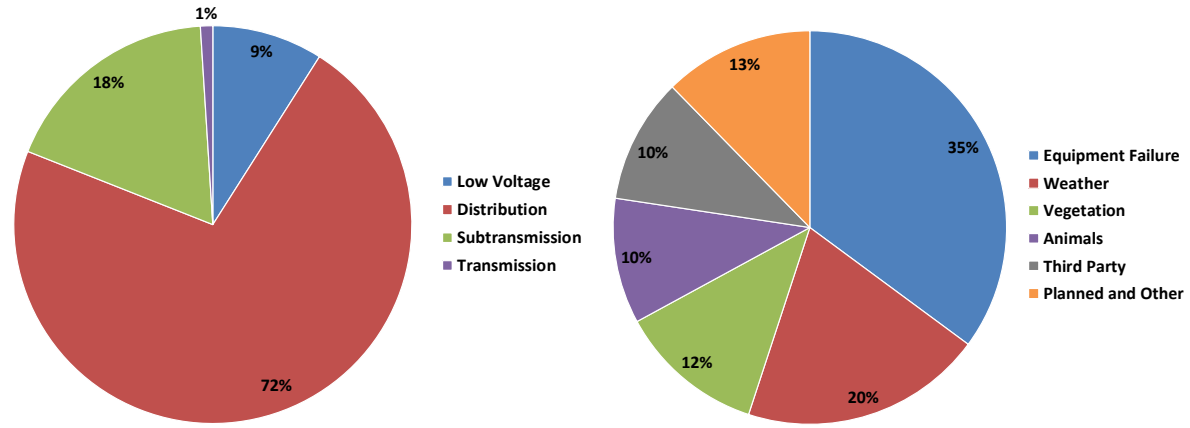
The number of assets is important when considering the cost of LV monitoring and control technology, as each distribution substation would potentially require its own monitoring and control technology. Although estimating the cost of deploying monitoring and control technology across Australia's LV networks is out of scope for this report, monitoring alone would be over $600 million dollars assuming $1,000 per distribution centre.

Smart metering can provide a similar level of monitoring and control over the low voltage network. While the cost of smart metering for this purpose alone is likely to be higher than the cost of LV monitoring, the incremental cost of providing network benefits where smart metering is going to be deployed primarily for other reasons may be far lower, depending on the required level of performance to access the network benefits.

7.2 Reliability and Outage Drivers

The relative reliability of LV network assets compared to the distribution (11kV) network, sub-transmission networks (33-132kV) and transmission networks in EnergyAustralia's network in 2009 is reported in Figure 5.

Figure 5 – Network Reliability (SAIDI) by Asset Type and Fault Driver



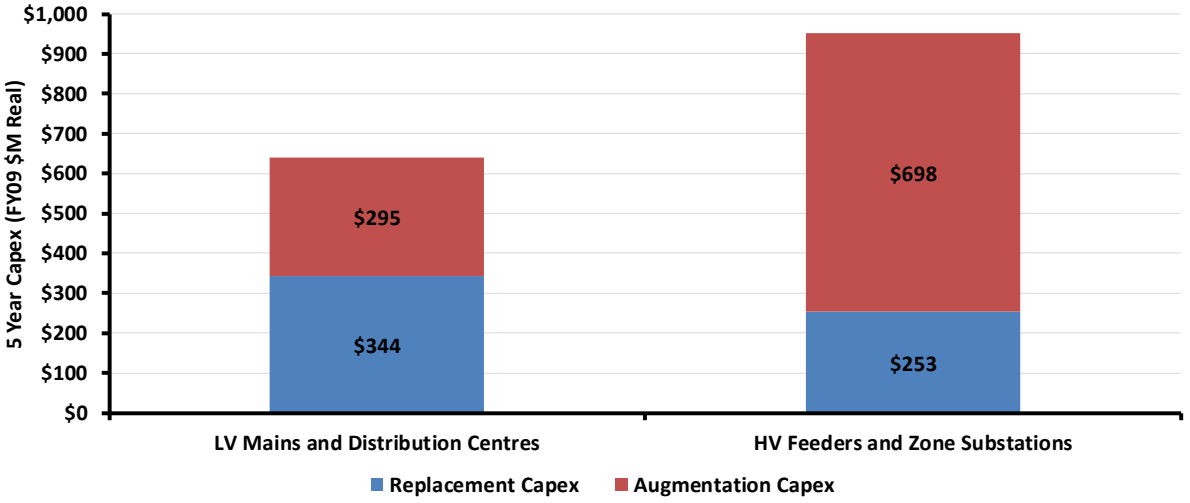
Source: EnergyAustralia

The outage driver is also reported, highlighting the proportion of outages due to vegetation, asset overloading and asset failure, which are all potentially addressable through smart metering technology.[29]

7.3 Operating and Investment Costs

While it is difficult to isolate the cost of maintaining and operating the LV network from the other voltages, it is possible to compare investment relativities, as illustrated in Figure 6 taken from EnergyAustralia's 2009 regulatory proposal.[30] In this case, the significantly higher level of investment in the HV network is largely due to changes in the NSW planning and reliability standards. The level and difference in replacement capex is also network specific due to historical investment patterns.

Figure 6 – EnergyAustralia's Proposed Capital Expenditure Program, 2009-14



Source: EnergyAustralia

Smart metering can generate benefits by impacting the need for network augmentation and the timing of replacement expenditure, as detailed in the following sections.

[29] The outage drivers are for the whole of system level, the assumption is that they apply consistently to the LV network.

[30] It is important to note that this is just one example, and that other networks could have significantly different replacement expenditure profiles due to historical investment decisions.

8 Implications for Network Benefits

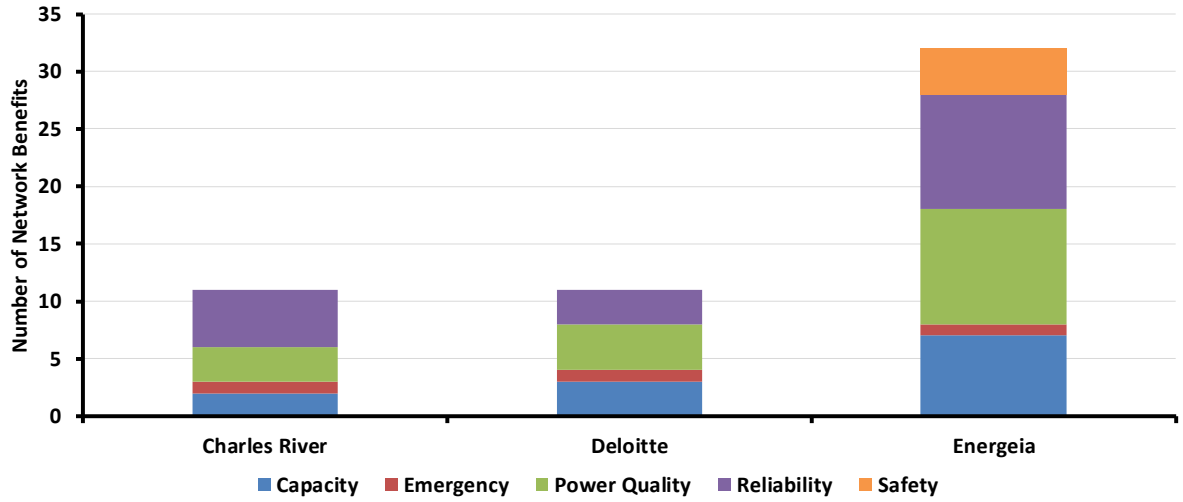
8.1 Benefits Assessment Results

Based on the results of our review, Energeia has developed what we believe is a relatively comprehensive list of the potentially material network benefits from smart metering services in an Australian context, which is reported in Appendix 1. We have indicated which benefits were included in the original cost benefit assessments feeding into the current MFSs, and an indicative level of materiality indicated by the number of dollar signs.

8.1.1 Scope of Benefits

The results of our review in terms of the original, new and Energeia estimated number of beneficial smart metering applications is presented in Figure 7.

Figure 7 – Estimates of Potential Network Applications by Study and Type



Source: CRA, Oakley Greenwood, Futura, Deloitte, Energeia, DNSPs

Overall, our analysis indicates a growing industry awareness of the potential network benefits from smart metering, particularly around capacity (i.e. demand management and asset utilisation), power quality (e.g. addressing solar PV), reliability (e.g. anticipating equipment faults) and safety. It is also important to emphasise that our review is focused on investigating network benefits, while previous reports had a broader mandate.

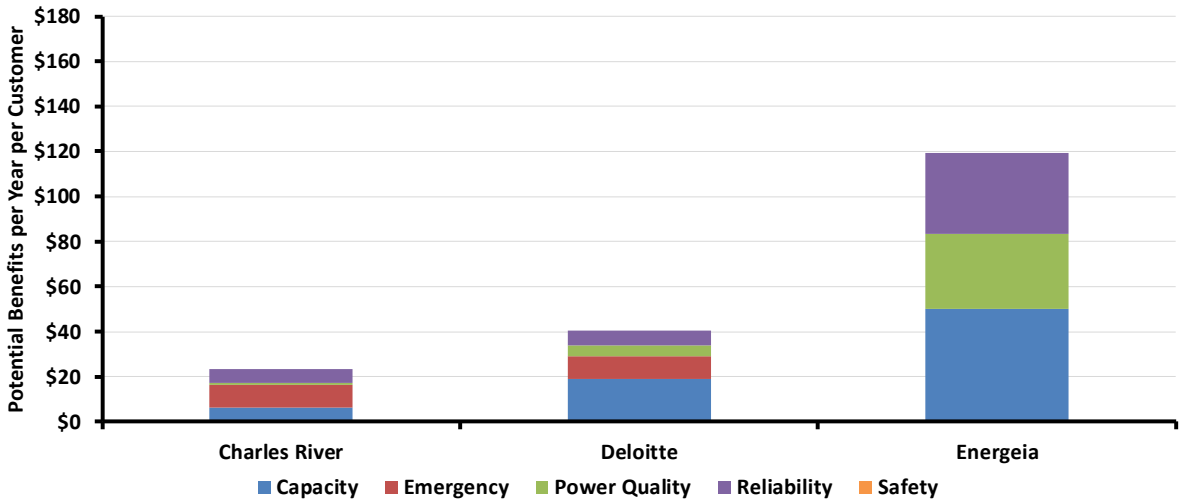
8.1.2 Indicative Value of Benefits

For each potential beneficial application of smart metering technology, Energeia reviewed previous estimates of the potential benefits to a network business in light of the new information and developments listed in Section 6. We developed our own, high level approach to estimating the benefits of newly identified smart metering related benefits (see Appendix 2), which was also informed by our interviews with subject matter experts from DNSPs.

Figure 8 presents the results of our high level, indicative assessment of the potential benefits from smart metering applications. The estimates assume a full deployment of smart metering make a number of key assumptions about initial and future network conditions, particularly around asset utilisation, network topology and the level of distributed energy resource penetration.

Importantly, we did not value benefits from emergency management or safety, as they are both relatively difficult to estimate and rely on a number of key assumptions that are likely to be controversial. Emergency management was a topical issue during the original assessments due to the severe water shortage at the time. We have included both categories in our list of key benefits, and they should be reassessed as part of any future review.

Figure 8 – Estimates of Potential Network Benefits by Study and Type



Source: CRA, Oakley Greenwood, Futura, Deloitte, DNSPs

The key difference in the level of benefits included in our review above previous reviews is in our inclusion of a number of key new network applications of smart metering technology. These new applications have been only recently identified through the Victorian benefits realisation programs, along with the industry's evolving understanding of the expected future level of distributed energy resources and their associated cost impacts.

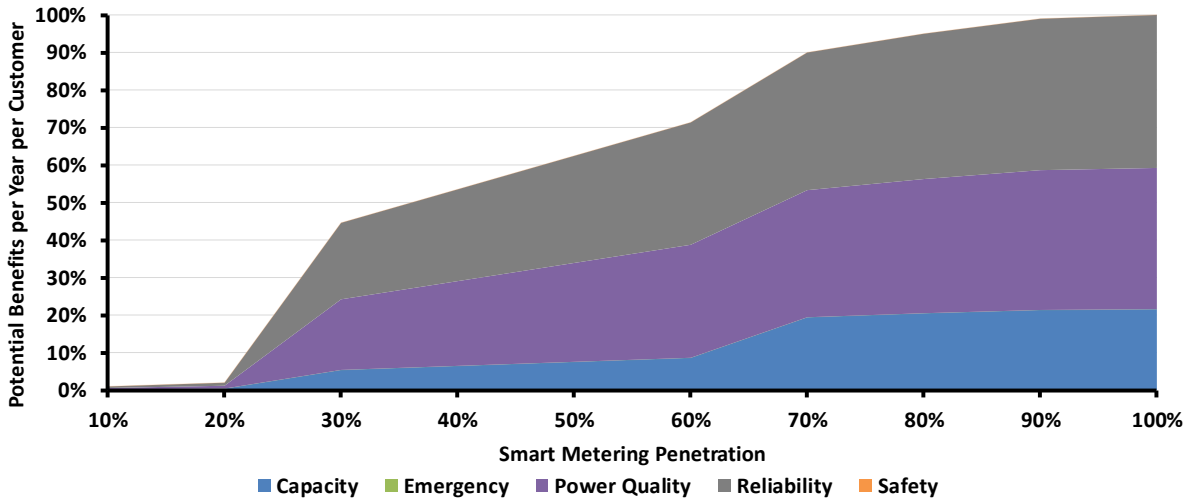
8.1.3 Accessibility of Benefits

As discussed in detail in Section 7.2 below, the level of network benefits that can be realised varies depending on the assumed level of smart metering penetration. While some benefits, such as connection management, increase in line with the number of smart meters, most require a certain minimum level of penetration to operate at all, and then increase at some rate as the accuracy of the information improves. Others, such as theft identification, require virtually all loads to be metered before leakage can be detected with any accuracy.

This is an important issue of relevance to the discussion of an Australian MFS for smart metering, and whether or not it should be optional, compulsory or apply only in certain circumstances, e.g. new connections and meter replacement scenarios. It is also important for the discussion of smart meter reversion, or the removal of existing smart meters in Victoria. The final Rules in this regard will have a major bearing on the timing and distribution of smart metering across Australia, including Victoria.

While estimating the precise level of benefit across the range of smart metering deployment scenarios is beyond the scope of this report, Energeia has developed an indicative, conceptual estimate of the percentage of total potential network benefits as the level of penetration increases, which is shown in Figure 9. This conceptual analysis highlights that network benefits are unlikely to accrue at low levels of random deployment, but will begin to accrue once a particular threshold is reached, assumed here to be around 20-30%. At some stage, benefits will begin to accrue at a slower pace once the level of accuracy reaches a particular threshold.

Figure 9 – Illustration of Benefits Realisation by Smart Meter Penetration



Source: Energeia

In Figure 9, the network capacity benefits of smart metering see initial benefits at 20-30% penetration related to improved utilisation of assets through load balancing and dynamic reconfiguration. This is due to increased but still imperfect visibility into the LV network state on a sampling basis. The second step in benefits indicated from around the 70% penetration level is due to the greater likelihood of realising demand management benefits from this point forward, due to the high number of potential participants required to generate a sufficient response.

Importantly, this analytical framework also highlights the risk of reversion in smart metering could have on the ability of networks to realise benefits.

8.2 Summary of Key Benefits

The following sections summarise each of network benefit identified as moderately to very material (i.e. $5-$30 per customer per annum), and which are summarised in Table 9. Functional and performance requirements, level of benefit certainty and benefit threshold assumptions are discussed in turn.

It is important to stress that this list is based on a high level review of existing information and informal interviews of subject matter experts. Materiality will vary according to the specific circumstances of each DNSP, and further work would be required to develop the robust estimates required for national policymaking.

8.2.1 Network Demand Management

Smart metering can be used to send cost reflective pricing signals to customers through cost reflective tariffs or alternative incentive mechanisms. They can also be used to control secondary loads including water heaters, pool pumps and air-conditioners.

The key MFSs required to access these benefits are:

- 30 minute interval consumption recording
- Multiple measurement elements
- Secondary load contactors

Not all of these functionalities are required in all applications, and network demand management is possible without smart metering. However, smart metering does provide measurement and verification of the demand response, and can provide load management services as well.

Network demand management depends on reaching a certain threshold level. Only a fraction of the eligible population takes up a demand management incentive, which implies that a significant level of smart metering penetration would be required before most of the benefits could be realised with certainty.

8.2.2 LV Phase Balancing

Smart metering can be used to detect when there are unequal amounts of load on each phase of supply. This condition typically leads to higher losses and lower available network capacity. It is also identifiable using LV network monitoring on the secondary side of the distribution transformers.

The key MFS required to access these benefits are:

- 30 minute interval consumption recording
- Outage event recording

Identification of unbalanced conditions is relatively certain, but the current level of unbalance is unknown. Estimates from overseas report capacity improvements of 6-7%, but Victorian DNSPs are expecting around a 5% improvement. There were no reported estimates found on the effect of imbalance on losses.

Each additional smart meter will increase the accuracy of the sample of phase imbalance above a certain minimum threshold, of say 20-30% of sites, due to the imperfect nature of the sample. A well designed, stratified random sample could generate relatively accurate results with fewer smart meters.

It is important that this issue be well understood when comparing options between the value of market led smart metering, and a statistically based deployment by networks to maximise benefits at least cost.

8.2.3 LV Dynamic Reconfiguration

Smart metering can be used to optimise the configuration of the LV network as conditions change. Based on the current and forecast loading at the customer or section level, the LV network can be configured to minimise the risk of overloading during the peak period.

The key MFS and supporting systems required to access the benefits of dynamic reconfiguration are:

- 5 minute interval consumption recording
- Progressive delivery of interval data (e.g. hourly increments)
- LV network connectivity model (e.g. a Distribution Management System)

The potential benefits of optimal LV network configuration are not well understood at this stage as the technique is only just being employed in Victoria. Importantly, this benefit depends on a meshed and segmented LV network, in other words, an LV network with the potential for alternative sources of supply and sectionalisation. This is more likely in urban, and to a lesser degree, suburban networks.

The current level of LV asset utilisation is also important as a lightly loaded network is unlikely to benefit from or need additional capacity. Benefits are less likely to occur in relatively young networks or those with a lot of redevelopment as the level of utilisation is likely to be lower in both cases than a relatively mature network area, where the spare capacity has been used up over the years as average consumption levels have grown.

Accessing benefits from dynamic reconfiguration depends on an accurate picture of the distribution of loads relative to network capacity. Here again the benefits are likely to emerge once the level of smart meters reaches a certain threshold, which we are roughly estimating at 20-30% of installations, but further work here to understand the threshold level for accessing these benefits would be warranted.

It is important to recognise that one relatively large load on a network segment can easily undermine the optimisation, so the benefit of smart metering larger customers is greater than smaller customers in this case.

8.2.4 LV Automated Volt-VAr Control

Smart metering can be used to drive an automated Volt-VAr control (AVVC) scheme to manage voltage as the level of distributed energy resource increases. They are particularly helpful in this application as they are taking measurements at the customer's premise, where the power quality standards apply. Voltage banding with alarms or periodic reporting can both be used to adjust transformer or voltage regulating tap changes and/or capacitors.

The key MFS and supporting systems required to access the benefits of dynamic reconfiguration are:

- 1-5 minute interval voltage recording
- Banded voltage alarms and 1-5 minute reporting
- 1-5 minute reporting of voltage interval data
- Automated Volt-VAr optimisation solution

The benefits of this service are driven by the level of current and expected future distributed generation, including storage, relative to LV network capacity, the age of the network, and network's policy regarding enablement of distributed energy resources and in particular rooftop solar PV.

As AS 4777 requires inverters to disconnect when over-voltage is detected, they should in theory not drive a voltage rise on the network and shut down instead, and resulting in lost benefits to customers. In practice, inverters configured to run higher than the standard and/or customer complaints are driving some DNSPs to instead upgrade the network through LV asset investment to avoid DER driven over-voltage conditions.

The threshold above which distributed energy resources are likely to increase the incidence of over-voltage conditions is not well understood. A series of studies[31] by Ausgrid as part of the SGSC trial have found little evidence of solar PV driven over-voltage, however, reports[32] by other DNSPs suggests that the issue is very real when the average size of solar PV systems are larger and the LV networks less robust.

This is another example where smart metering installations must achieve a certain minimum level of penetration before they could be used to drive an AVVC system. In this case, however, there is likely to be a high correlation between those installing smart metering and those with power quality issues is solar PV sites are required to receive a smart meter under any jurisdictional set MFS.

Alternatively, a targeted sample of meters could be deployed by network operators to implement an AVVC system at relatively low cost.

8.2.5 LV Power Quality Investigations

Smart metering can provide information that DNSPs can use to proactively identify power quality issues before they lead to customer complaints. Data from smart meters can also be used to verify power quality related claims by customers, eliminating the need in some cases for a formal investigation. Although they are relatively infrequent, the costs are material due to the need to install LV monitoring equipment in some cases.

The key MFS required to access the benefits of LV Power Quality Investigations are:

- Interval voltage recording
- Voltage excursion events and alarms

The benefits of this service arise once the voltage information is made available to the contact centre, claims and customer supply teams, so that issues can be proactively identified and rectified before customers lodge legitimate complaints and claims for damages.

Accessing benefits from LV Power Quality Investigations depends on an accurate picture of LV network voltages at the customer's meter. Here again the benefits are more likely to emerge once the level of smart meters reaches a certain threshold, which we are roughly estimating at 20-30% of installations, but further work here to understand the threshold level for accessing these benefits is warranted.

8.2.6 LV Vegetation Detection

Smart meters can improve network's management of vegetation by identifying when vegetation needs to be trimmed to avoid it bringing down power lines during a storm. Analytics can be used to identify when trees are

[31] Ausgrid, Effect of small solar Photovoltaic (PV) systems on network peak demand, October 2011.

[32] Energex, Distribution Annual Planning Report 2013/14 to 2017/18, Volume 1 Final, September 2013.

touching LV mains, usually during high winds or storms, which can then be rectified during normal maintenance schedules and potentially avoid an outage. Vegetation currently accounts for around 10-20% of all outages.

The key MFS and supporting systems required to access the benefits of dynamic reconfiguration are:

- Current and voltage events and alarms
- 1-5 minute interval voltage recording
- 1-5 minute current recording

The benefits of this service arise as the overage and accuracy of smart metering data reaches a certain threshold point, above which the likelihood of identifying vegetation issues increases. However, as this benefit has not yet been demonstrated in Victoria and is only reported on an anecdotal basis overseas, these benefits should be treated with caution pending verification by Victorian DNSPs using their SMI systems.

The threshold point for this benefit is not well understood, but is likely to following a similar pattern to the other benefit types that rely on accurate information to generate the benefit.

8.2.7 LV Incipient Asset Failure Detection

Smart metering can be used to detect incipient faults in a growing range of LV and HV assets. SP AusNet has already demonstrating this capability, and applied it to anticipating HV fuse candling. Accessing this benefit requires 5 minute interval data on voltage and current, which are used to develop impedance models that can detect changes in the condition of LV network assets.

The key MFS required to access the benefits of LV Incipient Asset Failure Detection are:

- 1-5 minute interval voltage recording
- 1-5 minute interval current recording

The benefits of this service arise when incipient failures are able to be identified and a maintenance crew dispatched during normal business hours to rectify the situation. Replacing the asset before it fails in service avoids a customer outage, and potentially reduces field costs where the fault occurred outside of business hours. Out of hours faults are likely to occur some fraction of the time.

The threshold for accessing the benefits of this service are likely to grow as smart metering coverage and penetration levels increase over some initial threshold, which we are assuming is around 20-30%.

8.3 Implications for Functionality, Performance and Access

Energeia's review of new information and circumstances since the national and Victorian MFS were developed has identified significant changes in the scope and level of potentially material network benefits, as well as the industry's understanding of the smart metering functionality and performance levels required to access them.

Table 9 displays the potential changes to functionality and performance levels identified by the Victorian DNSPs and Energeia through our interview process.

Table 9 – Summary of Potential New Functionality and Performance Levels Requirements

Network Benefit	New Functionality	Performance Level
Customer Safety Management	Neutral Impedance Detection	Existing Performance Level
LV Automated Volt-VAr Control	Voltage Banding (Excursions)	<1 Minute Alarms
LV State Model	Voltage and Current Interval Recording	At least 5 Minute Intervals
LV Incipient Asset Breakdown Detection	Voltage and Current Interval Recording	At least 5 Minute Intervals
LV Power Factor Detection	Reactive Power Interval Recording	At least 5 Minute Intervals
LV Technical Losses Optimisation	Reactive Power Interval Recording	At least 5 Minute Intervals
LV Dynamic Configuration	Existing Measurement Functionality	Progressive Reporting (e.g Hourly)
LV Outage Monitoring	Existing Measurement Functionality	<1 Minute Alarms
LV Power Quality Monitoring	Existing Measurement Functionality	<1 Minute Alarms
LV Power Quality Management	Voltage Interval Data Recording	At least 5 Minute Intervals
LV Automated Brownout Protection	Automated Disconnection	Immediate Upon Local Detection

Source: Victorian DNSPs, DNSP subject matter experts and Energeia

The changes specified in the table above mainly relate to:

- Measurement of new electrical properties, e.g. reactive energy, current, neutral impedance
- Interval recording of new measurement types, e.g. voltage, reactive energy, current
- Interval recording of higher frequency periods, e.g. 1 minute, 5 minutes, etc.
- Higher performance levels for reporting or streaming of interval data, e.g. hourly
- Higher performance levels for alarms and events, e.g. <1 minute
- Additional software applications, e.g. phase connection and automated volt-VAr systems

It is important to note that the above functionality and performance levels do not necessarily need to be implemented in all new smart meters to capture the benefits. Rather, smart meters would need to be able to be configured to support this functionality and level of performance when and where it is valuable. For example, high frequency voltage and current data may only be needed periodically in various targeted locations.

The need for high frequency communication between the smart meter and upstream systems, such as in the case of Automated Volt-VAr control, may lead to the need for direct access to the meter by network systems, which may themselves be localised in nature. It is important that the least cost option be investigated for meeting the required level of functionality and performance for any newly identified application.

Again, whether or not the newly identified functionality and/or enhanced performance levels should be included in a MFS, and whether or not it should be optional, compulsory or apply only in certain circumstances, is still subject to a separate cost benefit assessment exercise. It may well be that the additional functionality and performance level requirements do not warrant the incremental benefits that are expected to be gained.

9 Conclusions and Recommendations

In conclusion, Energeia's review of the latest information and current sector outlook has found that:

- Potentially material benefits (particularly network benefits) have been greater than initially anticipated in the original Victorian and National cost-benefit assessments;
- Energeia's indicative estimate is that the network derived benefits may be up to 75% or around $75 per annum (p.a.) more than estimated by the most recent Victorian review in 2011; and
- Benefits will vary significant due to circumstances and so it is critical that the metering framework fosters innovative applications of smart meters and the economic realisation of benefits as they emerge.
- The national framework should be tested against the newly identified functionality and performance levels to ensure it will drive appropriate investment decisions by stakeholders

Delays in the establishment of an efficient and certain regulatory framework could see many of the potential network benefits eroded as alternative investments are made in LV monitoring to address emerging issues.

Appendix 1 – List of Potentially Material Network Benefits

CBA	$	MFS	Network Benefit Description	BaU Description	Smart Meter Impact	Impact Benefit
			Investment			
			Capacity			
X	$	X	LV planning (load flow modelling)	Limited impedance models lead to sub-optimal engineering	Accurate models improve investment performance	Reduced augmentation capex
	$$$		Network augmentation (demand management)	Rising peak demand drives investment in new assets	Cost reflective tariffs reduce peak demand growth	Reduced augmentation capex
X	$		LV augmentation (power factor)	Poor power factor reduces available LV capacity	kVA tariffs and ID of poor Pf customers improve Pf	Reduced augmentation capex
	$$$		LV augmentation (phase imbalance)	Phase imbalance reduces available LV capacity	Phase balancing increases LV network capacity	Reduced augmentation capex
X	$$		LV augmentation (configuration)	Sub-optimal configuration reduces available LV capacity	Optimised configuration increases LV network capacity	Reduced augmentation capex
	$		LV augmentation (controlled load)	Load controlled to avoid investment in new assets	Built-in capability avoids controlled load investment	Reduced secondary system capex
			LV Quality			
X	$$	X	LV power quality rectification (over/under voltage)	PQ issues drive new assets or increased tap change visits	Service data used to drive automated volt-var solution	Reduced PQ capex, DER congestion
X	$	X	LV power quality planning (impedance modelling)	Limited impedance models lead to sub-optimal engineering	Accurate models improve investment performance	Reduced PQ capex
X	$$	X	LV smart grid monitoring and control	Sensors and sectionalisers installed on LV network	Smart metering used to provide monitoring and control	Reduced PQ capex
			Operations and Maintenance			
	$		**LV Load Surveys and Studies**	LV assets are periodically monitored	LV assets are automatically monitored	Reduced field labour and equipment opex
			Vegetation Management			
	$$		LV vegetation repairs	Condition failures lead to customer outages and overtime	Anticipated failures avoided in regular business hours	Reduced maintenance opex
	$		LV vegetation outages	Asset failures and overloads lead to loss of supply	Certain faults and overload conditions avoided	Reduced VCR
			LV Asset Failure			
X	$$		LV asset condition failures, including candling	Condition failures lead to customer outages and overtime	Anticipated failures avoided in regular business hours	Reduced maintenance opex
	$		LV transformer fuse repair (overload)	Changes in demand lead to asset overload	Condition identified and rectified prior to overload	Reduced field labour costs
	$$$		LV equipment outages	Asset failures and overloads lead to loss of supply	Certain faults and overload conditions avoided	Reduced VCR
			Community, Staff and Customer Safety			
	$		LV parallel operation	Line thought dead actually energized	Condition identified and rectified	Reduced insurance and claims costs
X	$$	X	HV fuse breakdown (candling)	Corrosion of release mechanism leads to melting	Condition identified and rectified	Reduced insurance and claims costs
X	$		Unregistered generator detection (safety)	Line thought dead actually energized	Condition identified and rectified	Reduced insurance and claims costs
X	$	X	Customer installation safety (neutral integrity)	Impaired earth path leads to step (shock) potential	Condition identified and rectified	Reduced insurance and claims costs
			LV Reliability			
	$		HV outage location	Outage trips nearest protection device, fault search ensues	LV outage detection used to pin-point HV and LV outages	Reduced field labour costs and SAIDI
	$		LV outage complaint management	LV outages called in by customer to contact centre	LV outages automatically tracked and reported	Reduced contact cente costs
	$		LV outage site visit (nested outage)	Field crew returns to restore nested outage	Nested outages detected while crew onsite	Reduced field labour costs and SAIDI
	$	X	LV outage site visit (wasted visit)	Field crew finds fault is in customer installation	Customer outage detected before crew dispatched	Reduced wasted visit costs
	$		Compliance reporting (outages)	LV outage data manually collated from various systems	LV outages automatically tracked and reported	Reduced backoffice labour costs
			LV Power Quality			
	$		LV PQ surveys / monitoring	Periodic PQ surveys, particulary at end of line	PQ automatically monitored variations reported	Avoided field labour and equipment opex
	$$		LV power quality complaints and investigation	PQ event investigated using specialist equipment	PQ data confirms PQ issue and avoids investigation	Reduced field labour costs
X	$		ID non-compliant Inverters	Non-compliant configurations operate outside of AS 4777	Smart metering detects non-compliant operation	Reduce field and contact centre costs
	$		Customer claims (over voltages and brownouts)	PQ incident claims investigated manually using various data	PQ incidents automatically tracked and reported	Reduce backoffie labour and claims costs
X	$	X	Equipment damage (brownouts)	Loss of phase can damage customer equipment	Monitoring used to disconnect load before damage occurs	Reduced claims
			Emergency Management			
X	$	X	Under frequency load shedding	Potential frequency collapse trips UFLS at feeder level	Load shed groups protect sensitive individual loads	Reduced VCR costs
	$		Energy rationing	Lack of available generation leads to potential blackouts	Energy usage rationed using main contactor and groups	Reduced VCR costs
			LV Losses			
X	$		LV technical energy losses (phase imbalance)	Phase imbalance increases heating and losses	LV active energy data used to identify imbalances	Reduced distribution loss factors
X	$		LV technical energy losses (power factor)	Poor Pf increases heating and losses	LV reactive energy data used to identify poor power factor	Reduced distribution loss factors
	$		LV non-technical energy losses (bypass)	Meter bypass reports generate investigations	Data used to identify tampering and bypass	Reduced distribution loss factors

MFS: X = Changes may be required to Minimum Functional Specification

$: $ = $0-5 per customer per year, $$ = $5-15 per customer per year, $$$ = $15-30 per customer per year

CBA: X = Included in original cost benefit assessment process

Appendix 2 – High Level Approach and Key Assumptions

Network Benefit Description	Smart Meter Impact	Impact Benefit	Key Assumptions
Investment			
Capacity			
LV planning (load flow modelling)	Accurate models improve investment performance	Reduced augmentation capex	2.5% augmentation capex improvement
Network augmentation (demand management)	Cost reflective tariffs reduce peak demand growth	Reduced augmentation capex	25% uptake * 25% response * 3 kVA coincident demand * $125 ZS and HV marginal cost
LV augmentation (power factor)	kVA tariffs and ID of poor Pf customers improve Pf	Reduced augmentation capex	5% improvement in 5-10% of LV * 3 kVA coincident demand * $100 LV marginal cost
LV augmentation (phase imbalance)	Phase balancing increases LV network capacity	Reduced augmentation capex	6% improvement in LV = 5% * 3 kVA coincident demand * $100 LV marginal cost
LV augmentation (configuration)	Optimised configuration increases LV network capacity	Reduced augmentation capex	10% increase in 25% of LV constraints in 50% of networks, e.g. urban
LV augmentation (controlled load)	Built-in capability avoids controlled load investment	Reduced secondary system capex	2.5% smaller ZS capex at $300/kVA and 3 kVA coincident demand per customer
LV Quality			
LV power quality rectification (over/under voltage)	Service data used to drive automated volt-var solution	Reduced PQ capex, DER congestion	Avoid $50K upgrade to 25% of distribution tx (older) in 10 years supprting 50 customers
LV power quality planning (impedance modelling)	Accurate models improve investment performance	Reduced PQ capex	1-5% improvement in annual power quality capex at $125 LV marginal cost
LV smart grid monitoring and control	Smart metering used to provide monitoring and control	Reduced PQ capex	$500 per DC monitor supporting 50 customers + $15 pa comms cost
Operations and Maintenance			
LV Load Surveys and Studies	LV assets are automatically monitored	Reduced field labour and equipment opex	1 FTE, 30 mins, 2 X year, 50 customers / DC * 50% urban and short rural distribution txs
Vegetation Management			
LV vegetation repairs	Anticipated failures avoided in regular business hours	Reduced maintenance opex	LV repair, 1/10 years, 3 FTEs, 2 hours, 10% caught, 50% savings, $200/hr fully loaded
LV vegetation outages	Certain faults and overload conditions avoided	Reduced VCR	2.5% improvement in vegetation outages (SAIDI)
LV Asset Failure			
LV asset condition failures, including candling	Anticipated failures avoided in regular business hours	Reduced maintenance opex	LV repair, 1/10 year, 3 FTEs, 2 hours, 15% caught, 50% savings, $200/hr fully loaded
LV transformer fuse repair (overload)	Condition identified and rectified prior to overload	Reduced field labour costs	LV fuse, 1/10 year, 1 FTE, 1 hours, 25% caught, 50% savings, $200/hr fully loaded
LV equipment outages	Certain faults and overload conditions avoided	Reduced VCR	5-10% improvement in condition outages (SAIDI)
Community, Staff and Customer Safety			
LV parallel operation	Condition identified and rectified	Reduced insurance and claims costs	Not valued
HV fuse breakdown (candling)	Condition identified and rectified	Reduced insurance and claims costs	Not valued
Unregistered generator detection (safety)	Condition identified and rectified	Reduced insurance and claims costs	Not valued
Customer installation safety (neutral integrity)	Condition identified and rectified	Reduced insurance and claims costs	Not valued
LV Reliability			
HV outage location	LV outage detection used to pin-point HV and LV outages	Reduced field labour costs and SAIDI	AEMO VCR would be used, but no improvement over existing HV monitoring assumed
LV outage complaint management	LV outages automatically tracked and reported	Reduced contact cente costs	1/15 year outage reported by 1/10 people for 5 mins
LV outage site visit (nested outage)	Nested outages detected while crew onsite	Reduced field labour costs and SAIDI	1/10 year major outage, 1/20 nested incidence, 3 FTEs, 1 hour drive, $200/hr fully loaded
LV outage site visit (wasted visit)	Customer outage detected before crew dispatched	Reduced wasted visit costs	1/20 year customer fault incidence, $75/wasted visit
Compliance reporting (outages)	LV outages automatically tracked and reported	Reduced backoffice labour costs	1 FTE for all included reporting
LV Power Quality			
LV PQ surveys / monitoring	PQ automatically monitored variations reported	Avoided field labour and equipment opex	2 FTE, 4 hours, 1/5 year, 50 customers / DC, 50% of DCs, $200/hr fully loaded
LV power quality complaints and investigation	PQ data confirms PQ issue and avoids investigation	Reduced field labour costs	0.25% investigations per annum, survey cost
ID non-compliant Inverters	Smart metering detects non-compliant operation	Reduce field and contact centre costs	2.5% of 2.5% pa uptake have illegal configs
Customer claims (over voltages and brownouts)	PQ incidents automatically tracked and reported	Reduce backoffie labour and claims costs	1 FTE for all included reporting
Equipment damage (brownouts)	Monitoring used to disconnect load before damage occurs	Reduced claims	.025% complaints per annum, $200 average damages
Emergency Management			
Under frequency load shedding	Load shed groups protect sensitive individual loads	Reduced VCR costs	Not valued
Energy rationing	Energy usage rationed using main contactor and groups	Reduced VCR costs	Not valued
LV Losses			
LV technical energy losses (phase imbalance)	LV active energy data used to identify imbalances	Reduced distribution loss factors	2.5% improvement of 5% losses, 7.5 MWh pa avg customer
LV technical energy losses (power factor)	LV reactive energy data used to identify poor power factor	Reduced distribution loss factors	2.5% improvement of 5% losses, 7.5 MWh pa avg customer
LV non-technical energy losses (bypass)	Data used to identify tampering and bypass	Reduced distribution loss factors	334 cases out of 800,000 sites (UED)

Appendix 3 – About Energeia

Energeia Pty Ltd (Energeia) based in Sydney, Australia, brings together a group of hand-picked, exceptionally qualified, high calibre individuals with demonstrated track records of success within the energy industry and energy specialist academia in Australia, America and the UK.

Energeia specialises in providing professional research, advisory and technical services in the following areas:

- Smart networks and smart metering
- Network planning and design
- Policy and regulation
- Demand management and energy efficiency
- Sustainable energy and development
- Energy product development and pricing
- Personal energy management
- Energy storage
- Electric vehicles and charging infrastructure
- Generation, including Combined Heat and Power (CHP)
- Renewables, including geothermal, wind and solar PV
- Wholesale and retail electricity markets

The quality of our work is supported by our energy-only focus, which helps ensure that our research and advice reflects a deep understanding of the issues, and is often based on first-hand experience within industry or as a practitioner of theoretical economic concepts in an energy context.

Energeia's Relevant Experience

Energeia's recent smart metering and smart grid related engagements are summarised below.

Review of a DNSP's Metering Business Cost to Serve

An Australian DNSP engaged Energeia to review their proposed metering business' cost to serve against alternative delivery models. Energeia developed a bottom-up cost to serve models for a full outsourced, in-sourced and optimal hybrid models covering the scope of metering services. This work demonstrated the DNSP's approach was substantially least cost and highlighted areas where it was not to management attention prior to submission of the proposal to the regulator.

Review of the Outlook for Competitive Metering Services

Energeia were engaged by an Australian DNSP to review the outlook for contestable metering services in each Australian state. The review looked at the key drivers of metering churn and this implications for metering competition in each state taking differences in each network's metering stock, e.g. basic, smart or interval, into account. The work identified significant market risks and opportunities, and identified a best practice new entrant, service offering and technology platform.

Development of a DNSP's Metering Asset Management Plan

Energeia was engaged by an Australian DNSP to develop an industry best practice, Rules compliant Metering Asset Management Plan (MAMP). Energeia documented the current and expected future regulatory framework for metering, engaged with leading DNSP metering businesses to benchmark the state of the art in metering asset management, and developed tailored MAMP based on the specific circumstances of the Australian DNSP.

Review of Victorian DNSPs' 2009-11 Advanced Metering Infrastructure Budgets

The Australian Energy Regulator engaged Energeia to undertake a review of Victorian Distribution Network Service Providers' (DNSPs) 2009-2011 budget proposals for Advanced Metering Infrastructure against the regulatory criteria specified in the revised Order in Council.

Review of Advanced Metering Infrastructure Enabled Load Control Performance Levels

A Victorian DNSP engaged Energeia to undertake a review of current load control enabling performance levels and to make recommendations considering the impact of updated use case benefits and communications cost information.

Review of Overseas Regulation of Smart Metering Information for Customers

An Australian jurisdictional regulator engaged Energeia to review the arrangements in place in comparable overseas jurisdictions and the experience of EnergyAustralia during their roll out of interval meters and ToU pricing to nearly 140,000 customers using between 15 MWh and 160 MWh per annum (p.a.).

Best Practice Regulation of Smart Metering

A smart metering vendor engaged Energeia to identify policy and regulatory options for improving the smart meter deployment in Victoria. The engagement included a detailed review of leading international smart metering deployments in California, Texas, Pennsylvania, Ontario and Sweden.

International Smart Meter Based Energy Retailing: Review and Recommendations

A top-tier Australian energy retailer engaged Energeia undertake a review of international deployments of smart metering and ToU based products to identify innovation and key lessons learned. The purpose of the engagement was to identify innovative products that the retailer could consider deploying across its smart meter enabled customer base.

Smart Meter Enabled Retail Product Development and Trialling

An Australian energy retailer engaged Energeia to support the design, development, justification and trialling of three innovative smart meter enabled electricity pricing plans that would save customers money, improve the retailer's margin and reduce customer churn.

Smart Meter Enabled Network Product Development and Trialling

A NSW DNSP engaged Energeia to support the design, development, justification and trialling of innovative, smart meter enabled network tariffs that could reduce network investment costs, save end user customers money and improve retailer margins. The engagement included the design of a robust sampling approach that would enable the rigorous quantitative assessment of product impacts on key performance indicators.

Review of Advanced Metering Infrastructure Related Threats and Opportunities in Australia

A top-tier Australian energy retailer engaged Energeia to undertake a review of emerging threats and opportunities in the electricity sector as it transitions to a more intelligent platform (smart grid) over the next five to ten years. The key

area of focus was the deployment of advanced metering infrastructure and related customer energy technologies, products and services.